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Project Implementation Plan

Southwestern Illinois Flood Prevention Initiative

Southwestern Illinois Flood Prevention District Council

June 13, 2011

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I. Introduction

On August 15, 2007 the Federal Emergency Management Agency announced their intention to "de-accredit" the Mississippi River levee systems protecting a 174 square mile area in three Illinois counties known as the American Bottom. The practical effect of this action would be to cripple the area economically and put an enormous financial burden on businesses and residents in this area. The threat of this action by FEMA prompted a chain of events that is without precedent in the area. The end result is a cooperative regional effort to improve flood protection and secure FEMA accreditation for the levee system protecting the American Bottom from flooding.

The American Bottom is an area of incalculable economic value and historical significance. It is home to some 155,000 residents. Businesses in the area employ upwards of 55,000 people. Some of the nation's most prestigious companies have major manufacturing facilities having national significance in the area. The region's leadership recognized that extraordinary measures were necessary to protect this economic asset and the homes and livelihoods of a large portion of the region's population. A new revenue source was created in 2008 and a regional organization was formed to carry out an ambitious plan to maintain a level of flood protection that has been in place for some 70 years. That plan is now taking shape.

The purpose of this report is to outline the basic components of the design, cost estimate, schedule, and financial plan for the project to improve the region's flood protection system. This implementation plan is a work in progress, based on a large volume of data and extensive analysis, but it is necessarily based on certain assumptions about conditions that may be beyond the control of the project designers and area leadership. Nonetheless, this report will establish a baseline plan that will be updated in the future as better information becomes available or conditions change.

Having a plan in place, even one that may be subject to adjustment from time to time, is an essential ingredient in helping businesses and citizens prepare for the future, to restore investor confidence in the area, and to assure taxpayers that their money is being spent effectively.

II. Background

A system of 74 miles of mainline levees protects an area called the American Bottom in Southwestern Illinois from flooding by the Mississippi River. The American Bottom is an area of 174 square miles that is home to 156,000 people and 55,000 jobs. The levee system was authorized by Congress and designed and built by the U.S. Army Corps of Engineers to provide protection from a 500-year flood event on the Mississippi River. The American Bottom has not been flooded by the Mississippi River in the 70 years since the flood protection system was initially built, including during the flood of record in 1993, a 300-year event.

Mississippi River flood protection consists of five "federal" levees (see Figure 1), i.e. levees designed and built by the federal government and whose owners participate in the Corps of Engineers Public Law 84-99 emergency assistance program. The construction of the following five (5) levees was authorized in federal law:

- ***Wood River levee***, operated and maintained by the Wood River Drainage and Levee District. Construction was authorized under Section 4 of the Flood Control Act of 1938, Pub. L. 75-761, with subsequent improvement was authorized under Section 1001(20) of the Water Resources Development Act of 2007, Pub. L. 110-114 ("WRDA 2007")

- ***Chain of Rocks canal, levee, and locks***, operated and maintained by the Corps. Construction was authorized under the River & Harbors Act of 1945, Pub. L. 79-114

- ***East St. Louis levee***, operated and maintained by the Metro East Sanitary District. Construction was authorized by the Flood Control Act of 1936, Pub. Law 74-738, as modified by the Flood Control Act of 1965, Pub. L. 89-298, and the Water Resources Development Act of 1976, Pub. L. 94-587. Subsequent improvement was authorized under the Energy and Water Development Appropriations Act of 1988, Pub. L. 100-202

- ***Prairie Du Pont levee***, operated and maintained by the Prairie Du Pont Levee and Sanitary District. Construction was authorized under the Federal Flood Control Act of 1936. Subsequent improvement was authorized under Section 102(8) of the Water Resources Development Act of 2000, Pub. L. 106-541 ("WRDA 2000") and Section 5070 of the WRDA 2007

- **Fish Lake levee**, operated and maintained by the Fish Lake Drainage and Levee District. Construction was authorized by the Flood Control Act of 1954. Subsequent improvement was authorized under Section 102(8) of WRDA 2000 and Section 5070 of WRDA 2007

The Metro-East Sanitary District (formerly the East Side Levee and Sanitary District, originally formed in 1910) is authorized by the Metro-East Sanitary District Act of 1974, 70 ILCS 2905/. The Wood River and Fish Lake districts were authorized by the Illinois Drainage Code, 70 ILCS 605/. The Prairie DuPont district was authorized by the Sanitary District Act of 1907, 70 ILCS 2205/. The levee districts own and have primary responsibility for maintaining the levee systems (with the exception of the Chain of Rocks levee, which is owned and maintained by the Corps of Engineers).

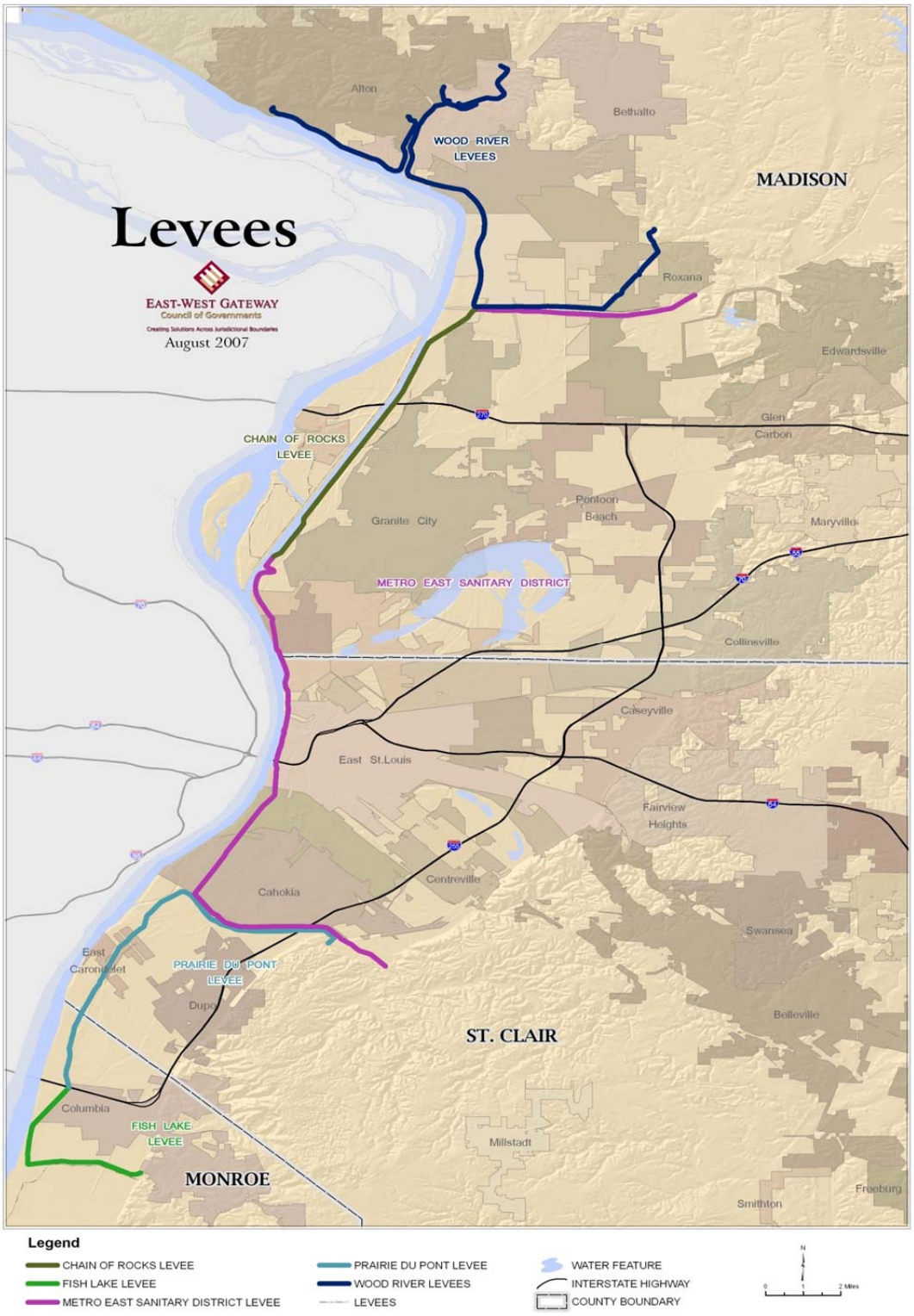


Figure 1 - Levee Systems

The Southwestern Illinois Flood Prevention District Council was formed in 2009 through and Intergovernmental Agreement between the Flood Prevention Districts of Madison, St. Clair and Monroe counties as authorized by the Illinois Flood Prevention District Act of 2008, 70 ILCS 750/. The primary responsibility of the FPD Council is to plan, finance, design and build capital improvements to the levee system. The Council's principal goal is to assure accreditation by FEMA in accordance with criteria described in 44 CFR 65.10 – Mapping of Areas Protected by Levee Systems.

In 2007, the Corps indicated that the agency had "reduced confidence" that the levee system could protect against a flood that has a 1% chance of being equaled or exceeded in any single year (commonly referred to as a 100-year flood or a base flood) without floodfighting. FEMA's announced decision to deaccredit the levee systems in our area, which is the industrial core of the St. Louis region, was based on this assertion by the Corps.

The region's leadership does not agree with the decision by FEMA to deaccredit the levee system. A number of area governments, businesses and citizens have joined to file a lawsuit challenging this decision based, in part, on the lack of any documentation of levee system deficiencies. However, given the significant economic consequences of FEMA's decision, should it stand, area leaders are moving aggressively to make improvements to the levee systems to assure that it will meet all applicable current standards.

While the levee systems in this area were built by the Corps generally in the 1940s and 1950s using design standards in place at the time for 500-year protection, the current "design deficiencies" are measured relative to current engineering standards, so the issue is not a failure of adequate maintenance by local levee districts, or any dramatic change in the condition of the levees, but primarily a change in engineering standards and in the procedures for measuring risk. The levee systems have consistently been determined to be in *acceptable* or *marginally acceptable* condition by annual and more thorough 3-year periodic inspections by the Corps.

According to its own preliminary evaluations and cost estimates the Corps suggests that it could potentially cost $500 million or more in today's dollars to maintain the authorized (500-year) level of flood protection. Further, the schedule to make these investments would essentially be open-ended, because the federal funding is not yet available. Making assumptions consistent with typical levels of federal appropriations, the project would take forty years or more complete. While the federal government could pay as much as 65% of the cost, it could take decades for those funds to be authorized and appropriated, so there would be significant uncertainty about the cost and schedule of the project.

Because of the uncertainty of federal funding and the complexity and time consuming nature of the USACE project development process, levee improvements will be primarily locally funded. The three affected counties have imposed a ¼% sales tax to pay for the restoration of the levee system and formed a new organization, the Southwestern Illinois Flood Prevention District Council to carry out the levee improvement project. The tax has been collected since January 2009 and produces about $11 million annually.

In July, 2009 FEMA issued Preliminary Flood Insurance Rate Maps for the areas protected by the Metro-East levees. Appeals of those maps were submitted by a variety of local governments during the 90-day period provided by law; all of those appeals (some were described as protests by FEMA) were denied in September, 2010.

The FPD Council has been up and running since July, 2009. Since that time, the organization has completed a comprehensive inspection of the levee system, performed an economic analysis of the costs of mandatory flood insurance, provided support to local governments to appeal preliminary flood insurance rate maps, conducted a design competition to determine the most cost-effective approach to assuring compliance with FEMA standards for levee system accreditation, and sold $94 million in bonds to pay for levee improvements. The Council's general goals have been to:

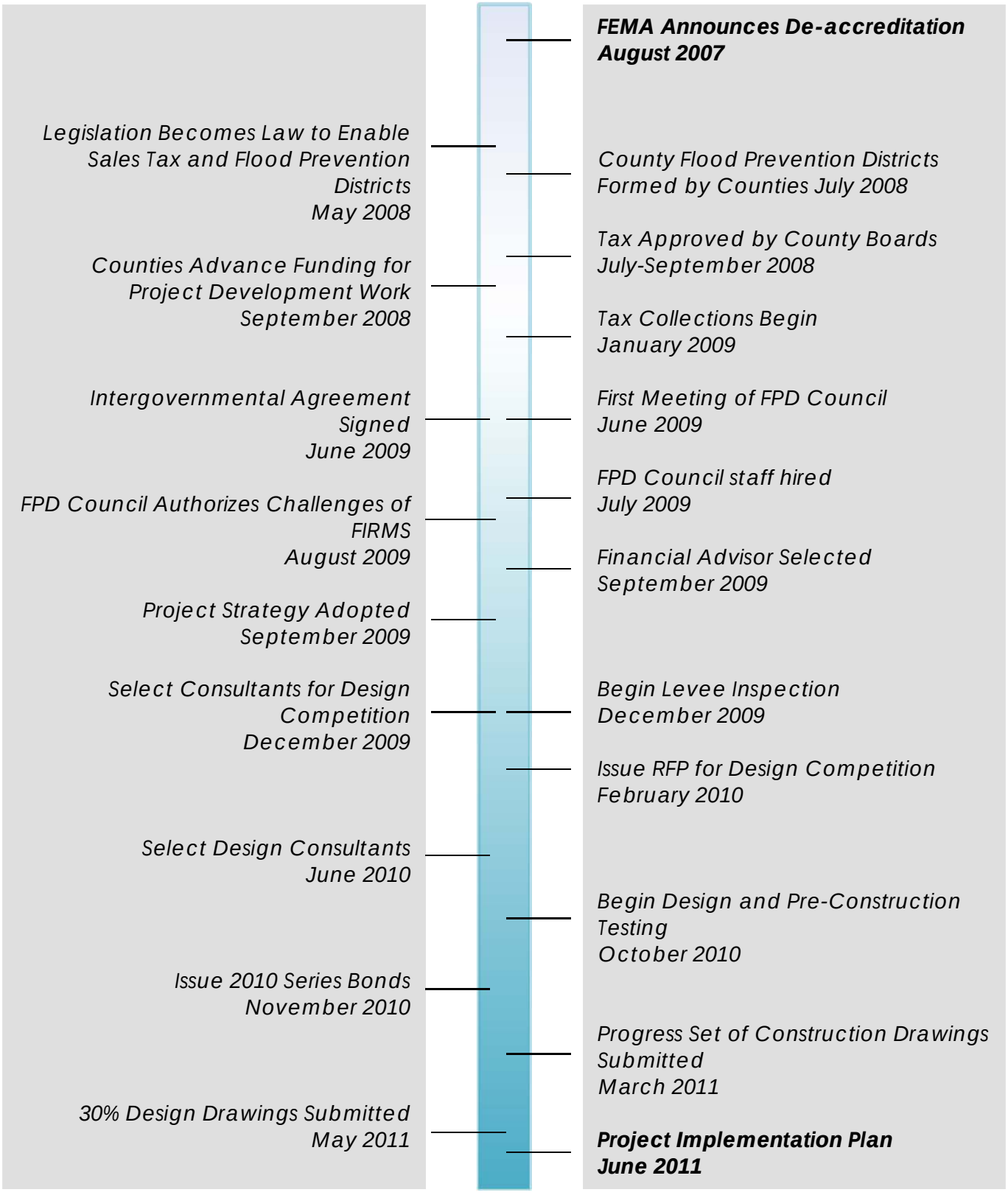
- assure compliance with FEMA accreditation standards with currently available revenue sources in five years or less; and

- minimize economic and financial hardship should the levee systems be de-accredited by FEMA

Notwithstanding the Council's strong disagreements with FEMA's decision to deaccredit the Metro-East levees and the agency's continuing efforts to overturn that decision, every effort is being made to remove all doubt about compliance with FEMA accreditation criteria. In October 2010, the Council engaged a team of engineering consultants led by AMEC Earth & Environmental to design and manage construction of improvements to the levee system. In early May, 2011 the Council received the 30% design and cost estimate submittal from the consulting team. This submittal was the culmination of about 7 months of effort involving substantial subsurface testing and analysis, discussions and review sessions with all affected parties including the levee districts and the Corps of Engineers, a careful review of many design alternatives and a value engineering review.

Three principal elements of the project development process have now come together: the design and cost estimate as part of the 30% design submittal, and the financial plan completed in June 2011. It is now possible to construct a project schedule. Together, these components will comprise an implementation plan for the project.

Figure 2
Project Timeline



III. Preliminary Project Design

The goal of the project design is to achieve improvements to the flood protection system that, once constructed, will fully address the requirements of 44 CFR 65.10, the criteria that determine the eligibility for FEMA to accredit the system and designate the American Bottom as protected from flooding. These FEMA certification criteria address the following elements:

- Freeboard – the levee height above flood level used to compensate for uncertainty of modeling that could lead to flood heights higher than calculated.
- Closures – structures that close gaps in levees or floodwalls typically used to gain access to the river side of those structures.
- Embankment Protection – levee embankments must not be subject to significant erosion during a flood event.
- Embankment and Foundation Stability – seepage either under or through levees must not jeopardize the structural stability of the embankment.
- Settlement – freeboard must not be lost as a result of levee settlement.
- Interior Drainage – drainage provisions for areas behind levee systems must be documented for recognition on flood insurance maps.

Other requirements must be addressed as a part of the accreditation process, such as operating and maintenance plans, but these will be addressed later in the design process.

Based on a thorough levee inspection completed in November 2010, AMEC concluded that the major areas to be addressed by the design would be underseepage and through-seepage. The design process included the following analytical elements (see Appendix A – *30% Design Memorandum and Deliverables* for details):

- Geotechnical Analyses – an investigation of subsurface conditions and materials based on hundreds of borings and other tests and modeling of outcomes in high water events.
- Environmental Assessments – limited investigations to determine the extent of any environmental concerns.
- Natural Resource Assessments (wetlands) - preliminary determination of affected wetland areas.
- Cultural Resource Assessments – an investigation to make a preliminary determination whether the project will affect structures or sites that have historical or cultural significance.
- Interior Drainage Hydraulic and Hydrological (H&H) Analyses – using historic data and modeling to determine peak flows, runoff volumes and water elevations in the areas behind the levee systems
- Civil Engineering Analysis and Design – development of designs to address the conditions identified in the foregoing investigations and analyses.

The preliminary design was submitted to the Council as a two-step process. A “progress set” of construction drawings was submitted in March 2011. This submittal was the subject of numerous reviews by the Corps of Engineers, the affected levee districts, and Council staff. In addition, the Council conducted a value engineering review using an independent group of engineering professionals and Corps staff. AMEC used the input from the various reviews and discussions,

together with additional analysis, to refine the design with the principal goal of improving cost-effectiveness. AMEC then submitted the final set of 30% design drawings, a design memorandum, and cost estimate in May 2011. The preliminary design described in those documents is summarized herein.

The design is driven primarily by the need to control underseepage and through-seepage. While it includes detailed site-specific proposals along the entire length of the levee systems, the overall project design is made up of several principal elements that are repeated throughout the proposal and together account for nearly all of the costs of the project. The selection of underseepage solution was driven by the analysis of site-specific subsurface conditions and made through a decision process illustrated in Figure 3.

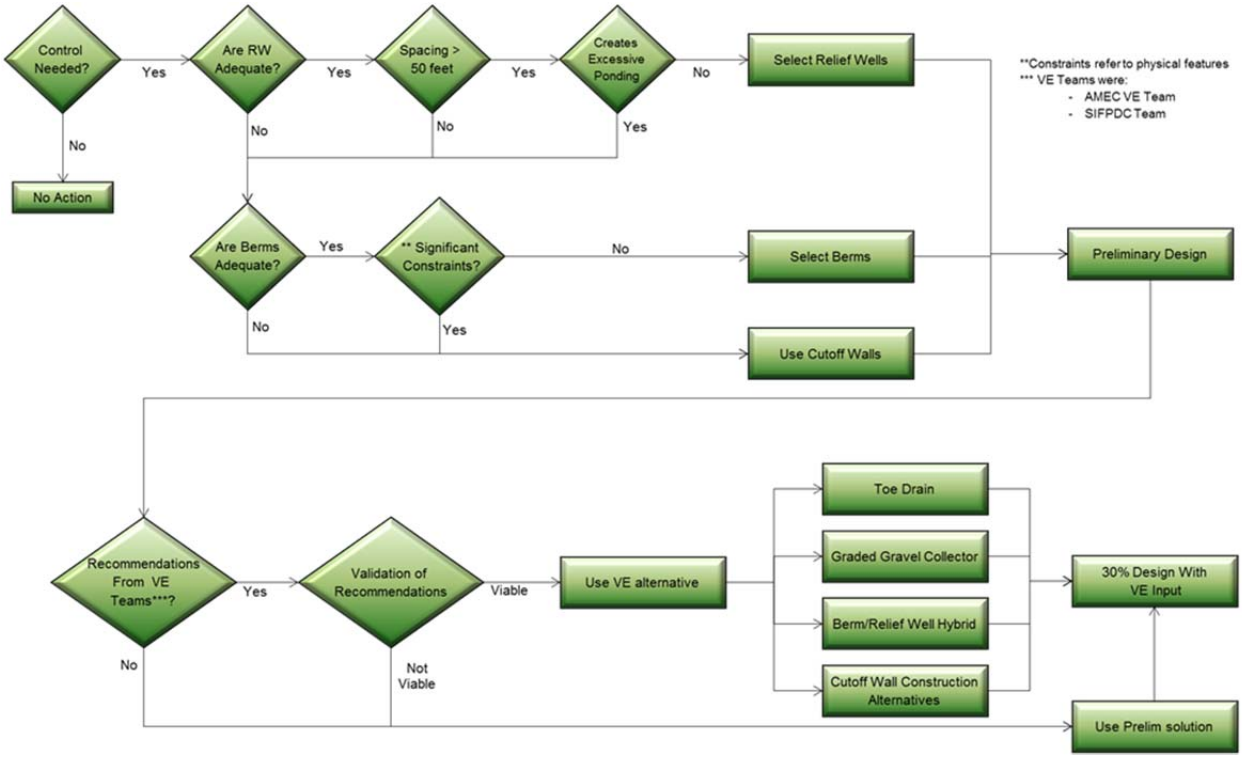


Figure 3
Underseepage Control Decision Process

Source: AMEC Earth & Environmental

These principal design elements are described below, with Figures 4-6 showing the essential design features proposed in each levee district followed by schematic drawings of the design of each of these features in Figures 4-9:

- Seepage Berms – A seepage berm (see Figure 7) is located along the protected side of the levee and constructed of pervious material like sand to provide weighted mass to resist the uplifting seepage forces during periods of high water elevation. With pervious material in the seepage berm, ground water is allowed to seep in a controlled manner from under the levee, thereby lowering the uplift pressure without eroding the levee foundation. Berms are sized to optimally offset the calculated uplift pressure during a high water event. The advantages of berms include low maintenance and relatively low construction cost. Disadvantages are the need for and cost of land to accommodate the berm. In many cases berms are not practical because high-value development adjacent to the levee makes acquiring the needed property impractical or too costly.

- Relief Wells – A relief well (see Figures 8 and 9) is a deep well located on the protected side of the levee, typically ranging in diameter between 8 and 12 inches extending at least halfway through the layer of pervious soil (known as the aquifer) under the levee. The relief well relieves uplift pressure by intercepting and providing a controlled outlet for seepage that would otherwise emerge uncontrolled on the land side of the levee, perhaps carrying soil and eroding the levee's foundation. The diameter and spacing of relief wells are determined based on the site-specific analysis of uplift water pressure during a high-water river event. The principal advantage of relief wells is the limited land area required. The primary disadvantage is the need to accommodate the outflow of the wells, usually by ponding, or by a system to collect discharge water and pump it back into the river. Discharge can take place in a trench or at the surface (D-type wells) or into a buried collection pipe (T-type wells). Relief wells also require periodic maintenance to preserve their efficiency over time. There are many existing relief wells throughout the levee system already. Where feasible, existing wells will be re-used and/or rehabilitated.

- Graded Filters – A trench on the landside toe of the levee (see Figures 13-14) can be used to control the flow of underseepage when it is lined with appropriate layers of pervious material to prevent the movement of soil from under the levee. Similar in concept to a relief well, the graded filter trench is a cost-effective means of providing a controlled outlet for underseepage without eroding the foundation of the levee. Low construction cost, limited maintenance and small land requirements are the principal advantages of this underseepage control measure. The disadvantage is the need to accommodate the water discharged from the trench. In some cases additional pump station capacity is required to effectively dispose of discharge.

- Cutoff Walls – Unlike the previously described measures, cutoff walls (see Figures 10-11) are generally not designed to control underseepage but to virtually eliminate it. A cutoff wall is an impervious wall constructed by excavating a trench through pervious materials under the levee and backfilling with various mixtures of soil and bentonite (a type of clay that expands when wet) slurry, cement and bentonite slurry, or concrete. The cutoff wall can be constructed as deep as bedrock, or can be shallow in cases where there is an impervious clay layer underlying the aquifer. Cutoff walls must also be extended in length to reduce the

likelihood of "end-effects" i.e. underseepage being diverted around the ends of the wall. Because of the high cost, cutoff walls are only used in situations where the uplift pressures are so great that no other less costly control method is practical or where protected landside constraints, like encroaching development, prohibit the use of other seepage control solutions. Advantages of cutoff walls include the lack of any need for maintenance and the absence of any discharge on the land side of the levee. The disadvantages include the extremely high cost, and difficult and sometimes risky construction process.

- Clay Caps – In cases where through-seepage (seepage through the levee embankment during periods of high water) is a potential problem, a layer of impervious clay is placed on the riverside face of the levee (see Figure 10). If there is insufficient room to place the clay on the levee because of encroachment of development, parts of the existing levee are excavated and replaced with clay.

Constructing the principal design elements described above will require related supporting investments to expand or improve pump stations to provide sufficient capacity to dispose of added discharge from relief wells or trenches. Other miscellaneous construction elements will also to implement the overall plan.

The Wood River levee system, shown in Figure 4, is made up of three independent levees: Upper, Lower and the East Fork. The East Fork does not require any improvements. A portion of the Upper Wood River levee in the vicinity of the Mel Price Lock and Dam has deficiencies relating to uncontrolled underseepage that are a direct result of changes in the river elevation caused by Corps construction of the Lock and Dam. The Corps has accepted full responsibility for providing necessary underseepage controls, and in the short term for implementing interim measures to meet FEMA accreditation requirements.

The full range of underseepage controls is proposed in the Wood River system, including berms, relief wells, shallow and deep cutoff walls and graded filters. The most prominent and costly feature of the proposed design is a deep cutoff wall at the "elbow" formed by the intersection of the Mississippi River and Wood River that separates the Upper and Lower Wood River levees. This deep cutoff wall, constructed on the riverside toe of the levee, would extend to bedrock and comprises 633,000 square feet of wall, estimated to cost upwards of $26.3 million. A series of alternatives were closely examined, but a variety of physical and environmental conditions made other options ineffective, impractical, or even more costly. A total of 65 new relief wells are planned along with the placement of 209,000 cubic yards of material for berms. Substantial use of graded filters is planned to reduce the number of more costly underseepage controls. About 28 acres of wetlands will need to be replaced as a result of the project.

The Metro-East Sanitary District maintains the East St. Louis levee, a continuous mainline levee extending from north of Granite City to Dupo on the south with flank levees along drainage canals on the north and south. A portion of the continuous levee along the Chain of Rocks canal is owned and operated by the Corps of Engineers, so no improvements are planned. The Corps has already implemented sufficient improvements on the Chain of Rocks levee to comply with FEMA accreditation requirements.

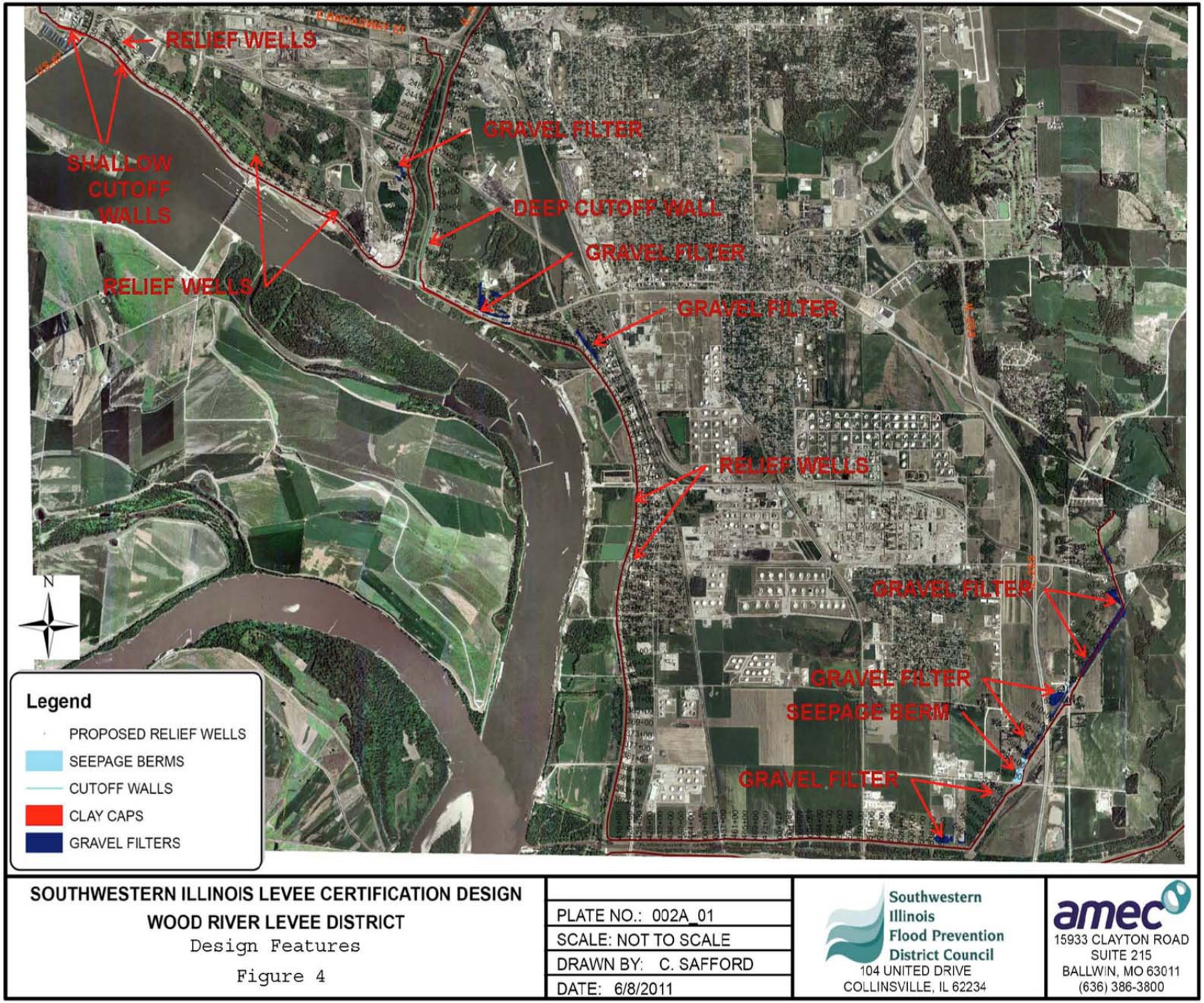
As in Wood River, the most prominent and costly feature is a deep cutoff wall where the Mississippi River is intersected by Prairie DuPont Creek at the south flank levee. This is an area where development is close to the levee and physical conditions and existing structures leave little opportunity for berms. The cutoff wall would be about 324,000 square feet and cost about $13.5 million. There is are substantial utility relocations (natural gas pipelines) relating to this cutoff wall, which will cost almost $6 million. 60 new relief wells are planned, as well as the rehabilitation of another 42 wells. Nearly 89,000 cubic yards of material will be placed for seepage berms and an additional 184,000 cubic yards for clay caps to address through-seepage issues. There is a chance that hazardous or toxic materials could be encountered while constructing the improvements in the MESD area. Consequently, the design and cost-estimate address that potential. About 58 acres of wetlands will be purchased to compensate for wetland areas affected by levee improvements in the MESD area.

The Prairie DuPont Levee and Sanitary District and Fish Lake Drainage and Levee District are independent districts that together operate and maintain a continuous mainline levee as well as flank levees. Much of the area protected by these levees is relatively undeveloped as compared to MESD and Wood River, which simplifies the designs for underseepage controls by permitting more extensive use of seepage berms. On the other hand, this area is one where the possibility of cultural impacts is more likely, and more study will be necessary before plans can be finalized and permitted.

Improvements proposed for the PdP/FL levee districts are shown in Figure 6 and include seepage berms, relief wells, and clay caps. Seepage berms will involve the placement of some 285,000 cubic yards of material. The preliminary design calls for 156 new relief wells and 33 wells to be rehabilitated. Pump station improvements are contemplated to accommodate additional flow from new relief wells.

Throughout all four levee systems, deteriorated gravity drains will be replaced or lined as needed and those closure structures affected at the 100-year flood elevation will be improved as necessary. Several pump stations will be improved throughout the system to handle increased flows from relief wells, toe drains or graded filters.

The preliminary design described here should be interpreted as a work in progress. Testing and analysis is ongoing to refine the design, particularly to examine more cost-effective improvements to reach the goal of accreditation, and to reduce environmental, economic and cultural impacts.

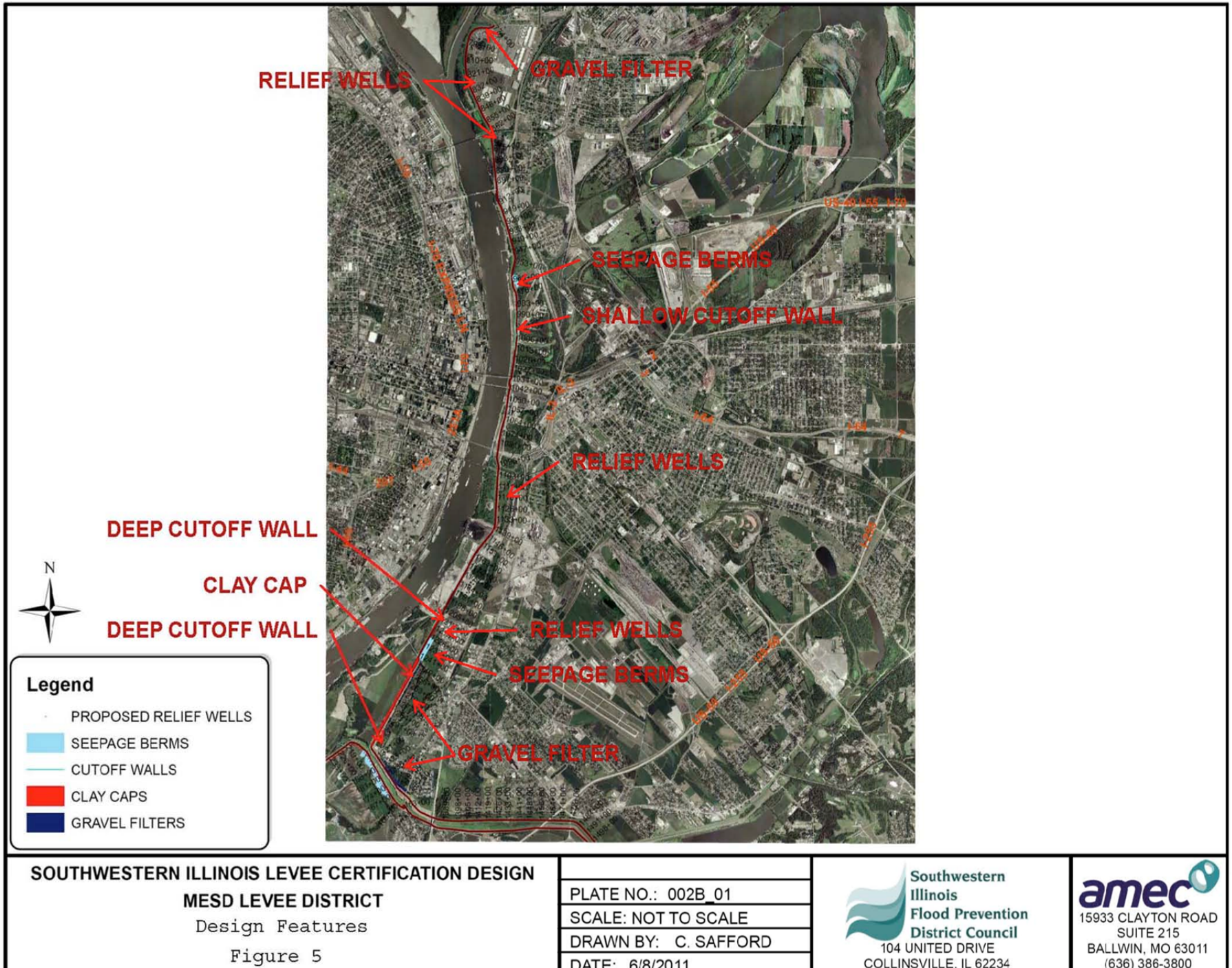


SOUTHWESTERN ILLINOIS LEVEE CERTIFICATION DESIGN
WOOD RIVER LEVEE DISTRICT
Design Features
Figure 4

PLATE NO.: 002A_01
SCALE: NOT TO SCALE
DRAWN BY: C. SAFFORD
DATE: 6/8/2011

Southwestern Illinois Flood Prevention District Council
104 UNITED DRIVE
COLLINSVILLE, IL 62234

amec
15933 CLAYTON ROAD
SUITE 215
BALLWIN, MO 63011
(636) 386-3800



SOUTHWESTERN ILLINOIS LEVEE CERTIFICATION DESIGN
MESD LEVEE DISTRICT
Design Features
Figure 5

PLATE NO.: 002B_01
SCALE: NOT TO SCALE
DRAWN BY: C. SAFFORD
DATE: 6/8/2011

Southwestern Illinois Flood Prevention District Council
104 UNITED DRIVE
COLLINSVILLE, IL 62234

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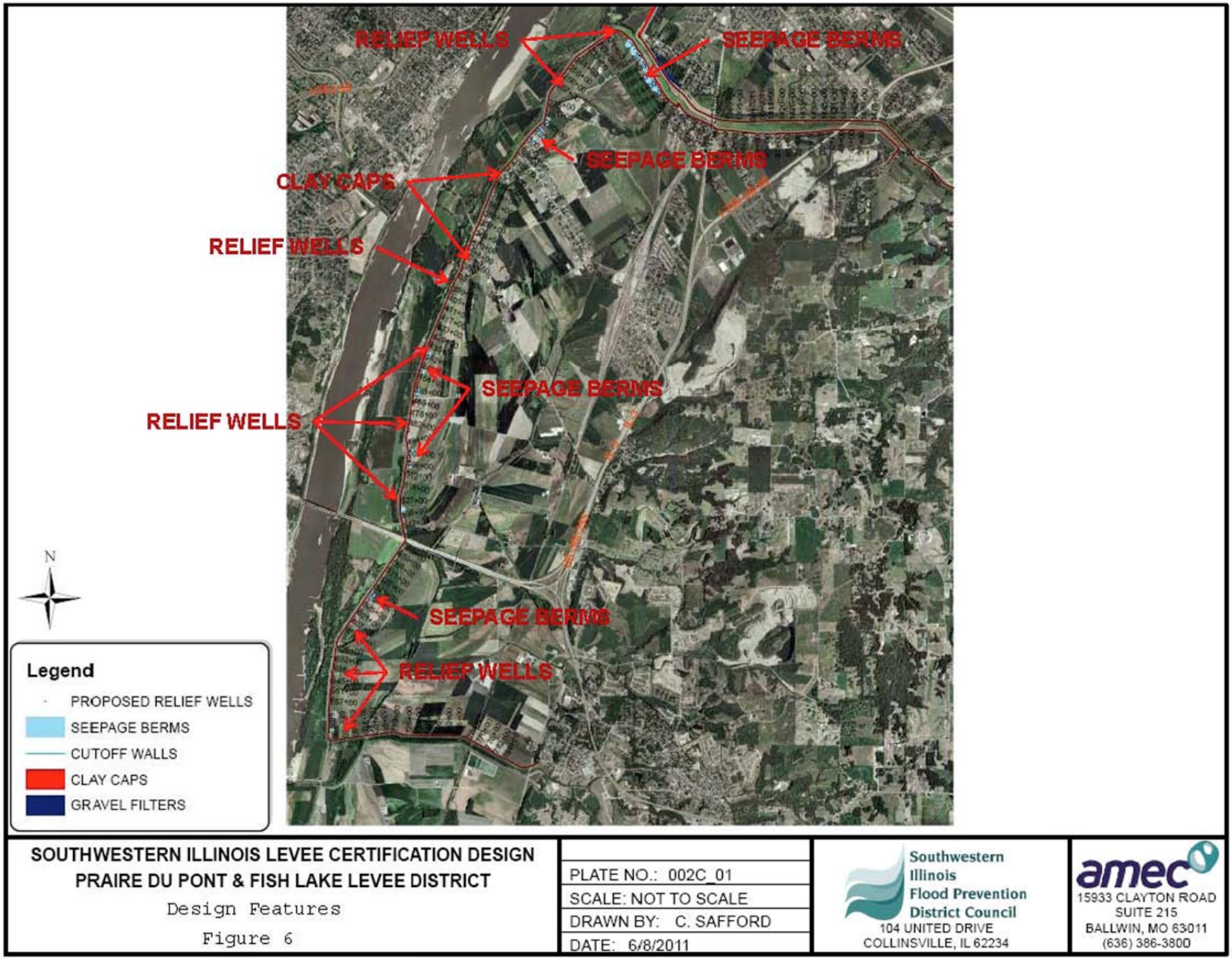

SOUTHWESTERN ILLINOIS LEVEE CERTIFICATION DESIGN
PRAIRE DU PONT & FISH LAKE LEVEE DISTRICT
Design Features
Figure 6

PLATE NO.: 002C_01
SCALE: NOT TO SCALE
DRAWN BY: C. SAFFORD
DATE: 6/8/2011

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104 UNITED DRIVE
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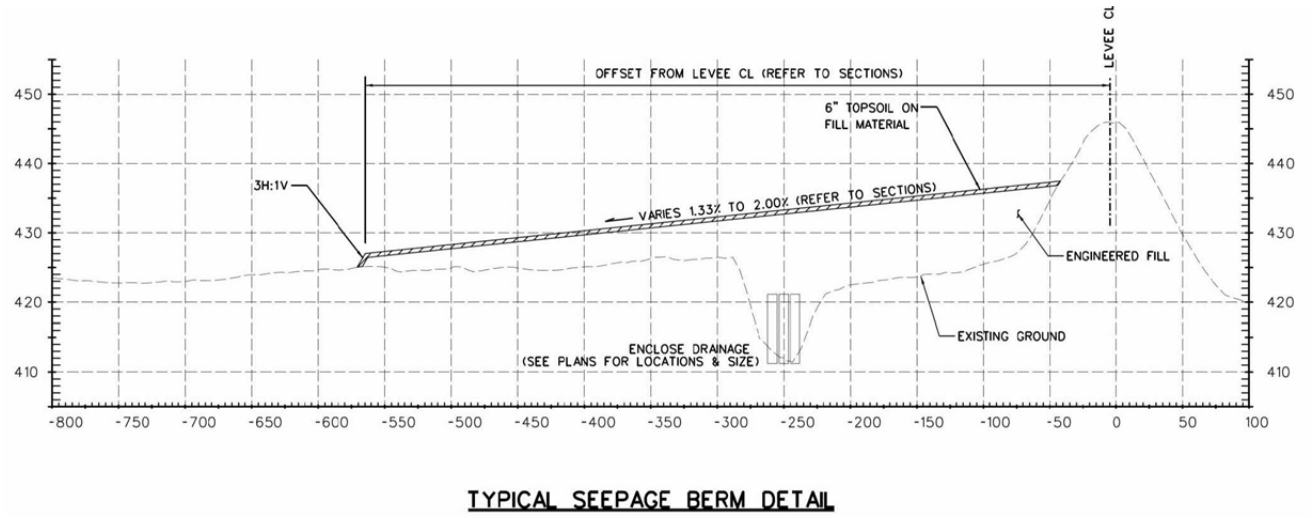


Figure 7

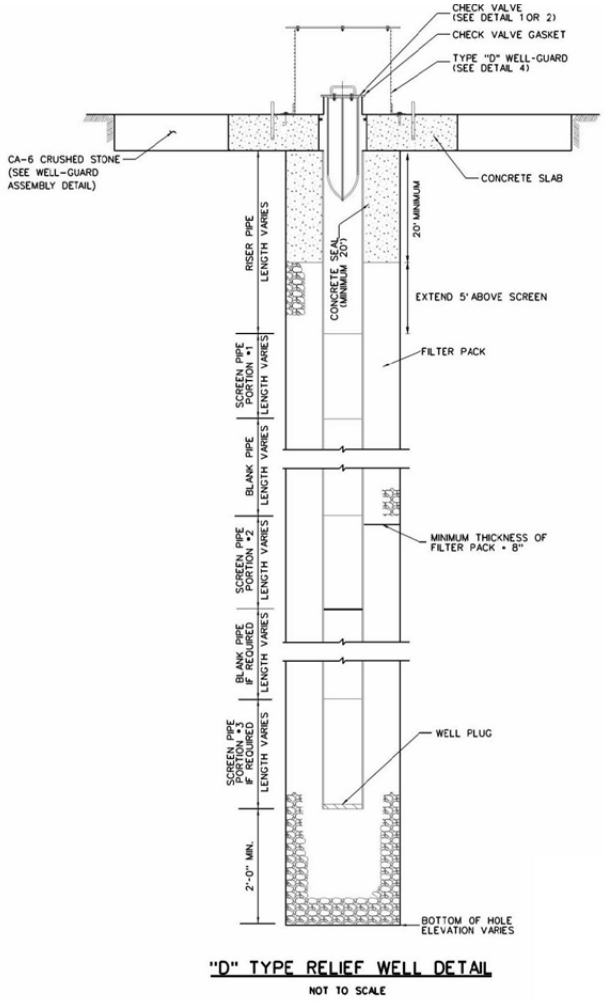


Figure 8

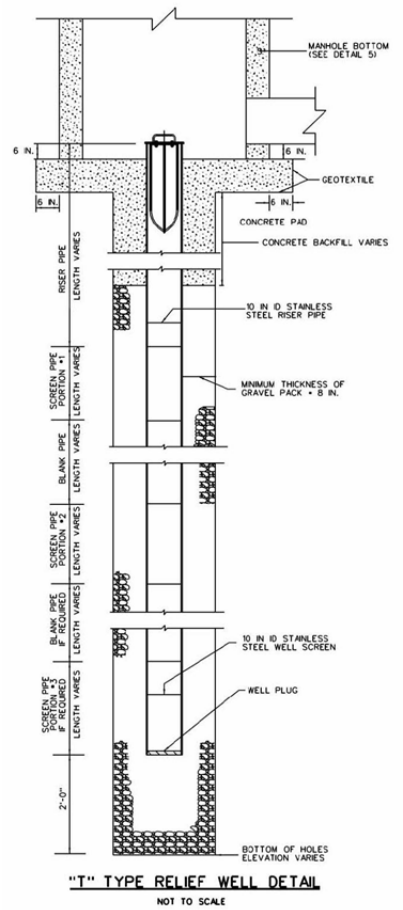
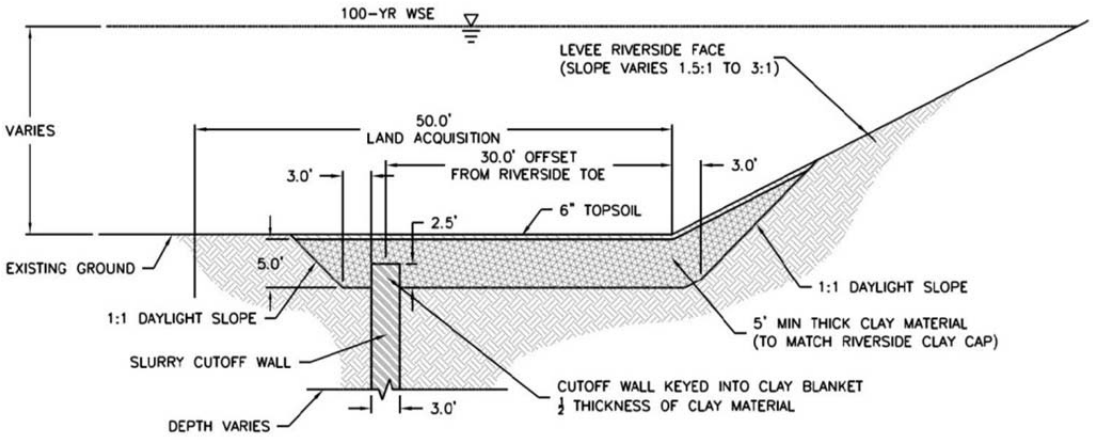
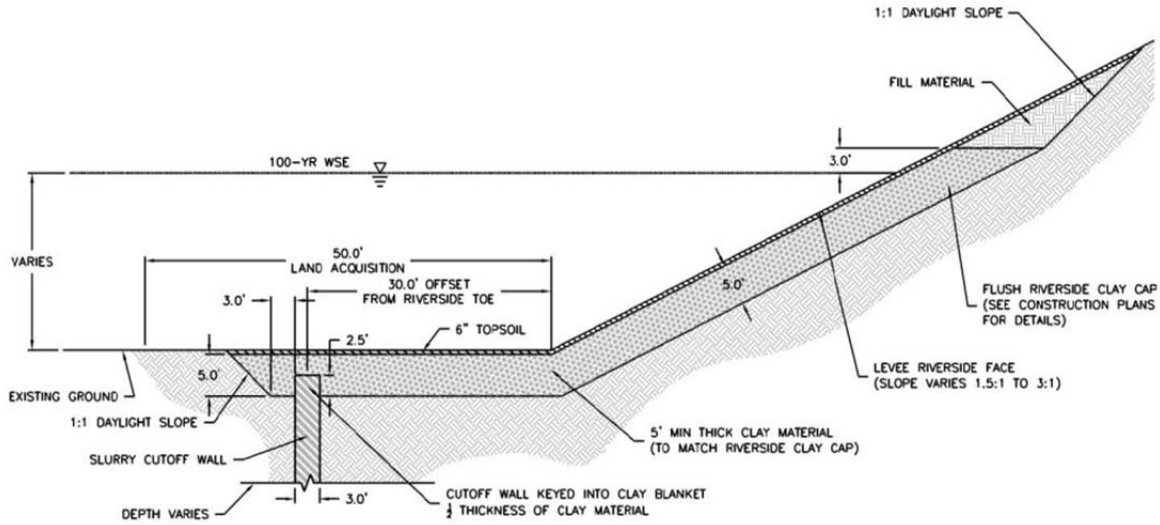


Figure 9



DETAIL 1 - SLURRY CUTOFF WALL WITH FLUSH CLAY BLANKET (NO RIVERSIDE CLAY BLANKET REQUIRED)

Figure 10



DETAIL 3 - SLURRY CUTOFF WALL IN COMBINATION WITH A FLUSH RIVERSIDE CLAY BLANKET

Figure 11

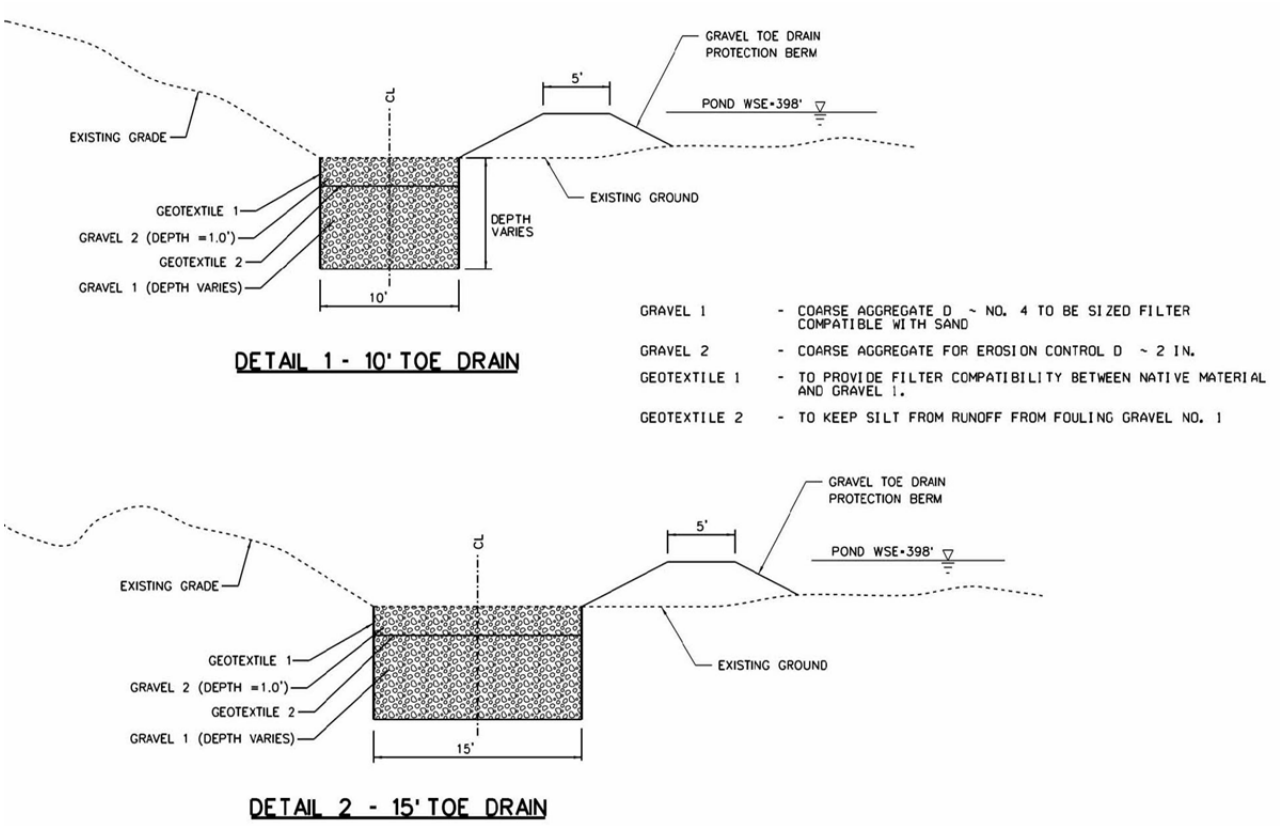


Figure 12
Toe Drain Details

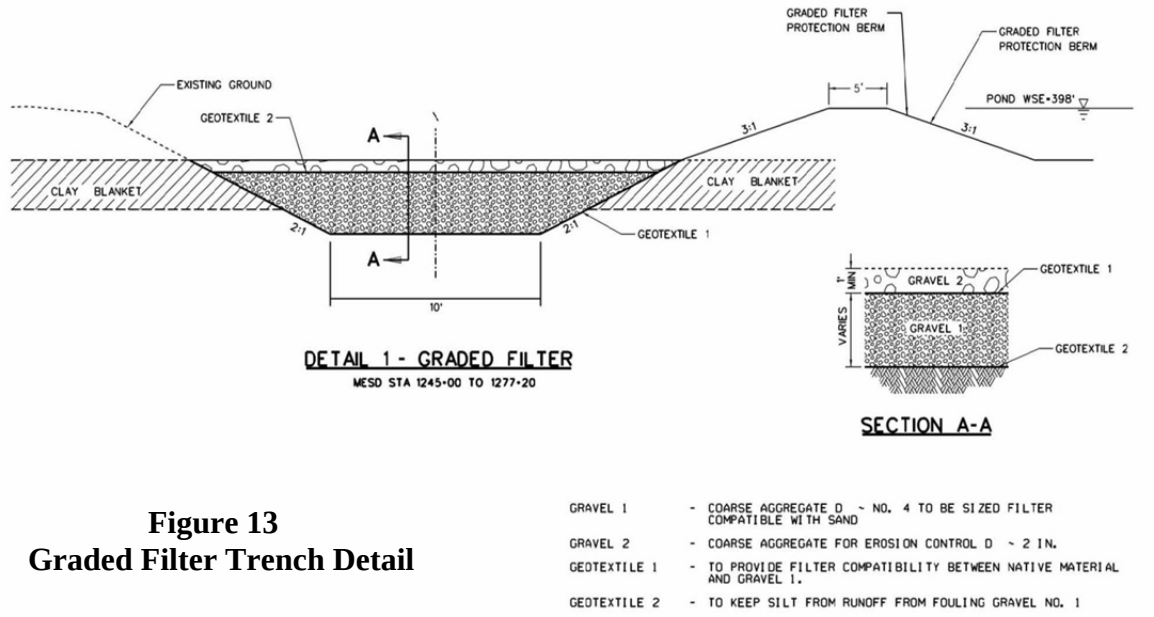


Figure 13
Graded Filter Trench Detail

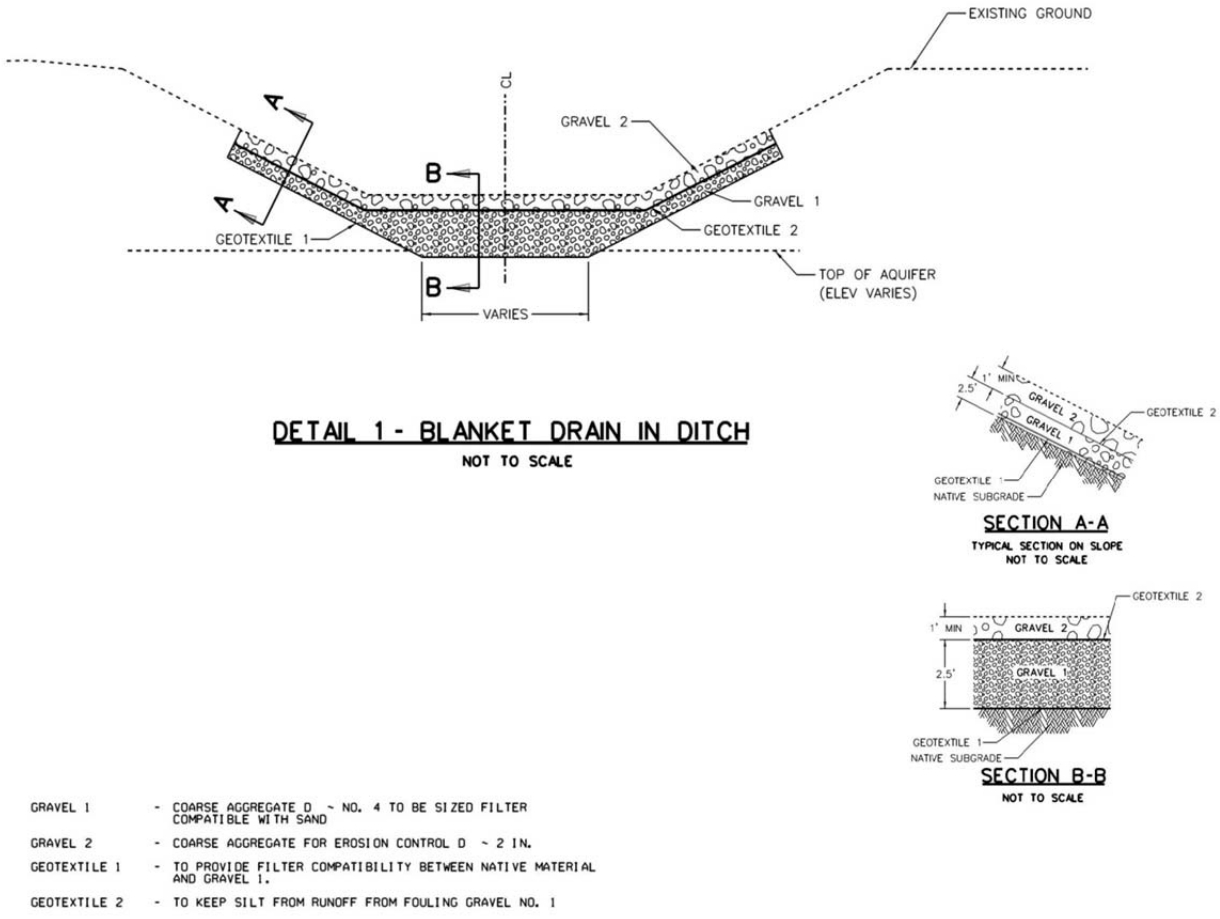


Figure 14
Blanket Drain in Ditch Detail

IV. Cost Estimate

As part of the 30% design submittal AMEC provided a construction cost estimate. At this stage of the design process, there is some uncertainty in the estimate. Construction quantities will change as the design becomes more complete and unit costs will become more predictable as the time of construction approaches. Even given those uncertainties, a cost estimate is useful at this stage of project development both to validate the overall budget for the project and to compare the cost-effectiveness of alternative design solutions. The cost estimate is also essential to support a financing strategy and schedule for the project.

Recognizing the uncertainty of a 30% design cost estimate, a contingency amount is added to the calculated cost of each construction component (see Table 2). The cost of some construction items may be more or less predictable, so AMEC used different contingency amounts to reflect this variability. AMEC also calculated an "escalated" estimate to reflect inflation over a four year construction period. There are schedule risks that could also add costs. Those could include delays caused by natural events such as high water or weather, or delays by state and federal agencies in securing permits.

In addition to actual construction costs, there are other project expenditures that are included in the overall cost estimate for the project. Professional services for program management, design and construction management have been estimated, along with the cost of issuance for subsequent Council debt, and the operating costs for the Council. Cost totals include amounts for design and pre-construction testing that have been previously expended from the Council's bond issue proceeds in order to preserve consistency with financial capacity estimates discussed later in this report.

Construction cost estimates are provided in summary herein (see Tables 1-2); the detailed construction cost estimate is included as Appendix C to this report.

Table 1
Project Cost Estimate Summary

	Levee System			
Type of Improvement	***Wood River***	***MESD***	***PdP/FL***	***Total***
Berms	$7,422,000	$6,650,000	$6,864,000	$20,936,000
Relief Wells	4,387,000	7,540,000	8,038,000	19,965,000
Cutoff Walls	31,328,000	27,038,000	0	58,366,000
Clay Caps	0	5,598,000	513,000	6,111,000
Civil Works	9,033,000	12,872,000	2,197,000	24,102,000
Construction Testing				5,688,000
Subtotal- Construction	$52,170,000	$59,698,000	$17,612,000	$135,168,000
Program Mgmt.				2,200,000
Design				7,799,000
Construction Mgmt.				5,183,000
Certification				325,000
Subtotal-Prof. Services				$15,507,000
Operations & Financing				$10,000,000
Total				**$160,675,000**

Notes: all costs are in year of expenditure dollars and include contingency amounts (see Table 2 for details); totals include previously expended amounts for design and construction

Table 2
Detailed Summary of Construction Costs

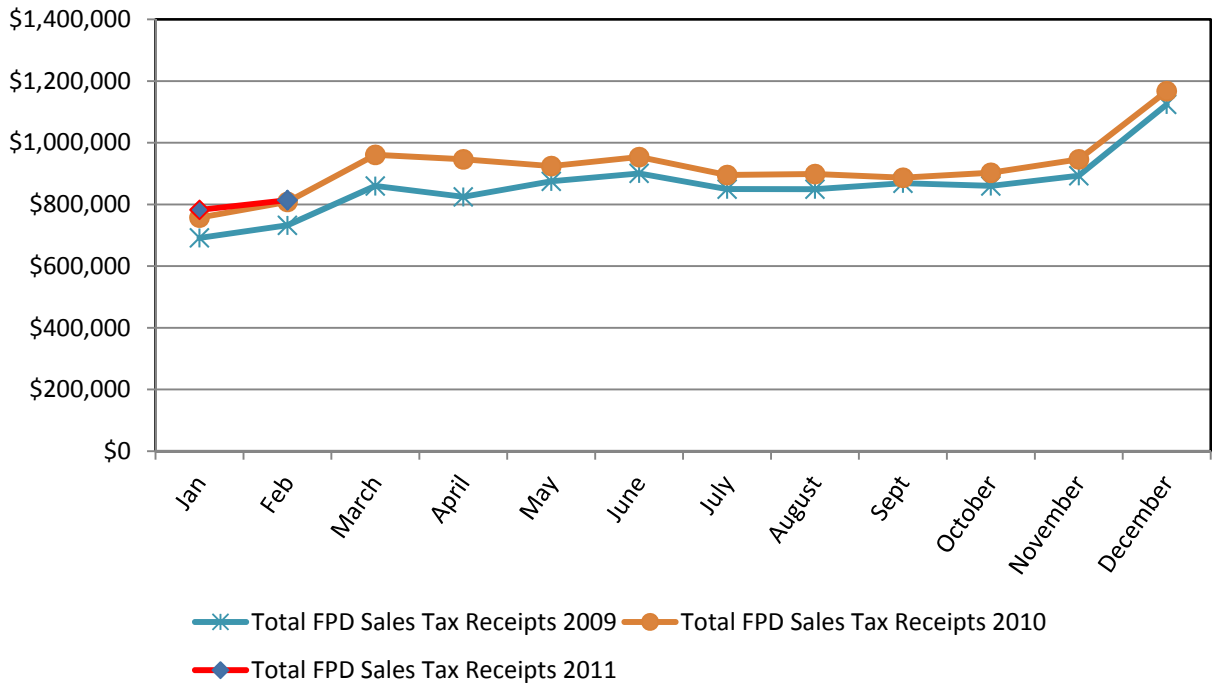
DETAILED SUMMARY - WOOD RIVER, MESD, PdP & FISH LAKE						
Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%	268,311	$ 3,863,678
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%	185	$ 1,332,072
3	Clear & Grub - Wooded	AC	$ 21,625	20%	70	$ 1,816,500
4	Cutoff Wall - Deep	SF	$ 32	30%	957,418	$ 39,828,589
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%	45,453	$ 1,527,221
6	Cutoff Wall - Shallow	SF	$ 12	30%	158,600	$ 2,474,160
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%	181,813	$ 2,399,932
8	Dewatering	LF	$ 51	20%	11,455	$ 701,046
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%	569	$ 65,549
10	Drainage - Inlet Structure	EA	$ 2,200	20%	1	$ 2,640
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%	7,200	$ 1,218,240
12	Excavation	CY	$ 11	20%	191,485	$ 2,527,603
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%	47,161	$ 1,358,237
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%	70,017	$ 2,436,592
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%	709,631	$ 1,703,114
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%	29,590	$ 426,096
17	Haul Off of Excess Material	CY	$ 6	20%	187,835	$ 1,352,413
18	Mobilization (% varies)	LS	$ 1,492,890		1	$ 1,492,890
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%	1	$ 726,600
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%	1	$ 839,400
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%	1	$ 1,019,400
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%	1	$ 1,019,400
23	Pump Station - Various Improvements	EA	$ 600,000	20%	4	$ 2,880,000
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%	1,247	$ 62,849
25	Pvmt - Improved Roadway	LF	$ 122	20%	3,522	$ 515,621
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%	8,388	$ 503,280
27	Pvmt - Road Repair	LF	$ 44	20%	15,840	$ 836,352
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%	42	$ 100,800
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%	76	$ 547,200
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%	6	$ 350,640
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%	78	$ 1,123,200
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%	24	$ 365,760
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%	3,588	$ 172,224
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%	29	$ 104,400
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%	3,548	$ 212,880
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%	3,591	$ 275,789
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%	11	$ 817,740
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%	51	$ 1,014,390
39	Relief Well - New Type "D"	EA	$ 32,500	20%	215	$ 8,385,000
40	Relief Well - New Type "T"	EA	$ 40,000	20%	67	$ 3,216,000
41	RipRap Bank Protection	CY	$ 120	20%	6,252	$ 900,288
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%	135	$ 1,053,000
43	ROW Acquisition - Commercial	AC	$ 30,000	20%	9	$ 324,000
44	ROW Acquisition - Governmental	AC	$ 25,000	20%	12	$ 360,000
45	ROW Acquisition - Industrial	AC	$ 30,000	20%	68	$ 2,448,000
46	ROW Acquisition - Residential	AC	$ 18,000	20%	1	$ 21,600
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%	79	$ 2,180,400
48	Seeding	AC	$ 1,650	20%	180	$ 356,420
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%	583,346	$ 8,400,183
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%	175	$ 23,100
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%	60	$ 8,280
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%	2,340	$ 339,768
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%	2,870	$ 454,608
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%	960	$ 158,976
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%	835	$ 167,334
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%	580	$ 139,896
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%	3,190	$ 842,160
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%	5	$ 1,800,000
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%	12,190	$ 7,314,000
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%	42	$ 504,000
61	Utility Relocation - Shield OE Power	LF	$ 50	20%	4,048	$ 242,880
62	Utility Relocation - Underground Communication	LF	$ 100	20%	8,300	$ 996,000
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%	2	$ 24,000
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%	3,805	$ 1,141,500
65	Wetland Mitigation	AC	$ 25,000	20%	112	$ 3,360,000
66	Construction Estimate					$ 125,175,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 129,480,000

V. Financial Plan

The goal of the financial plan is to produce the maximum fiscal capacity for the Council to pay for levee system improvements. There are several existing revenue sources available, or potentially available, for this purpose. The principal source of revenue is the ¼% sales tax authorized in 2008 by state statute (70 ILCS 750/) for this purpose. This tax has been collected since January 1, 2009 and is now yielding about $11 million annually (see Figure 15). Far smaller revenues are potentially available from the levee districts themselves, each of which has taxing or assessment authority and borrowing capacity under existing law. While the Corps of Engineers will not provide direct funding to the project, they may well have the fiscal capacity to build parts of the project, thereby reducing the Council's costs.

The challenge is to leverage all existing revenue sources to optimize the proceeds available for construction. In 2009, the Council retained financial advisors, Scott-Balice Strategies and ButcherMark Financial Advisors to assemble a financial plan and to structure the Council's bond issues. An initial financial plan was produced in 2010 prior to the Council's first bond issue and that plan has now been updated to reflect current market conditions, the project schedule and cost estimate.

Figure 15
Flood Prevention District Sales Tax Trends 2009-2011



The 2010 financial plan called for the Council to issue several series of sales tax revenue bonds in combination with expenditures of any excess sales tax receipts that might accumulate after payments of interest and principal on the bonds. This plan was approved by the Council and the first series of bonds was issued in November 2010 for a par amount of $94,195,000. Of that total, only $87.4

million is available to pay project costs after setting aside the remainder in a debt service reserve fund. This was a successful bond issue largely because of a favorable interest rate environment and some beneficial tax subsidies offered by the federal government as part of the American Recovery and Reinvestment Act of 2009. The Council issued Build America Bonds, Economic Recovery Zone Bonds and tax exempt bonds. Neither Build America Bond or Economic Recovery Zone Bond programs have been reauthorized so those favorable programs are no longer available for future issues.

The financial plan developed in 2010 was designed to maximize proceeds by delaying additional borrowing to correspond to the cash needs of the project, thereby reducing interest payments and taking advantage of future increases in sales tax receipts. The 2010 plan envisioned bond issues in 2012 and 2014 to complete the financing of the project. Projections made in the plan suggested that the Council could raise $166.5 using a combination of borrowing and excess sales tax funds. The Plan assumed that all flood prevention district sales tax funds collected by the three counties would be used solely to pay for the project and not used for other purposes allowable in the authorizing legislation.

At the Council's request, ButcherMark has now updated the 2010 financial plan. The 2011 plan reflects the new project cost estimate, a revised spending schedule, the loss of the favorable federal tax benefit programs, the latest sales tax receipts, and current and projected interest rate conditions. This plan now calls for small bond issues in 2013 and 2015, with a greater reliance on the use of excess sales tax receipts to pay current expenses ("pay-go").

The following assumptions (summarized in Table 3) have been built into the forecast models used in the 2011 Financial Plan Update to determine the capacity of flood prevention district sales tax revenues to meet the financial needs of the project:

1. Sales Tax Revenues – Sales tax receipts increased from 2009 into 2010. The plan uses the total calendar year deposits from 2010 ($11.047 million) as its starting point for revenue projections into the future. The model builds in a modest growth rate in those sales taxes of 3% per year over the life of the debt. Sales tax revenues are the major source of revenues for leveraging debt to pay for levee reconstruction. Prudent management and rating agency criteria only allow financial plans to leverage growth in these taxes by looking backward at the actual documented growth pattern. A sensitivity analysis (see Table 4) addresses the impact should sales tax revenues fall short of current projections.

2. Operating Expenditures – These are the funds that are budgeted to operate the Council during the planning, design, construction and post construction periods of the project. The operating budget is assumed to grow at a modest 3% per year. No sensitivity analysis was done for this assumption because this is an item that is under the control of the Council and not subject to market variability.

3. Financing Assumptions – The current schedule to spend the $87.4 million from the initial bond issue shows those monies being fully drawn down during the first quarter of 2013. The plan recommends that construction costs from April 2013 to April 2015 be paid from surplus moneys in the three county flood prevention district sales tax funds, estimated to be approximately $25.5 million

during that time, supplemented by a small subordinated[1] Council bond transaction in the first quarter of 2013 in the net amount of $8.3 million. The plan also recommends that interest earned through April 2016 on the Construction Fund and the Debt Service Reserve Fund held by the bond Trustee be used to pay project costs during this period. The estimate of surplus in the three county Sales Tax Funds is based upon a calculation made of the amounts that will flow out of the Bond Indenture from the 2010 bond transaction (i.e. funds that are not required to pay interest or principal on the bonds or Council operating costs) as excess to the counties and assumes that those monies are modestly invested by the counties and that they are not spent for any purpose other than levee reconstruction. To facilitate the orderly payment of expense the plan provides that in the future excess moneys should not flow out of the Indenture to the County Sales Tax Funds, but rather they should be retained and protected under the Bond Indenture by being placed in the Project Fund, invested and then be spent as pay as you go for levee reconstruction in accordance with the approved financial plan of the Council. This would be a credit enhancement (those monies would be available in the event of a default), simplify accounting and management of those moneys and guarantee that they would be spent on the levee reconstruction costs in accordance with the Council approved plan.

The financial plan recommends that the Council plan for a final (second) subordinated bond transaction in early 2015, that is projected to raise approximately $38.4 million in net additional bond proceeds to pay for construction costs.

Financial market conditions and project needs will change over time, which could affect the timing and amount of additional borrowing. Consequently, the two subordinated bond transactions now projected for 2013 and 2015 will most likely be sized differently as the Council approaches those dates.

4. Coverage and Rating of Subordinated Debt – The most important determinant of the net proceeds from a sales tax bond will be the coverage level selected by the issuer to achieve a "A" subordinated rating from the ratings agencies to present a strong credit to bond investors. The coverage level is the amount of revenue forecast to be received annually by the issuer in excess of the annual debt service amounts (principal and interest on the bonds). The relevant gauge of coverage is the additional bonds test (ABT), the ratio between the previous year's sales tax revenues and the maximum annual debt service on all bonds. This margin of safety or comfort is a variable in the plan and directly affects the rating on the bonds. For planning purposes ButcherMark recommends that the coverage requirement be established at the lowest possible net coverage ratio to achieve a single "A" rating, approximately 1.25, and also achieve a reasonable cost of capital in the market. This excess coverage will also be needed to provide funds to the Council to pay operating costs during construction and post-construction until the bonds are paid off. The sensitivity analysis shows the impact of varying the net coverage ratio on the leveraging capacity of the sales taxes.

[1] The initial Council bond issue of November, 2010 was a "senior" issue and legally first in line for repayment. Bonds issued that are subordinate are repaid from revenues left over after senior bonds are repaid. Senior bonds usually have higher coverages (more protection for bondholders) than subordinated bonds and, therefore, are rated higher than subordinated bonds. Issuers use subordinated bonds to maximize their leveraging capacity, because subordinated bonds require less coverage (see discussion below).

5. Market Interest Rates – ButcherMark based its estimated yields on tax exempt market interest rates derived from the Municipal Market Monitor Index published for June 7, 2011. To produce a conservative yield estimate, ButcherMark began with the current MMD interest rate and added:

- the spread between the November 2010 actual and MMD rates for a similar maturity
- the spread between the A-index and the AA-index (future issues will target the single A rating rather than AA)
- 0.5% (50 basis points).

For example, the total spread for a current interest bond maturing in 2029 (16 years after the anticipated issue date of 2013) would be 5.75% (3.50% (MMD for year 16 on June 7, 2011) plus 0.95% (the spread to MMD in the 2010 bond issue) plus 0.8% (A-index minus AA-index) plus 0.5%). The sensitivity analysis shown in Table 4 measures the impact from varying this assumption.

6. Reserve Fund – A debt service reserve fund is normally required by the rating agencies and the market to ensure that there are sufficient funds in place to meet timely principal and interest payments to bondholders. These reserve funds stay in place for the life of the debt, are normally sized at the maximum annual debt service obligation on the issued bonds, are conservatively invested and readily available and usually pay for the last debt service obligation of the bonds at the end of the maturity.

Table 3
Key Financing Assumptions

Assumption	2010	2013	2015
Tax Revenues	$11,047,000	$11,719,810	$12,433,546
Net Coverage	1.75x	1.25x	1.25x
Gross Coverage	1.5x	1.1x	1.1x
Rating	AA-	A	A
Spread to Market (June 7, 2011)		0.50%	0.50%
2010 & Future Rev Growth		3%	3%

Surplus Fund Balance 11/23/2010 (Est.)	$1,500,000
Annual Administrative Expenditures	$600,000
Ann. Exp Growth	3.00%
Construction Fund Earnings	0.87%
Surplus Earnings	0.50%
Reserve Earnings	2.32%
Fixed Costs per Issuance	$100,000
Per bond costs of issuance	$7
Minimum Surplus Fund Balance	$25,000
Reserve Percentage	100%

Table 4
Sensitivity to Financing Assumptions

Maximum Additional Leveraging of Sales Tax Revenue Post-2010 Bond Issue ($millions)			
	Spread to Current Rates		
Net Coverage	+50 bp	0	-50 bp
1.40x	65.2	67.0	68.7
1.25x	**75.2***	77.5	79.8
1.10x	80.0	82.6	85.4

Maximum Additional Leveraging of Sales Tax Revenue Post-2010 Bond Issue ($millions)			
	Reserve Requirement, as Pct of Maximum "Reasonably Required"		
Tax Rev. Growth	100%	50%	0%
2%	69.3	71.3	73.5
3%	**75.2***	77.6	80.0
4%	81.0	83.7	86.4

* Base Case

Table 5
Summary of Financial Capacity Analysis
FPD Sales Tax

Source of Funds	Amount	
2010 Net Proceeds	$87,409,570	
2013 Net Proceeds	8,282,700	
2015 Net Proceeds	38,447,201	
Construction Fund Earnings	1,950,359	(4/15/16)
Reserve Fund Earnings	1,059,273	(4/15/16)
Surplus Draws	25,492,166	
MESD & WRDD Net Proceeds	0	
Total Other than 2010 Net Proceeds	**75,231,698**	
Total Capital Improvement Fund Draws	**162,641,267**	
Maximum Semiannual Draw after 4/15/2013	14,218,211	

In structuring subordinated debt within an Indenture it is not uncommon to be able to reduce the amount of the reasonably required reserves, sometimes to zero, and still obtain very high ratings. The financial plan conservatively includes a reserve fund on subordinated debt sized at the maximum annual debt service on the respective bonds in 2013 and 2015. The sensitivity analysis also shows the impact on the Council's fiscal capacity by reducing this requirement.

While the goal of the Council is to pay for the project solely with receipts from the FPD sales tax, there are other potential sources of funding that may be needed should costs rise unexpectedly, sales taxes not grow to meet current assumptions, or the project schedule be delayed because of events not controlled by the Council (e.g. high water, weather, delays in state and federal permitting). The financial plan therefore considers other sources of funding to supplement sales tax receipts if necessary.

The Metro-East Sanitary District has the statutory authority to generate revenues to carry out their purposes and issue debt. The law sets a maximum tax rate and an overall maximum debt limit for the District. MESD has historically provided flood protection to many properties that were not included within District boundaries, and therefore not paying taxes to the District. Illinois legislation approved in 2010 and effective in 2011 (70 ILCS 2905 Sec. 2-11) provided for such areas to be annexed by the District. The increment of taxes paid by these annexed areas could be used to support the project. Current estimates suggest that the assessed value of annexed properties would be about $208 million. Applying existing tax rates results in estimated addition annual revenue to MESD of about $649,000.

As a Sanitary District, MESD has a maximum statutory debt limit of 5.75% of its assessed valuation. Against its 2008 assessed valuation of approximately $730 million MESD had a debt capacity of almost $42 million. As of its 2008's audited financials, MESD had no outstanding debt.

Based on the following assumptions MESD could generate approximately $3.4 million through borrowing:

- 20 year term
- 2 times annual debt service coverage
- 7% average interest rate

With the approval of MESD, these funds could be used to help pay for the project.

The Wood River Levee and Drainage District has the statutory authority (70 ILCS 605/) to levy assessments on all properties within the district and to issue drainage and levee improvement bonds to finance capital projects necessary to carry out their public purpose.

The District has previously obtained judicial approval to increase assessments to generate an additional $450,000 annually, of which approximately $350,000 is estimated to be incremental revenue that could be used to support the debt service obligations of a bond issue for levee reconstruction. As a drainage district WRDD has no statutory debt limit. Wood River currently has issued bonds for levee work and has outstanding debt of $436,491.

ButcherMark has made an estimate of the leveraging capacity of the incremental WRDD revenue of $350,000 and determined that, using the assumptions below, WRDD could raise an additional $1.9 million.

- 20 year term
- 2 times annual debt service coverage
- 7% average interest rate
- Estimated bond size: $1,870,000

With the approval of the Board of the Wood River district, these funds could be used to support the project.

The Corps of Engineers is now authorized to spend federal funds on portions of the project and should be fully authorized to spend for eligible projects on the entire levee system by federal fiscal year 2013. However, the availability of funds is determined annually by the federal budgeting process. The outcome of that process is uncertain in the best of times. Given the stresses on the federal budget and the reluctance of Congress to earmark funds, the federal funding environment is even more difficult and unpredictable.

Once a federal project is authorized, the Corps of Engineers can undertake design and construction with the agreement of a local sponsor to provide a share of the cost and meet a number of other conditions. Typically, the federal share of project costs is 65%, but it can be greater. Certain costs, such as land acquisition or treatment and disposal of toxic and hazardous waste must be paid by the local sponsor.

While it would not be prudent for the Council to incorporate an unknown or unpredictable funding source into the financial plan, the expectation by the Corps is that over the next five year period there will be some federal appropriations for elements of the project that are coincident with the Corps projects in the American Bottom. Based on discussions with the Corps, it is reasonable to expect a minimum of $20 million in appropriations for projects in MESD and Wood River over the next few years. If the Council and the Corps can agree on directing these funds toward high priority elements of the project, it could effectively reduce the Council's costs. However, the Council would still be responsible for the local-cost share and other costs that are not eligible for federal funding.

Table 6 summarizes the latest estimates of fiscal capacity of the Council and others to pay for the project. The total estimate of fiscal capacity potentially available to the project is nearly $187 million. However, achieving this total will require reliance on other agencies to contribute to the project, either by building components of the project or providing cash to the Council. *The Council's strong preference is to build the project solely with revenues provided through the FPD sales tax.*

While the added fiscal capacity provided by third-parties will be useful as a backstop source of funding if the sales tax unexpectedly proves inadequate, the levee districts can make good use of the excess funds they will collect for maintenance and ongoing capital improvements that will be needed in the future. Further, reliance on parties over which the Council has no control, such as the federal

government, diminishes confidence in the Council's ability to effectively manage the project to meet critical cost and schedule goals.

Table 6
Estimated Fiscal Capacity Including "Backstop" Funding

Organization	Amount
FPD Council	$162,600,000
Metro-East Sanitary District	3,470,000
Wood River Levee and Drainage District	$1,870,000
Corps of Engineers	$20,000,000
Total	**$187,940,000**

At this point, the financial plan concludes that with prudent decision-making by the Council and the counties, with continuing efforts to control costs, and barring unforeseen developments in the financial markets, FPD sales tax receipts should be sufficient to pay for construction of the project and ongoing Council operations.

VI. Project Schedule

A preliminary project schedule is shown in Figure 16. There are two critical goals that need to be addressed by the schedule:

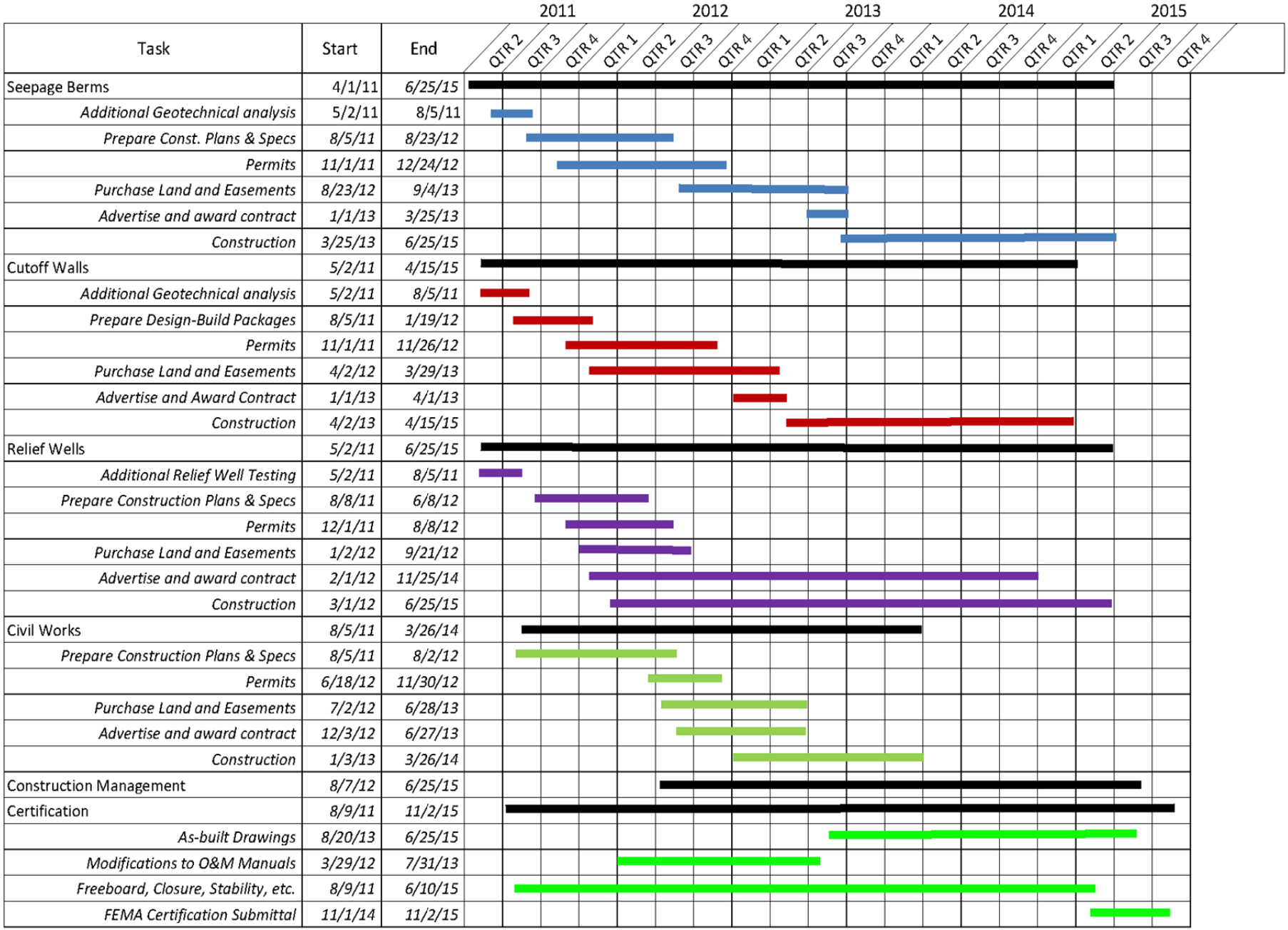
- complete the project by 2015
- pay for the project with funds available during the period of construction

The schedule must allow sufficient time for design and construction, including such time-consuming tasks as obtaining necessary permits for construction, and acquiring needed land and easements. However, the schedule may also be constrained by limitations of funding, so the design and construction process must be aligned with the financing process for the schedule to be met. Also, the schedule should anticipate potential delays by building in som additional time that may be required due to unplanned events like high water or weather.

The schedule is based on somewhat independent contracting and construction processes for each major type of improvement, since each requires its own set of skills and equipment. In addition, the plan anticipates that cutoff walls will be built through a *design-build* contracting process. Design-build is a method of project delivery wherein the design and construction of a project are contracted by a single contractor. This system is used to minimize the project risks for the owner and to reduce the delivery schedule by overlapping the design phase and construction phase of a project. In the case of cutoff walls, the construction process is specialized and often difficult, and experienced contractors will have better capability to design the walls using their deeper understanding of the unique construction processes and specialized equipment required for this work.

The schedule for building other design features reflects the traditional design-bid-build project delivery process.

The preliminary schedule optimally provides for construction to be substantially complete by the end of 2014, with the submittal of certification documentation to occur in 2015. Unless costs can be reduced further, the Council may not be able to produce the necessary financing to meet the construction schedule. Further work will be necessary to fully align the construction schedule and financing plan.



Task	Start	End
Seepage Berms	4/1/11	6/25/15
Additional Geotechnical analysis	5/2/11	8/5/11
Prepare Const. Plans & Specs	8/5/11	8/23/12
Permits	11/1/11	12/24/12
Purchase Land and Easements	8/23/12	9/4/13
Advertise and award contract	1/1/13	3/25/13
Construction	3/25/13	6/25/15
Cutoff Walls	5/2/11	4/15/15
Additional Geotechnical analysis	5/2/11	8/5/11
Prepare Design-Build Packages	8/5/11	1/19/12
Permits	11/1/11	11/26/12
Purchase Land and Easements	4/2/12	3/29/13
Advertise and Award Contract	1/1/13	4/1/13
Construction	4/2/13	4/15/15
Relief Wells	5/2/11	6/25/15
Additional Relief Well Testing	5/2/11	8/5/11
Prepare Construction Plans & Specs	8/8/11	6/8/12
Permits	12/1/11	8/8/12
Purchase Land and Easements	1/2/12	9/21/12
Advertise and award contract	2/1/12	11/25/14
Construction	3/1/12	6/25/15
Civil Works	8/5/11	3/26/14
Prepare Construction Plans & Specs	8/5/11	8/2/12
Permits	6/18/12	11/30/12
Purchase Land and Easements	7/2/12	6/28/13
Advertise and award contract	12/3/12	6/27/13
Construction	1/3/13	3/26/14
Construction Management	8/7/12	6/25/15
Certification	8/9/11	11/2/15
As-built Drawings	8/20/13	6/25/15
Modifications to O&M Manuals	3/29/12	7/31/13
Freeboard, Closure, Stability, etc.	8/9/11	6/10/15
FEMA Certification Submittal	11/1/14	11/2/15

Figure 16
Draft Project Schedule

VII. Conclusion and Recommendation

Much progress has been made in the nearly two years that the Council has been in existence toward the regional goal of maintaining a high level of flood protection for the American Bottom. Doing so is a regional priority and the Council has acted with a sense of urgency in conceiving major improvements to the flood protection system. That process has now reached an important milestone. A preliminary design is done, costs have been estimated, and financing put in place. The Council has adopted some definitive goals and is now in a position to set forth how those goals will be achieved. Accordingly, this report is something of a guide to the completion of the project.

The Council should consider adopting this Project Implementation Plan. Recognizing that the Plan will be a work in progress, at least until the design is fully completed, adoption will be a commitment to essential design, schedule and financing elements of the project. This commitment will be a reassurance to the community in planning for the future.

In addition to adopting the plan there are a number of critical next steps for the project:

- Continue the design process with a goal of reducing costs and any negative impacts of construction.
- Work with regulatory agencies to expedite the project permitting process.
- Refine the project schedule and better align it with the sequence of financing.
- Seek agreement from counties that all FPD sales taxes will be devoted to the project.
- See assurances from the USACE that federal funds will be directed to assist in a timely manner to focus on elements of the Council's project.
- Work with levee districts to provide for sufficient funding for ongoing maintenance of improvements and to identify capital funding to "backstop" the sales tax for funding the project.

In September, 2009 the Council adopted a process for analyzing the problem and conceiving solutions. That process has been successfully executed and is now virtually complete. With the conclusion of the project planning strategy, it is now time to take the next step by adopting a plan to bring the project to a successful conclusion – implementing flood protection improvements and achieving FEMA accreditation of area levee systems.
The Plan described in this report can accomplish that goal, with cautious optimism that it can be achieved by 2015 and lift the cloud of uncertainty that has enveloped the area since 2007.

Appendix A

30% Design Memorandum and Deliverables

30% DESIGN MEMORANDUM AND DELIVERABLES FOR SOUTHWESTERN ILLINOIS LEVEE CERTIFICATION DESIGN IMPROVEMENTS

PREPARED FOR

SOUTHWESTERN ILLINOIS FLOOD PREVENTION DISTRICT COUNCIL

PREPARED BY

AMEC EARTH & ENVIRONMENTAL, INC

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1.0 GENERAL INFORMATION

1.1 System Overview

The levee systems protecting the American Bottom include five levee entities or levee districts, Wood River Drainage and Levee District (WR), Metro-East Sanitary District (MESD), Chain of Rocks (COR), Prairie du Pont Drainage and Levee District (PdP) and Fish Lake Drainage and Levee District (FL). Wood River is made up of three standalone levees, Upper Wood River, East-West Fork of Wood River, and Lower Wood River. These three levees maintain protection independently from each other, and surrounding levees. The MESD and COR function as a single levee. However, the combined MESD/COR system is not dependent upon WR nor PdP/FL to maintain its protection. The PdP and Fish Lake levees are also dependent upon each other and function as one continuous levee system. Figure 1 presents an overview of the levee system.

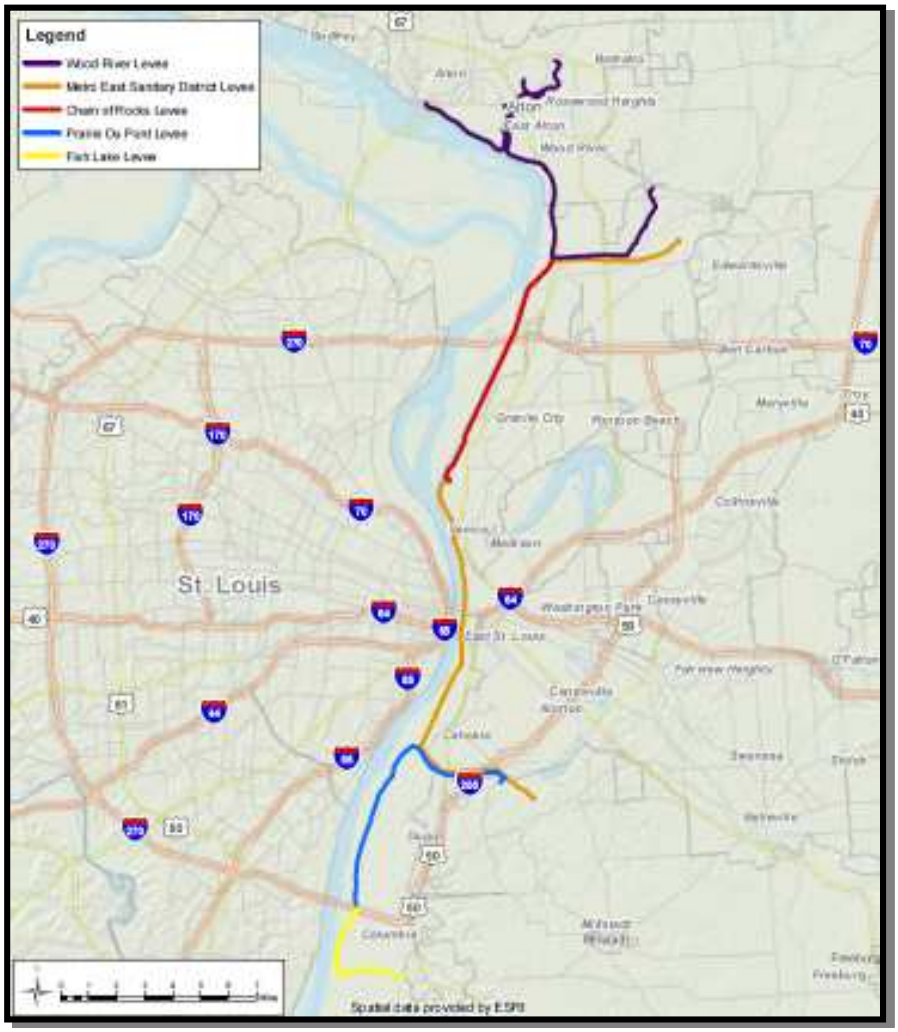

Figure 1. Southwest Illinois Flood Protection System

1.2 Purpose and Scope

The purpose of this project is to design improvements such that, upon construction, the subject levee systems will be eligible for accreditation in accordance with 44 CFR 65.10 criteria. This

set of criteria is referred herein as FEMA Certification criteria. FEMA certification addresses the following design criteria:

- Freeboard
- Closures
- Embankment Protection
- Embankment and Foundation Stability
- Settlement
- Interior Drainage

In November 2010, AMEC prepared a report of a certification inspection of the subject levee system. Findings from that study indicated several areas within the subject levee system required either design improvements and/or operations/maintenance effort. This design memorandum addresses those areas requiring design improvements related to underseepage, through-seepage, and associated appurtenant features. This report addresses AMEC's efforts, the design methodology, and the basis of design, and rehabilitation schemes for the areas requiring improvements. Specifically included in our design efforts and in this memorandum are the following:

- Geotechnical Analyses and Design
- Limited Phase I Environmental Assessments
- Natural Resources Assessments - Wetlands
- Cultural Resources Assessments
- Interior Drainage Hydraulic and Hydrologic (H&H) Analyses
- Civil Engineering Analyses and Design

1.3 Stationing and Elevations

Generally, and unless noted otherwise, all stationing in this Design Memorandum (DM) and associated Drawings refer to the USACE ***Levee*** Stations. The portion of the DM that addresses hydrology necessarily requires a stationing system that includes the whole sub-watershed, so portions of that discussion refer to a stationing system referred herein as ***River*** Stations. The River Stations progress up-station from downstream to upstream. It is important to note that the River stationing corresponds to the centerline of the river while the Levee Stationing to the centerline of the top of the levee, which are offset variable distances from the river's centerline, so there is no one-to-one relationship with respect to distances along the various alignments

2.0 GEOTECHNICAL ANALYSES AND DESIGN

2.1 Introduction

The purpose of this section is to summarize AMEC's 30% geotechnical design for the Southwest Illinois levee systems including Wood River, Metro East Sanitary District, Prairie DuPont and Fish Lake levee districts. All elevations in this memorandum are in feet and refer to the National Geodetic Vertical Datum of 1929 (NGVD). Coordination of the Drainage and Levee District design plans with the USACE in final design is essential to avoid future conflicts in cost sharing. The focus of this effort was to first evaluate the flood protection system against the various geotechnical criteria contained in FEMA 65.10 to identify deficient sections. The levees and flood walls were screened using the gathered field information for seepage (both through seepage and underseepage), stability and settlement criteria. Once sections of the existing levee were identified to be deficient, a repair solution was developed to address the issue. The selected solutions were generally chosen initially to be consistent with the original proposed solutions (by AMEC) and to be consistent where possible with the corresponding solution proposed by the USACE. Subsequent analyses and refinements led the AMEC team to chose more cost effective solutions as more sophisticated analysis tools and value engineering principles were considered. The following sections describe the inputs used in our various analyses and the decision process through which we have arrived at our 30% design.

2.2 Locations of Existing Explorations and Relief Wells

The locations of existing exploration points (including known historical borings as well as recent USACE and AMEC borings), existing relief wells, and piezometers, are shown in the copies of the GIS shapefiles for the various levee systems provided under separate cover.

2.3 Development of Inputs for Underseepage Analyses

The USACE blanket method spreadsheet that was adapted by AMEC from the St. Louis District underseepage spreadsheet was primarily used for this 30% Design work. The inputs for each Station were developed by reviewing and analyzing data from pertinent nearby soil test borings and cone penetration tests soundings (CPTs), aerial photographs, and cross sections previously prepared by USACE.

The seepage entry point is defined as the location where the aquifer daylights on the riverside of the levee. Where there is a riverside blanket, factor "x_1" is calculated by the spreadsheet using formulas from EM 1110-2-1913 (2). Where there is no riverside blanket, a minimum x_1 distance of 250 feet was assigned in accordance with Table 1 from DIVR 1110-1-400 (1). Along flank levees that do not connect to the aquifer, x_1 is calculated in accordance with the reference documents: ETL 1110-2-569 (4); DIVR 1110-1-400; and, EM 1110-2-1913. The seepage exit point is defined as the location where the aquifer daylights on the landside of the levee. Where there is a landside blanket, factor "x_3" is calculated by the spreadsheet using formulas from EM 1110-2-1913.

Subsurface exploration information is used to determine landside blanket thickness, Z_{BL}, and composition. Riverside and landside blanket vertical permeability values, K_v, were selected based on the blanket thickness and composition using the applicable tables from DIVR 1110-1-400.

The aquifer thickness, d, and composition (soil types and grain size) are determined from the exploration information. The weighted average permeability of the pervious substratum

(aquifer) was estimated using the empirical K_h vs. D_{10} correlation shown on Figure 3-5b of EM 1110-2-1913 and TM-3-424 (6). Permeability was estimated from the correlation where D_{10} values were available, and where no D_{10} data were available, K_h was estimated using values based on visual classifications. Based on results of pumping tests conducted by others, the aquifer permeability as indicated by D_{10} correlations was adjusted by a factor of 1.5 as recommended by Richard Bird, of URS, in a memo[1] dated Dec 7, 2010. Additional pump tests to further validate aquifer permeability values for under seepage analysis will be completed in the next phase.

Landside ditches have been assumed dry in accordance with guidance in Paragraph 6.a from DIVR 1110-1-400, unless facts are known that support a less conservative assumption. Where landside ponds exist, the water level in the pond is assumed the same as that surveyed when the cross-section was developed.

The USACE blanket method spreadsheet is considered appropriate as a screening and preliminary design tool. However, because it relies on analytical simplifications, it may in some cases produce overly conservative results when used as the basis for design. Two-dimensional and/or three-dimensional analyses will be used to optimize the design and provide value engineering during the next design phase. Preliminary modeling has been completed at various cross-sections; however confirmation of aquifer and blanket permeability is needed to confirm the solution.

2.4 Design Water Levels

Design river water levels used for modeling along the main riverfront flood protection system are the Station-by-Station Base Flood levels along the Mississippi River that were provided by USACE. Along the flank levees, AMEC evaluated the relationship between the Mississippi River backwater and tributary headwater and provided the appropriate Base Flood elevations. In each of the tributary rivers/systems, the Mississippi River backwater controlled the Base Flood elevation for a significant length of the tributaries. The Base Flood is the flood event that has a 1-percent chance of being equaled or exceeded in any given year; this flood event is commonly called the “100-year” flood.

2.5 Required Factors of Safety

We have used design criteria outlined in AMEC documents dated November 2010 (including several attachments), supplemented by Jo Tucker’s email dated December 10, 2010, which describes assumptions used by USACE related to blanket spreadsheet input. AMEC’s design criteria differ from the USACE St. Louis District’s design criteria in that AMEC’s criteria incorporate a “variable” factor of safety for exit gradient, i_e, versus the critical gradient, i_{cr}, as described by Chapter 3.1.4 in the unnamed draft document from the USACE New Orleans District (5). The variable-factor-of-safety value decreases with increasing distance (X) from the landside toe of the levee. Figure 2 illustrates the change in factor-of-safety relative to distance X divided by the levee height (H).

[1] Memorandum from Richard Bird to Jo Tucker and Tom Cooling, 12/7/2010, Selection of Design Aquifer Permeability/Transmissivity. (Bird, 2010)

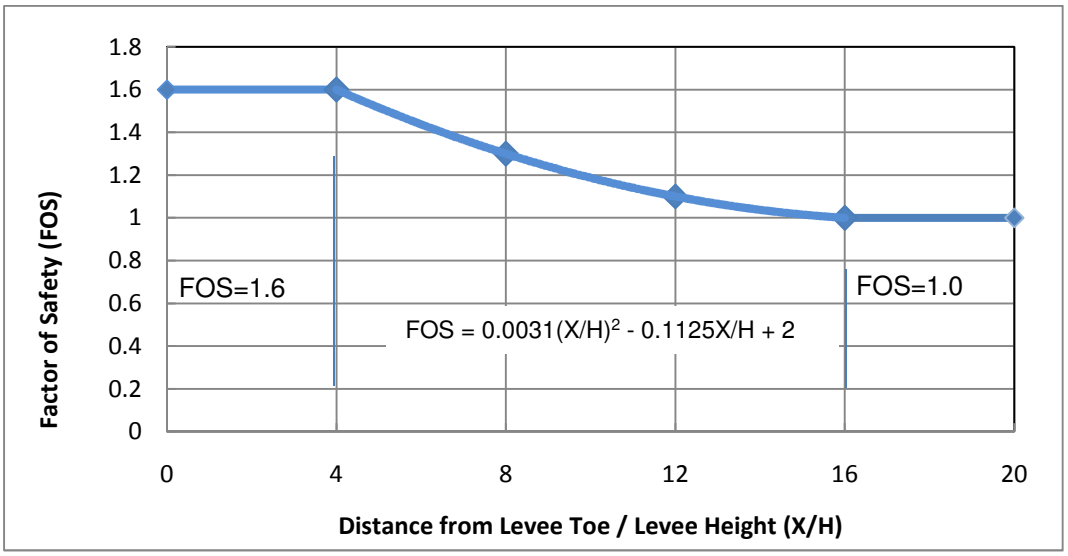

Figure 2. Variable Factor Of Safety

For purposes of 30% design, seepage berms are assumed to consist of semi-pervious soil, have a minimum thickness of 5 feet at the landside toe and 2 feet at the berm toe, and have a top slope no flatter than 2%. The minimum seepage berm width is four times the levee height and there is no maximum limit to berm width. Based upon the current minimum design thickness at the berm toe of 2 feet combined with a minimum top of berm slope of 1.33% (1 vertical to 75 horizontal), the berm thickness at the toe of the levee may be much thicker than 5 feet.

This same factor of safety was used for the design of other seepage gradient control elements including the use of aggregate seepage collection ditches and drains. Where these types of drains were located within four levee heights (i.e., 4xH) the gradients were controlled with a factor of safety of 1.6.

2.6 Slope Stability Considerations

Slope stability is being evaluated using SLOPE/W, review of subsurface explorations, and laboratory testing of the soil materials. SLOPE/W is part of Geo-Slope International's GeoStudio 2007 suite of integrated geotechnical software (version 7.15) and is in general accordance with EM 1110-2-1913 and EM 1110-2-1902 *Slope Stability*. The slope geometry, subsurface materials, ground water, and seepage conditions of the levee system have been evaluated to group portions of the levees into reaches that have similar geotechnical characteristics. A section within each of the reaches that represents the most "critical" aspects (relative to slope stability) was then selected. Each critical section is being evaluated to estimate the factor of safety relative to slope stability for various loading conditions; which are summarized below.

- normal river stage - landside slope
- normal river stage - riverside slope
- normal river stage - earthquake - landside slope
- normal river stage - earthquake - riverside slope
- Base Flood stage - long term (steady state seepage) landside slope
- Sudden Drawdown (from flood stage to normal stage) - riverside slope

Preliminary results indicate that all the load cases are stable.

2.7 Settlement Considerations

To adequately provide the engineering analyses necessary to satisfy the requirements of 44 CFR 65.10, exploration, laboratory data review, and analyses were completed to verify the flood protection system settlement behavior throughout the three systems. To effectively perform the analyses, subsurface exploration and geotechnical evaluation as described for the stability analysis above were performed. In addition to the subsurface exploration and laboratory analyses recommended above, the top of flood protection survey elevation was reviewed along with information from the levee districts regarding noted settlement over the more than 50 years the levees have been constructed. Analysis and information developed shows there are no issues with settlement of the existing flood protection system features.

2.8 Through Seepage Evaluation/Design

Through seepage was evaluated using SEEP/W, review of subsurface explorations, review of historical flood fighting records of documented or potential through seepage problems, review of a geophysical levee screening, and interviews. SEEP/W is part of Geo-Slope International's GeoStudio 2007 suite of integrated geotechnical software (version 7.15) and is in general accordance with EM 1110-2-1913. Subsurface explorations that were reviewed include CPT sounding and soil test borings at the levee toes and through the crest of the levee. The historical flood fighting records include anecdotal reports as well as maps and drawings prepared during the flood event(s) that indicated through seepage had occurred. In areas where through seepage was observed, boring logs generally confirmed sandy zones within the levee. To address the issue of through seepage, a clay cap is proposed on the riverside face of the levee extending down the face to the riverside toe and keying into the blanket materials on the riverside flood plain. Alternatively, where a cutoff wall is proposed to extend from the levee crest through seepage is similarly eliminated.

2.9 Underseepage Evaluation/Design

Underseepage control will be provided by relief wells, seepage berms, cutoff walls, toe drains, filter blankets or combinations thereof. Most of these features are also currently used in various locations to address some of the historic underseepage issues. As AMEC completed analyses of the flood protection system, initial efforts were focused on reviewing analyses completed by the USACE (for the authorized level of protection), modifying it for the FEMA 100-year flood level and subsequently selecting appropriate input parameters from our field investigation program.

Underseepage analyses were conducted generally at 330-foot intervals throughout the levee systems using the leaky blanket theory developed into a spreadsheet. The locations of our analyses were selected to coincide with the location of the USACE cross-sections and geotechnical explorations completed both by AMEC and the USACE. Subsequently, a select number of critical areas or complex cross sections were modeled using two-dimensional finite element seepage model (SEEP/W) to refine the analysis. In other select areas the subsurface conditions and/or ground surface geometry did not match well with the assumptions implicit in the leaky blanket spreadsheet and these areas were also modeled using the finite element model. The SEEP/W analyses for several cross-sections resulted in more realistic solutions and better matched the observed levee behavior under flood loading.

The results of the leaky blanket spreadsheet and initial modeling were completed to establish the reaches of the levee system for which an inadequate safety factor exists under the existing physical conditions with a 100-year storm applied to the wet side. If considered deficient based on our selected safety factor for FEMA 65.10 certification, a series of solutions were then evaluated to improve the safety factor.

Initially, AMEC generally attempted apply the same or similar solutions established for each deficient reach identified in our proposal. Solutions were also selected, where appropriate, to match the solutions identified by the USACE for the authorized level of protection for the same reach. Therefore, our initial solutions utilized relief wells, seepage berms and cutoff walls. Because of their relatively low capital cost, relief wells were generally recommended as the preferred control where they adequately reduce exit gradients. Where wells did not adequately reduce gradients, seepage berms were recommended. (Typically, a design relief well spacing of less than 50 feet was deemed too close.) Where seepage berms were not cost effective due to land acquisition costs or infrastructure relocations, cutoff walls were recommended.

In areas where topographically low areas (ditches or artificially excavated areas) exist on the dry side of the levee, seepage analyses were used to identify excessive hydraulic gradients. In these areas seepage berms were thickened to fill in low area, or where seepage berms were not required, soil fill was modeled to fill in the low areas thereby providing a counter weight to the underseepage forces. In some cases the low areas were stormwater ditches that could not be filled; therefore, civil design solutions were selected in these cases to accommodate either relocation of the ditch or conversion of the ditch to a pipe/ culvert.

Cutoff walls were used as last resort solutions as described above where seepage berms and/or relief wells were inadequate to sufficiently reduce the seepage gradients on the levee dry side or where space or other constraints make the installation of seepage berms impractical. Deep cutoff walls, where used, are planned to completely cutoff seepage that currently flows through and beneath the levee and planned to be extended to the underlying bedrock surface. In several cases a shallower cutoff was proposed where an interval of low permeability material was identified that extended over a wide geographic area. Because cutoff walls represent a significantly higher construction cost per lineal foot of levee as compared to the other underseepage control methods, their application was limited.

Subsequently, civil design drawings and a preliminary cost estimate were developed corresponding to the selected solutions. This was then reviewed for possible alternatives to accomplish the seepage controls with equally effective solutions that present savings in construction duration, permitting and/or cost.

2.10 Value Engineering and Design Optimization

Upon review of the preliminary cost estimate and design drawings, several value engineering and design optimization efforts were conducted to refine the initial solutions and in several cases alternate solutions were selected to control underseepage. The value engineering and design optimization process was significantly aided by the use of two dimensional and three dimensional finite element modeling. In areas where the leaky blanket layer was thin to absent, seepage gradients were found to be effectively controlled through the use of graded filters. Graded filters were also modeled in geographically low areas (in existing ditches in many cases) where the existing soils were replaced with graded filter materials. In other areas a French-Drain styled toe drain was inserted near the dry-side levee toe to collect underseepage. Both of these techniques control the seepage gradients effectively; however, they do introduce additional seepage flows to the dry side of the levee which require civil design to route them to

the existing pump stations. The cost advantage of the seepage drains over seepage berm solutions include the vastly reduced quantities of land acquisition, wetland mitigation and other civil design features needed to allow for construction of the seepage berms with their relatively large footprint. On the other hand, upgrades to some of the smaller pump stations to accommodate increased flows must also be taken into account.

Figure 3 illustrates the decision process for selecting an appropriate underseepage solution.

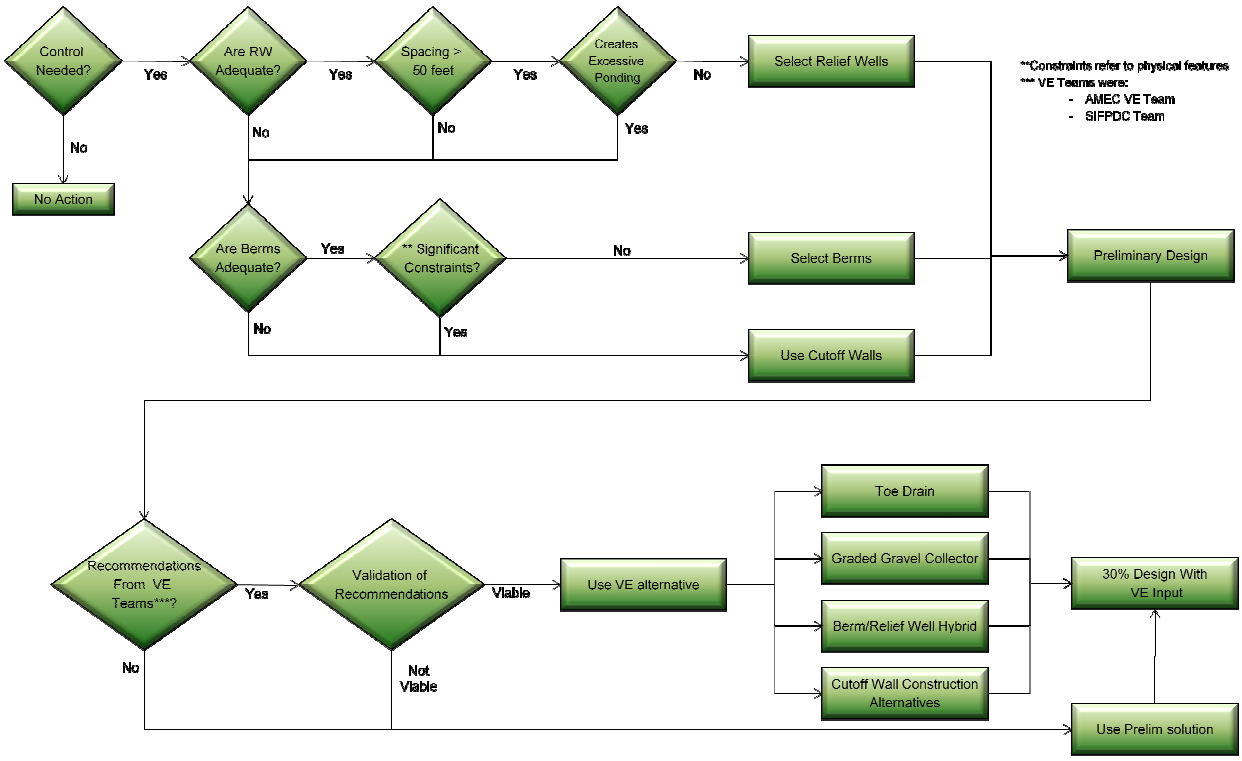

Figure 3. Underseepage Solution Flowchart

Where through seepage was not an issue, the planned cutoff walls were moved to the riverside toe of levee which will save the cost of constructing the cutoff wall through the levee. To accomplish this move, stability concerns require some types of cutoff wall construction to be moved about 35 feet riverward of the levee toe; therefore, cost trade-offs include land acquisition, wetland permitting and construction of a clay cap to tie the top of cut-off wall into the riverside toe of levee slope.

The existing relief wells in reaches that require them will be cleaned and tested to verify adequate efficiency and confirm there is no excessive sand production. Existing wells that fail to meet the requirements will have to be refurbished or replaced. Wells will be either D-type or T-type[2] relief wells. Similarly, existing toe drains will also be inspected to confirm they are operating correctly and in satisfactory condition.

[2] D-type wells discharge to the surface with a check valve in the top of the casing. There is a protective housing over the top of the casing. T-type wells discharge below ground surface into a collector system. T-type wells are typically protected by manhole covers.

2.11 Bibliography

1. *DIVR 1110-1-400 Section 8, Change 2, Ground Water & Seepage, 1998.* Vicksburg, MS: MVD, USACE.
2. *EM 1110-2-1913 Design & Construction of Levees, 2000.* Washinton, DC: USACE.
3. *EM 1110-2-1914 DESIGN, CONSTRUCTION, AND MAINTENANCE OF RELIEF WELLS, 1992.* Washington, DC: USACE.
4. *ETL 1110-2-569 Design Guidance for Levee Underseepage, 2005.* Washington, DC: USACE.
5. *http://www.mvn.usace.army.mil/ENG/PageA/ch3.pdf, 2008.* New Orleans, LA: New Orleans District USACE.
6. *TM 3-424 Investigation of Underseepage and its Control, 1956.* Vicksburg, MS: WES-USACE.
Bird, R. (2010, December 7). Selection of Design Aquifer Permeability/Transmissivity. *URS Memorandum to Jo Tucker and Tom Cooling* . St Louis, MO, USA: URS.

3.0 ENVIRONMENTAL ASSESSMENTS

3.1 Introduction

The purpose of this environmental evaluation was to evaluate the existing available literature regarding documented and potential subsurface contamination in areas that will or may be impacted by levee exploration (e.g., geotechnical drilling) or revitalization within the following levee systems:

- Wood River (WR) Levee District
- Metro East Sanitary District (MESD)
- Prairie Du Pont (PDP) Sanitary & Levee District
- Fish Lake (FL) Drainage & Levee District

3.2 Background

The preliminary design concepts intend to use refurbished and new relief wells, seepage berms, gravel filters, and/or cutoff walls to provide seepage control for the Federal Emergency Management Agency (FEMA) Certification level (FEMA level) for the 100-year Flood. These rehabilitation measures, as well as investigations to evaluate the feasibility of such measures, may require drilling or excavation through contaminated soil or groundwater, and may produce solid, special, or hazardous wastes.

3.3 Scope of Work

Areas of known or potential contamination were identified prior to subsurface exploration and preliminary design in order to plan the balance of the project in a manner that avoids these areas to the extent possible. For areas that could not be avoided, this evaluation provided information for development of worker protections, preparation of appropriate investigative programs, evaluation of the impact and cost of design alternatives, and coordinated with agencies with a stake in environmental site controls.

The following scope of work (SOW) items were completed:

- Obtained and reviewed available pertinent documents from regulatory agencies and design team consultant members.
- Conducted an environmental regulatory database search for the levee corridor (inclusive of the four levee systems) to obtain information on known or suspected sites of concern.
- Contacted regulatory agencies to obtain information on sites not previously documented or additional information on documented sites where current information was deemed insufficient, as appropriate.
- Reviewed historical aerial photographs for the levee corridors, where such review has not been previously conducted.
- Performed interviews with regulators, sub-consultants, and other parties to identify and obtain specialized knowledge regarding portions of the levees with known or suspected environmental issues.
- Developed an inventory of potential or known contaminated sites in each levee district, and prepared a Geographic Information System (GIS) overlay.
- Provided health and safety protocol for inclusion in the site-specific Health and Safety Plan (HASP) to address drilling and construction activities.
- Prepared a hazardous materials handling protocol to use for subsurface investigation activities in areas where potential contamination may exist.

- Provided support for environmental considerations regarding discharge of ground water from testing of the existing relief wells.
- Prepared an Application for Wastewater Discharge Permit for water generated through capacity testing in areas known or suspected to be impacted.
- Obtained a Wastewater Discharge Permit for water generated during capacity testing of relief wells in the Sauget area of MESD.
- Prepared an application for a Construction/Operation Permit Approval to allow re-injection of treated groundwater generated through a cleanup procedure implemented at relief wells prior to capacity testing.
- Obtained the Construction/Operation Permit through the Illinois Environmental Protection Agency (IEPA) to allow cleanout of creosote in relief wells throughout the levee system.
- Prepared a National Pollutant Discharge Elimination System (NPDES) Notice of Intent for coverage under the general storm water permit for discharges of storm water associated with construction activities in order to discharge water generated during capacity testing or dewatering activities.
- Obtained the NPDES general storm water permit (one for each levee district) from IEPA for discharge of groundwater from relief wells after creosote clean-out and testing to document groundwater IEPA Tier 1 Class I groundwater standards.

3.4 Database Reviews

AMEC reviewed existing environmental databases to determine potential sites of interest along the levee systems. The database tools used were the U.S. Environmental Protection Agency (USEPA) EnviroFacts web site and a database search conducted by Environmental Data Resources, Inc. (EDR). A search distance of 0.25 miles from the levee systems was used for the database searches. Sites were flagged based on their listing on databases pertaining to potential soil and groundwater impacts (i.e., landfills, underground storage tanks, spills or releases, areas of documented soil or groundwater impacts).

3.4.1 EnviroFacts Database Evaluation

USEPA EnviroFacts is a web site that provides access to several USEPA environmental databases to provide information about environmental activities that may affect air, water, and land anywhere in the United States. The Enviromapper program was used to generate maps of sites with environmental information for the levee system area. The database information was reviewed by AMEC's environmental professionals to determine sites of potential concern based on listings that could pertain to soil and groundwater impacts. The information obtained from the USEPA database search is as follows:

- Wood River Levee: Six sites of potential concern were listed in the USEPA Resource Conservation and Recovery Act (RCRA) or Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) databases.
- MESD Levee: ten sites of potential concern were listed in the USEPA RCRA or CERCLA databases.
- PDP and FL Levees: No sites of potential concern were listed.

3.4.2 EDR Database Evaluation

AMEC contracted with EDR to perform a search of available USEPA and Illinois Environmental Protection Agency (IEPA) environmental databases. A search area of 0.25 miles on each side

of the levee system was used by EDR. AMEC environmental professionals reviewed the EDR report to determine sites with the potential for soil or groundwater impacts based on the databases in which they were listed. The sites of potential environmental concern from both sources were identified and referenced against the levee station numbers and plotted using GIS. Based on the review, AMEC's environmental professionals recommended additional research for some areas.

- Wood River Levee: Five sites of potential concern were listed in the EDR databases and retained for further review.
- MESD Levee: Nine sites of potential concern were listed in the EDR databases and retained for further review.
- PDP and FL Levees: No sites of potential concern were listed.

A list of sites retained for further review based on the EDR and EnviroFacts review is included in **Appendix A.** Available documents and information were reviewed for these sites, as described in Section 3.5.

3.5 Site Environmental Review

AMEC obtained environmental information and historical reports from levee design team consultants, (i.e. URS, ARDL), the U.S. Army Corps of Engineers, and the IEPA. AMEC's environmental professionals reviewed the information to determine soil and groundwater conditions along the levee systems. The information reviewed provided additional guidance relating to environmental restrictions for geotechnical subsurface drilling and investigation work to be performed along the levees. A list of reports reviewed is included in **Appendix A**. The additional information reviewed for each levee is discussed below.

3.5.1 Wood River Levee

Olin Corporation Zone 17 - IL Route 3, Alton, IL (EDR Site #12)
No additional information was available to review. As this site is located within the geotechnical drilling work area, environmental restrictions were recommended (see Section 4.0).

Owens-Brockway Glass Container - Foot of Vine Street, Alton, IL (EDR Site #14, 16, and 19)
No additional information was available to review. As this site is located within the geotechnical drilling work area, environmental restrictions were recommended (see Section 4.0).

Laclede Steel/Alton Works - Broadway Cut STS, Alton, IL (EDR Site #17, 22)
No additional information was available to review. As this site is located within the geotechnical drilling work area, environmental restrictions were recommended (see Section 4.0).

Based on the results of the environmental review for the Wood River Levee, environmental impacts were determined to be possible. Therefore, environmental protocols were recommended for select station ranges, as outlined in Section 4.0.

3.5.2 MESD Levee

Former US Army Charles Melvin Price Support Center - Rt #/Neidringhaus, Granite City, IL (EDR Site #69)
Several potential environmental concerns were identified in the EDR database report for the former US Army Charles Melvin Price Support Center. The site is located at Rt 3/Niedringhaus,

Granite City, IL, at the north end of the MESD levee. The environmental concerns are as follows:

- Closed Landfill
- Building 231 environmental concerns
- Leaking underground storage tanks (LUSTs)
- Possible unexploded ordinance (UXO)

AMEC contacted Mr. Rick Archeski from the USACE to determine if additional information existed regarding the concerns listed above. Mr. Archeski referred AMEC to Ms. Debbie Grady at the Support Center. AMEC contacted Ms. Grady on 26 October 2010. Ms. Grady indicated that the landfill is closed and no constituents exceeding criteria were exhibited in soil or groundwater in the area. Ms. Grady also explained that tetrachloroethylene (PCE) impacts in soil and groundwater at Building 231 have been delineated and the area is located approximately 2,000 feet from the levee. Ms. Grady stated that the investigation was completed in 2010. She also indicated that the LUST sites have been closed and closure concurrence from the IEPA has been received.

Ms. Grady indicated that there was one area of suspect UXO at the old warf area on the west side of the levee at the Support Center. An investigation was completed and potential UXO was removed. No Further Action was received and a Final NFA Record of Decision was completed in November 2008.

Various Sites - Sauget Areas 1 and 2, Krummrich Vicinity - Sauget, IL (EDR Sites #93, 94, 96, Orphan)

In order to obtain additional information with regard to these sites, AMEC contacted Ms. Stephanie Linebaugh and Mr. Ken Bardo of USEPA to gain additional information with regard to the status of investigation, corrective actions, and environmental impacts in the vicinity of the levee. Ms. Linebaugh and Mr. Bardo indicated that there were no corrective actions (such as impervious covers) in the vicinity of the levee (on the land side) that should interfere with proposed drilling and construction activities. However, documented impacts exist in the subsurface in the vicinity of the MESD Levee. Therefore, Ms. Linebaugh and Mr. Bardo recommended the use of environmental protocols when drilling or performing construction activities in the vicinity of the sites.

Conoco Phillips (3300 Mississippi Avenue, Cahokia, IL - Site Not Evident on EDR Database Report)

During AMEC's inquiries with regard to the Sauget and Krummrich sites, it was brought to the attention of AMEC that another site in the vicinity of the Sauget and Krummrich sites may have contributed subsurface impacts in the vicinity of the MESD Levee. In order to gain additional information about this site, AMEC contacted Mr. Jeff Guy of IEPA. Mr. Guy indicated that he was not very knowledgeable about the site as his oversight had been limited. Mr. Guy suggested that AMEC submit a FOIA request to obtain pertinent documents. On January 18, 2011, AMEC received electronic files from IEPA containing the documents for the site. The documents reviewed are included on the list in **Appendix A**. Based on the file review, environmental protocols were recommended when drilling or performing construction activities in the vicinity of the site.

Based on the results of the environmental review for the MESD Levee, environmental impacts were determined to be possible. Therefore, environmental protocols were recommended for select station ranges, as outlined in Section 3.6.

3.6 Environmental Restrictions

Based on a review of the EDR database report and other relevant information, AMEC environmental professionals identified areas (identified by station numbers) where specific environmental/hazmat protocols were to be used during geotechnical subsurface investigation and construction activities due to the possibility of encountering soil and/or groundwater contaminants. The use of environmental/hazmat protocols have been recommended in the following areas:

Restricted to Environmental Drilling Protocols:

- Wood River Levee: EDR Focus Map 2:
  - **From station 230+00 to 270+00**; EDR Site #17: Laclede Steel Co Alton Works, Broadway Cut STS, Alton, IL.
  - **From station 40+00 to 60+00**; EDR Sites #14, #16, #19: Owens-Brockway Glass facility.
- Wood River Levee: EDR Focus Map 3:
  - **From station 00+00 to 50+00**; EDR Site #12, Olin Corporation, Zone 17 Plant, Illinois Route 3, East Alton, IL; restricted along south side of Wood River.
- MESD Levee: EDR Focus Maps 20/21:
  - **From station 1110+00 to 1312+60**.Sauget Area (EDR Sites #93, 94, 96, Orphan, Conoco Phillips).

AMEC's environmental team developed environmental/hazmat protocols to be used during geotechnical subsurface investigation and construction activities in the areas outlined above. The environmental/hazmat protocols are included in **Appendix A**. AMEC also prepared health and safety procedures, included in the site-specific project HASP for field personnel to use during investigation activities.

4.0 NATURAL RESOURCES ASSESSMENTS - WETLANDS

4.1 INTRODUCTION

This section describes the efforts completed and associated findings of potentially impacted wetlands and threatened/endangered species resulting from the planned construction improvements.

4.2 Wetlands Assessment

4.2.1 Review of NWI Mapping

Based on preliminary engineering design, levee improvements will likely include a combination of relief wells, cutoff walls, clay caps, and seepage berms. In general, the installation of relief wells should have a relatively small permanent impact on existing wetlands, as the footprint of a relief well is relatively small (~10 square feet). To estimate the potential impact of the proposed levee improvements, AMEC compared the location of potential berms, clay caps, gravel filters and cutoff walls with wetlands, as identified on National Wetlands Inventory (NWI) maps.

Wood River

- According to NWI maps, approximately 11 acres of forested wetlands and approximately 8 acres of non-forested wetlands or ponds would be permanently impacted. Total wetland impact at Wood River is estimated to be approximately 19 acres.

PDP and FL

- According to NWI maps, approximately 1.6 acres of forested wetlands and 1.8 acres of non-forested wetlands would be permanently impacted. Total wetland impact at PDP/FL is estimated to be approximately 3.4 acres.

MESD

- According to NWI maps, approximately 11.1 acres of forested wetlands and10.4 acres of non-forested wetlands would be permanently impacted. Total wetland impact at MESD is estimated to be approximately 21.5 acres.

4.2.2 Review of Prior USACE studies.

- None. No available wetlands studies.

4.2.3 Review of NEPA documents completed by others

AMEC reviewed the following documents:

- Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) completed for MESD in 2010
- EA and FONSI for Wood River Drainage & Levee District completed in 2005
- No NEPA documentation is available for PDP and FL. Therefore, no NEPA documentation was reviewed.

4.2.4 Conduct Field Delineations to Identify Wetlands

Wetland delineations of the project areas within the individual levee systems have not been completed. Prior to permitting, a field review to identify and delineate wetlands for all of the levee systems will be required for all areas within the project footprint. Wetland delineations will be required along the levee system in all areas of potential disturbance.

4.2.5 Additional record review; coordination with agencies; and field surveys.

- Coordination with the U.S. Fish & Wildlife Service (USFWS) and Illinois Department of Natural Resources (IDNR) is required. There are several threatened and endangered (T&E) species known to occur in the area and there may be restrictions on land clearing and working within waterways during certain times of the year. A preliminary scoping letter to the USFWS has been prepared for submittal to USFWS.
  - Field surveys for certain T&E species may be required.
- A pre-application meeting with the USACE and the IL Environmental Protection Agency (IEPA), Bureau of Water, is necessary as individual permits will be required for wetland (and stream) impacts. *(An individual 404 permit is required for wetland impacts that exceed 0.5 acre).*
  - Field surveys for wetlands and other surface waters will be required prior to submitting permit applications.
- Identification of Wetland Mitigation Options - Wetland mitigation will be required for wetland impacts. The USACE has indicated that wetlands must be mitigated at a ratio of 1:1.5 to 1:3+, depending on the quality of the wetland being impacted.
- Completion of a Wetland Mitigation Plan - This will be required to be submitted in conjunction with the USACE 404 permit application. A mitigation plan would not be required if a mitigation bank were available. Refer to Section 3.2.1, below.

4.3 Wetlands Coordination and Permitting

The following table details permits required prior to construction within wetland areas or other USACE jurisdictional waters (i.e., waters of the U.S.). Coordination with regulatory and other review agencies is recommended as early as possible during project planning. This allows for revisions or other measures necessary to meet agency requirements to be made before project plans are finalized.

Potential Permitting Requirements Pertaining to Wetlands

Agency	Permitted Activity	Permit/Review Authority
U.S. Army Corps of Engineers (USACE)	Impacts to Waters of the US, including wetlands.	• Clean Water Act (CWA) Section 404 Permit
Illinois Environmental Protection Agency (IEPA)	Impacts to Waters of the US, including wetlands.	• CWA Section 401 Water Quality Certification (WQC)
Illinois Department of Natural Resources (IDNR)	Construction within a public body of water and within floodways.	• Permit for Construction within a Floodway* • Reviews 404 permits for natural resources and T&E species concerns. Has permit review responsibilities under the Fish and Wildlife Coordination Act (16 USC 661-664) and administers the Interagency Wetland Policy Act of 1989 and the IL Endangered Species Protection Act.
USFWS	Issuance of Federal Permit	• Review of 404 permit
SHPO	Issuance of Federal Permit	• Review of 404 permit
*Additional approvals may be required for floodplain impacts by IDNR/OWR, FEMA, and local authorities.		

USACE 404 permitting/IEPA 401 WQC Process

In Illinois, the USACE, IDNR, and the IEPA use a joint application form for impacts to waterways, floodplains, and wetlands. Each regulatory agency should be sent a copy of the application. The applications are filed simultaneously with the USACE, IDNR, and IEPA, and processed concurrently. Permit processing is expected to take approximately12 months, once a complete permit application is submitted.

4.4 Wetland Issues

4.4.1 Relief Wells

Although relief wells may be located within or adjacent to wetlands, the impact of constructing these wells should be relatively minor and mostly temporary during the installation process. Temporary impact to wetlands as a result of access and construction would be the primary impact to these systems. Minor permanent impact may result from the construction of new wells. Any permanent impact to wetlands as a result of repairing or replacing relief wells would require permitting.

Clean fill materials may need to be placed into wetlands to create work pads in association with replacement of existing relief wells, if conditions are wet at the time of construction. Similarly, drilling of pilot holes for new wells to replace ineffective existing wells may involve placement of drilling (fill) materials into a wetland. Discharges of clean fill materials associated with these types of construction activities are covered under Nationwide Permits #3 (Maintenance) and #6 (Survey Activities). Section 401 WQC has already been issued by the IEPA for these two nationwide permits, with no special conditions. These actions would be temporary, and fill materials would be removed and affected sites restored to pre-project conditions. Adverse effects to wetlands would be temporary and not significant.

4.4.2 Seepage Berms, Clay Caps, and Cutoff Walls

Any permanent impact to wetlands would require permitting and mitigation. Mitigation for wetland impacts will be required if impacts exceed 0.1 acre. Mitigation requirements are dependent on the outcome of the wetland delineations and final construction plans.

4.4.3 Required Mitigation

As discussed above, wetland mitigation will be required for any impacts exceeding 0.1 acre. The mitigation requirements will be determined by the District Engineer, on a case-by-case basis, and must be practicable in terms of cost, existing technology and logistics in light of the overall project purpose. Appropriate compensatory mitigation may include restoration, creation, enhancement, or in some cases preservation of wetlands and other aquatic resources including forested riparian corridors.

To comply with mitigation requirements, the applicant may choose to perform project-specific mitigation or purchase credits from a mitigation bank, if available. A project-specific mitigation project is usually designed and implemented by the permittee upon the approval of the St. Louis District Corps of Engineers (SLDCOE). The project-specific mitigation is often located on-site or near the authorized activity. The permittee is responsible for monitoring the mitigation site, typically for a period of 5-10 years, in order to insure the aquatic ecosystem has been successfully re-established or re-created at an appropriate site and its habitat is similar to the impacted/lost ecosystem.

In addition, the permittee is responsible for developing any and all real estate arrangements, such as easements or deed restrictions, required to insure long-term avoidance of the mitigation area. The requirement for an easement or a deed restriction is at the discretion of the SLDCOE. The easement or deed restriction requirement may be waived if the compensatory mitigation is completed on public lands. However, a maintenance agreement with the public landowner will be required if the permittee is not the owner of the mitigation lands.

There are 11 permitted mitigation banks listed on the St. Louis District's website. Five are located in Illinois and six are located in Missouri. Additional banks may be available. The project does not lie within the service area of any of the five banks in Illinois; however, it may be possible (for a higher fee or mitigation ratio) to use one of the following:

- Madison County Mitigation Bank - sponsored by Madison County Highway Department; bank is not for commercial use.
- Indian Creek Wetland Mitigation Bank - project is outside the service area
- Southern Illinois Wetland Mitigation Bank - services portions of St. Clair and Madison Counties
- Richland Creek Mitigation Bank - located in St. Clair County
- Crooked Creek Wetland Mitigation Bank - project is outside the service area

Mr. Michael Thompson with Wetlands Forever, Inc. (mike@rpmtrees.net; 618-204-0199) was contacted by AMEC staff. He is the sponsor of several banks in the area and is in the design phase of a potential new bank, which will be called the American Bottoms Wetland Mitigation Bank. Reportedly, he will be applying for his permit to run the bank in the next three to six months, and has already been in discussions with the USACE. This proposed bank will service the project area. The bank is forecasted to have 150-180 credits, ranging in price from $15-25k. Mr. Thompson indicated that he will negotiate the cost of credits based on how many credits are needed. The bank may be open as soon as 2012. Mr. Thompson also expressed an interest in taking on the mitigation on a contract basis if the bank is not permitted prior to the need for credits. It should be noted that this potential bank has not been approved by the USACE and will not necessarily be available in the timeframe of the project.

There are also a number of other options for off-site mitigation. The USACE can provide potential mitigation sites that they have reviewed in the past, and/or adjacent property owners may provide areas that could be used for a mitigation site. Areas used for borrow could potentially be converted to mitigation areas.

AMEC has estimated that mitigation costs will be approximately $50K per acre of wetland impact. This assumes an average mitigation ratio of 2:1 and an average cost of $25K to construct an acre of wetland or buy a wetland mitigation credit.

4.5 Threatened and Endangered Species Review

The potential for impacting Threatened and Endangered (T&E) species will be evaluated during the permitting process. A preliminary scoping letter has been drafted for submittal to the USFWS. Consultation must also be initiated with the Illinois Department of Natural Resources (IDNR), as State agencies or units of local government must consult the IDNR about proposed actions that they will authorize, fund or perform. Consultation with IDNR, which has not been initiated, may be completed on-line through IDNR's Ecological Compliance Assessment Tool (EcoCAT).

Federally listed species are provided protection under the Endangered Species Act. State listed species are provided protection under the Illinois Endangered Species Protection Act. The

USFWS will likely require surveys for some or all of the known Federally-listed species within the project area of each levee system. Depending on the results of the surveys, an "incidental take permit" may be required for the project if Federally-listed species would be potentially impacted. Additionally, the USFWS could require a Biological Assessment (BA) to determine potential impacts to species and mitigation if impacts are expected. If the incidental take of state-listed species is likely, a conservation plan may be required by the IDNR.

Land disturbing activities, tree clearing and construction could be limited during certain times of the year due to the presence to T&E species. T&E species occurrence data was obtained from the USFWS website and the Illinois Natural Heritage database. The following list includes all Federally and State threatened and endangered species known to occur in each county that the specific levee is located.

Threatened and Endangered Species County Occurrence Data

LEVEE SYSTEM	***FEDERALLY-LISTED SPECIES WITHIN THE COUNTY***	***SPECIES LISTED ONLY BY THE STATE AS THREATENED OR ENDANGERED***
WOOD RIVER	6	21
MESD	7	30
PDP/FL	7	34

5.0 CULTURAL RESOURCES ASSESSMENTS

5.1 Archaeological Overview/Background Research

Background research was conducted on archaeological site files and survey reports located at the Illinois Historic Preservation Agency (IHPA) and the Illinois State Museum Research and Collections Center in Springfield, Illinois. Information from this effort is summarized below:

Wood River

- Several large sections have been archaeologically investigated previously;
- 30 previously recorded archaeological sites are located within 1000 ft of the Wood River Levee, only 6 of those archaeological sites are within 100 ft of proposed improvements;
- There are no National Register of Historic Places (NRHP) properties or districts within 1000 ft of the Wood River Levee.

MESD

- A majority of the MESD Levee has been previously surveyed for cultural resources;
- 64 previously recorded archaeological sites are situated within 1000 ft of the MESD Levee, 1 site is located within 100ft of proposed levee improvement
- There are no NRHP properties or districts within 1000 ft of the MESD Levee.

PDP

- A majority of the PDP Levee has been archaeologically investigated by SCI Engineering, Inc. (SCI);
- 28 previously recorded archaeological sites are situated within 1000 ft of the PDP Levee, 4 known sites are within 100 ft of proposed improvements;
- The P. Martin/Boismenue House was constructed in 1790 by Pierre Martin and listed on the NRHP in 1990. It is located at the intersection of First Street and Old Route 3 (Water Street) in North Dupo, Illinois and is within 1000 ft of the PDP Levee.

Fish Lake

- A majority of the FL Levee has been archaeologically investigated by SCI;
- 5 previously recorded archaeological sites are situated within 1000 ft of the PDP Levee;
- There are no NRHP properties or districts within 1000 ft of the Fish Lake Levee.

5.2 Consultation with Agencies

Consultation with regulatory agencies is required for compliance with Section 106 of the National Historic Preservation Act (NHPA). AMEC has consulted with the USACE - St. Louis District and the IHPA to define the area of potential effect and to develop an approach to implement archaeological investigations.

- Consultation with the USACE is on-going.
- A meeting was held with the IHPA on February 15, 2011 to discuss the project and identify the area of potential effect.
    - IHPA understands that this is a separate undertaking from the COE project and appears willing to focus on the direct impacts only, of the project on cultural resources. There was no mention with regard to indirect impacts.
    - IHPA appears flexible with regard to defining the future cultural resources needs based on type of proposed levee improvement, and on previous completed surveys. Review surveys that are older than 10 years to determine if they meet

the current archeological survey guidelines and are sufficient in assessing geomorphological content.
- IHPA would prefer open communication with the project team going forward so that they can better work with us to meet our construction schedule.

5.3 Consultation with Native American Tribes

Consultation with Native American Tribes is the responsibility of the lead federal agency (USACE) for compliance with Section 106 of the NHPA.

5.4 Phase I Cultural Resources Work Plan

Based on the information obtained during the consultation process with the IHPA/USACE, a draft work plan was developed to define the area of potential effect, determine types of cultural resources surveys that will be required, document the field methods that will be used to conduct the surveys, define the methods used to collect artifact and soil samples, describe the analysis and curation processes, and provide a schedule for completion of fieldwork and submittal of a report detailing the results of the investigation. The cultural resources tasks include:

- Phase I Cultural Resources Survey
- Geoarcheological Survey
- Historic Above-Ground Structures Survey
- Reporting
- Curation of Artifacts and Project Documentation

A draft work plan is currently being updated to incorporate the updated 30% Design Drawings. The area of potential effect will be reviewed against these designs to confirm the extent of proposed improvements and determine the level of cultural resources surveys required.

5.5 Cultural Resources Survey Completed by SCI

SCI completed a cultural resources survey program of the PDP and Fish Lake Levees between September 2008 and February 2009. (We understand small portions of the levee were inaccessible to the field crew at the time of the survey.) AMEC has obtained copies of this report and submitted it to the IHPA for Section 106 clearance of the PDP and Fish Lake levees on February 24, 2011. As of April 2011, we have not received comments on this report from the IHPA.

6.0 HYDROLOGIC AND HYDRAULIC (H&H) AND INTERIOR DRAINAGE ANALYSES

6.1 Hydrology

6.1.1 Task Description

The purpose of the hydrologic study was to determine the 10, 25, 50, 100 and 500-year frequency event peak discharge values at critical locations that can be used for hydraulic modeling in order to determine available freeboard at the subject levee systems pursuant with FEMA levee standards outlined in 44 CFR 65.10. The results were also utilized to perform the through-seepage and under-seepage analysis. The hydrologic models were created using the USACE HEC-HMS model and were calibrated using historical peak flow gage data from the United States Geological Survey.

Wood River; The watershed of Wood River is drained by three major tributary streams, Wood River, East Fork Wood River and West Fork Wood River. All three streams flow generally from north to south. East Fork and West Fork Wood River combine to form Wood River which eventually flows into the Mississippi River. At the point of confluence of East Fork and West Fork Wood Rivers, approximately 3,300 feet upstream of the East Broadway Street Bridge, the tributary watershed is 119.6 square miles. It is just upstream of this location in the watershed where the overall topographic characteristics of the watershed change from steeply sloped terrain to the broad flat floodplain of the Mississippi River. Wood River has a drainage area of approximately 123 square miles at the terminus of the hydrologic project modeling located at the point where Wood River discharges into the Mississippi river.

Cahokia Creek Diversion Canal; The watershed of Cahokia Creek is drained by two major tributary streams, Indian Creek and Cahokia Creek. Both streams flow generally from north to south. At the confluence of Indian Creek with Cahokia Creek, Cahokia Creek turns to flow generally east to west, then ultimately discharges into the Mississippi River. At the point of confluence of Indian Creek and Cahokia Creek, approximately 5,000 feet upstream of Highway 19, the tributary watershed is 261.1 square miles. It is just upstream of this location in the watershed where the overall topographic characteristics of the watershed change from steeply sloped terrain to the broad flat floodplain of the Mississippi River. Cahokia Creek has a drainage area of approximately 276 square miles at the terminus of the hydrologic project modeling located at the point where Cahokia Creek is no longer bounded by levees. Beyond this location, Cahokia Creek continues to flow approximately 3,400 feet to the point of confluence with the Mississippi River.

Prairie du Pont Canal; The watershed of Prairie du Pont Canal is drained by three (3) major tributary streams, Sparrow Creek, Hickman Creek, and Prairie du Pont Creek. All three streams flow from generally the east to the west. These streams combine to form the Prairie du Pont Canal which ultimately discharges into the Mississippi River. At the point of confluence of the three major tributaries of Prairie du Pont Canal, approximately 900 feet upstream of County Highway 40, the tributary watershed is 36.2 square miles. It is at this location in the watershed where the overall topographic characteristics of the watershed change from steeply sloped terrain to the broad flat floodplain of the Mississippi River. Prairie du Pont Canal has a drainage area of approximately 41.5 square miles at the terminus of the hydrologic project modeling located at the point where Prairie du Pont Canal is no longer bounded by levees. Beyond this location, the Prairie du Pont Canal continues to flow approximately 7000 feet to the point with its confluence with the Mississippi River.

Carr Creek; The watershed of Carr Creek is drained by two major streams, Wilson Creek and Carr Creek. Both streams flow from generally the east to the west with Carr Creek ultimately discharging into the Mississippi River. At the point of confluence with Carr Creek, Wilson Creek has a drainage area of approximately 2.74 square miles and Carr Creek has a drainage area of approximately 8.05 square miles. At the terminus of the hydrologic project modeling located at the point where Carr Creek is no longer bounded by levees and discharges into the Mississippi River floodplain, approximately 5400 feet upstream of the confluence of the Carr Creek channel with the Mississippi River, the watershed is approximately 11.94 square miles.

6.1.2 Hydrologic Model Calibration and Results

Wood River and Cahokia Creek Diversion Canal; The Hec-HMS model was calibrated by comparing peak flow results to historical peak annual flow data from two USGS gages in the watershed. Two USGS stream flow gages are located within the study area, Cahokia Creek at Edwardsville, IL and Indian Creek at Wanda, IL. Because no gages are available in the Wood River system and because of the close proximity of the Indian Creek gage and the similar basin characteristics, an area-weighted approach was used to transfer the Indian Creek gage results to the Wood River system.

The calibration approach adjusted model parameters so that the 100-year HMS flow was within 15 percent of gage flows while also trying to best match gage values for the other frequency flows. Curve numbers in the Indian Creek catchments were increased nine percent. Curve numbers in the Cahokia Creek catchments were decreased 17 percent. In the Cahokia Creek upper catchments the transform method was changed to Clark transform hydrograph in order to reduce peaks and lengthen the hydrograph. Curve numbers in the Wood River system were increased 12 percent.

Tables 1 and 2 show calibration results and percent difference as compared to gage flows. Table 3 shows resulting peak discharges at key locations to be used in hydraulic modeling.

Table 1. Cahokia and Indian Creek Calibration Results

	10 yr (cfs)			50 yr (cfs)			100 yr (cfs)			500 yr (cfs)		
	Gage	HMS	%	Gage	HMS	%	Gage	HMS	%	Gage	HMS	%
Cahokia Gage 05587900 (HMS CCU10400J)	8,140	4,634	-43%	9,975	9,057	-9%	10,600	11,935	13%	11,850	20,722	75%
Indian Gage 05588000 (HMS INC10100J)	4,305	4,261	-1%	7,190	6,661	-7%	8,620	8,137	-6%	12,450	12,781	3%

Table 2. Wood River Calibration Results

	10 yr (cfs)			50 yr (cfs)			100 yr (cfs)			500 yr (cfs)		
	Gage	HMS	%	Gage	HMS	%	Gage	HMS	%	Gage	HMS	%
Mouth of WF Wood River (HMS WFW10000J)	6,500	5,134	-21%	10,855	8,674	-20%	13,010	12,254	-6%	18,795	15,367	-18%
Just D/S EF and WF Confluence (HMS WOR10104J)	14,030	12,056	-14%	23,430	19,514	-17%	28,090	26,789	-5%	40,575	33,759	-17%

Table 3. Requested Certified Discharges

		Peak Discharges, cfs				
Cahokia Creek	HMS Element	10-year	25-year	50-year	100-year	500-year
US Route 255	CCL10401J	9,070	11,996	14,437	17,153	25,146
Above Indian Creek Confluence	CCU10000J	4,953	6,997	8,975	11,814	20,323
Above Mooney Creek Confluence	CCU10500J	4,567	7,102	9,268	12,186	20,934
Above Sherry Creek Confluence	CCU11000J	4,424	6,900	8,617	10,841	17,228
At Madison County line	CCU11400J	3,707	5,431	6,685	8,288	12,912
Indian Creek						
Mouth at Indian Ck	INC10000J	4,440	5,663	6,888	8,414	13,314
Roosevelt Rd	INC10600J	2,922	3,591	4,237	5,090	7,653
East Fork Wood River						
At Mouth	EFW10000J	7,104	9,279	11,027	14,582	18,403
Coy Lane	EFW10600J	5,282	6,708	8,436	11,731	15,401
West Fork Wood River						
At Mouth	WFW10000J	5,134	7,018	8,674	12,254	15,367
Below Lick Creek confluence	LKC10000J	4,173	5,694	6,880	9,435	13,249
Below Honeycut Branch confluence	WFW10400J	3,916	5,294	6,360	8,844	12,463
Below Tributary X confluence	WFW10500J	2,304	3,194	4,001	5,444	7,022
Wood River						
Below East and West Fork confluence	WOR10104J	12,056	15,923	19,514	26,789	33,759

Prairie du Pont Canal; The overall hydrologic analysis of the Prairie du Pont watershed was accomplished using the Corps of Engineers computer program HEC-HMS, version 3.5. The HEC-HMS program incorporates rainfall-runoff algorithms which allow the analysis of various basin characteristics, rainfall distributions and routing techniques. Tables 4 and 5 below present the discharge results of the HEC-HMS program hydrology analyses for Prairie du Pont Canal. It should be noted that no calibration of the modeling referred to in this report was possible due to the absence of stream gages in the studied watershed.

Table 4. Peak Discharge Comparison - Prairie Du Pont Canal

Location		*Peak Discharges FIS values/Discharge values from this study*				
	HMS Element	10-year (cfs)	25-year (cfs)	50-year (cfs)	100-year (cfs)	500-year (cfs)
Prairie du Pont Canal at confluence with Mississippi River	Junction 14	12,000/ 8046	N/A/ 11,125	17,700/ 14,434	19,500/ 18,205	21,800/ 27,800
Change in Peak Discharges (%)		-33%	N/A	-18%	-7%	+28%

Table 5. Requested Certified Discharges - Prairie Du Pont Canal

Location	HMS Element	Drainage Area (sq mi)	*Peak Discharges*				
			10-year (cfs)	25-year (cfs)	50-year (cfs)	100-year (cfs)	500-year (cfs)
Outlet of PDP Canal	Junction 14	41.5	8046	11,125	14,434	18,205	27,800
IL Route 3	Junction 13	41.3	8052	11,159	14,652	18,520	28,400
PDP East Pump Station	Junction 12	41.2	8186	11,357	15,217	19,254	29,500
Harding Ditch Pump Station	Junction 11	41.1	7723	10,971	15,341	19,592	31,000
Prairie Du Pont Creek							
Co. Hwy 40	Junction 2	36.2	6519	9299	13,313	17,117	27,250
IL Route 163	Junction 6	20.2	3862	5403	7764	9849	14,750

Carr Creek; The overall hydrologic analysis of the Carr Creek watershed was accomplished using the Corps of Engineers computer program HEC-HMS, version 3.5. The HEC-HMS program incorporates rainfall-runoff algorithms which allow the analysis of various basin characteristics, rainfall distributions and routing techniques. Tables 6 and 7 below present the discharge results of the HEC-HMS program hydrology analyses for Carr Creek. It should be noted that no calibration of the modeling referred to in this report was possible due to the absence of stream gages in the studied watershed.

Table 6. Peak Discharge Comparison - Carr Creek

Location		*Peak Discharges FIS values/Discharge values from this study*				
	HMS Element	**10-year (cfs)**	**25-year (cfs)**	**50-year (cfs)**	**100-year (cfs)**	**500-year (cfs)**
Carr Creek 10,400 ft. downstream of Bluff Rd.	Junction 7	N/A/2763	N/A/4237	N/A/5787	N/A/7409	N/A/11,750
Upstream of Bluff Road	Junction 6	N/A/3130	N/A/4773	N/A/6522	N/A/8334	N/A/13,100
Downstream of Wilson Cr. confluence	Junction 2	2522/3108	N/A/4745	5667/6498	7417/8321	11,723/N/A
Downstream of confluence of Carr Creek Trib.	Junction 1	1571/2007	N/A/3085	3502/4236	4576/5430	7140/N/A
Upstream of Gall Road	Carr Cr Gall Rd	1332/1703	N/A/2616	2959/3592	3862/4603	6020/N/A
Carr Creek Trib						
		Peak Discharges FIS values/Discharge values from this study				
Location	HMS Element	10-year (cfs)	25-year (cfs)	50-year (cfs)	100-year (cfs)	500-year (cfs)
Downstream of Gall Road	Carr Cr Trib	260/339	N/A/526	596/731	785/933	1240 N/A

Table 7. Requested Certified Discharges - Carr Creek

Location		***Peak Discharges***				
	HMS Element	**10-year (cfs)**	**25-year (cfs)**	**50-year (cfs)**	**100-year (cfs)**	**500-year (cfs)**
Carr Creek 10,400 ft. downstream of Bluff Rd.	Junction 7	2763	4237	5746	7409	11,750
Upstream of Bluff Rd.	Junction 6	3130	4773	6494	8334	13,100

6.2 Hydraulics

6.2.1 Task Description

The purpose of the hydraulics study was to determine the 10, 25, 50, 100 and 500-year frequency event peak water surface elevations and the available freeboard for the 100-year frequency event, pursuant with FEMA levee standards outlined in 44 CFR 65.10.

The USACE HEC-RAS version 4.0 computer model was used to analyze the study reaches. Cross-sectional geometry was complimented with the bathymetry survey data where available.

Bridge and inline structure dimensions were collected by a survey crew and entered into the models.

Manning's n values were estimated from photographs taken by the survey crew, and from aerial photography. Ineffective flow areas were set within the cross sections based on engineering judgment. Normal depth slope was used as a downstream boundary condition. Flow change locations from HMS hydrology models were applied to the nearest or next downstream cross section in the hydraulic model.

6.2.2 Levee Freeboard Determination

The National Flood Insurance Program (NFIP) requires that a certified levee provide at least 3.0 feet of freeboard through the levee system, with an additional 0.5 feet at the upstream end of the levee, and an additional 1.0 feet near bridge crossings or other constrictions. The freeboard values listed in the table below take into account backwater effects from the Mississippi River based on the HEC-RAS model for the Upper Mississippi River Flow Frequency Study (UMRFFS) performed by the U.S. Army Corps of Engineers.

Table 8 shows the minimum amount of freeboard available at each study reach. NFIP freeboard requirements are met along the length of all levees in the study area.

Table 8. Available Freeboard

Watercourse	Minimum Freeboard
Wood River, East Fork and West Fork Wood River	9.5
Indian Creek	5.1
Cahokia Creek	7.5
Prairie du Pont Canal	
MESD Flank Levee	5.61
PDP Flank Levee	4.80
Carr Creek	
Fish Lake Flank Levee	4.59

6.3 Interior Drainage Analysis

The Southwest Illinois levee certification project studies portions of the Mississippi River, Wood River, Wood River East, Wood River West, Cahokia Creek, Prairie du Pont Canal, Indian Creek and Carr Creek. Adjacent to these water bodies are five levee systems, including Wood River, Chain of Rocks, Metro East Sanitary District, Prairie du Pont and Fish Lake. The purpose of this interior drainage analysis (IDA) is to determine the locations and extent of interior flooding in the low-lying areas adjacent to the levees.

A total of 77 conveyance locations through the levee were studied, including 28 pump stations (plus associated gravity drains) and 49 gravity drains. Each location was evaluated separately and depending on the location, condition and area draining to each structure, the location was

modeled and evaluated for interior flooding. Although each location is modeled as an individual conveyance through the levee, some are interconnected and were modeled as such within the interior hydrology models.

6.3.1 Summary of Methods

The project area was divided into three distinct areas for modeling purposes: 1) The "Wood River" system is contained by the Wood River levee system and includes a drainage area of roughly 28 square miles; 2) the "MESD" system is contained by the Metro East Sanitary District and Chain of Rocks levee systems, and includes a drainage area of roughly 212 square miles; 3) the "Fish Lake/PdP" system is contained by the Fish Lake levee and Prairie du Pont levee systems, and includes a drainage area of roughly 30 square miles.

These three areas are hydrologic systems that are independent of the backwater effects from the exterior system (i.e. Mississippi River) and therefore require a coincident frequency analysis that utilizes joint probability to determine the effects of high river stages on the interior flooding. Historic USGS gauge records are used to determine exterior discharges at points along the system. The water surface elevations were determined from USACE HEC-RAS models for each location using the point discharges as flow change points. PCSWMM models were developed to represent the interior conditions. The analysis required joint probability calculation for each location to determine the one-percent recurrence interval event on the interior side of the levee system.

6.3.2 Floodplain Plotting

The floodplains were plotted using two-foot LiDAR data where available and USGS 10-meter DEM in other locations. Resulting floodplains were reviewed and adjusted as necessary using engineering judgment.

7.0 CIVIL ENGINEERING ANALYSES AND DESIGN

7.1 Desktop Strip Map Investigations

The GIS data bases were obtained from Madison, St. Clair and Monroe counties. The GIS data bases include parcel limits, right-of-way limits, parcel ownership, etc. This information was imported from the ESRI 9.3.1 GIS platform into the Bentley Microstation V8i (Selectseries 2) and Bentley InRoads Suite V8i (Selectseries 2) platforms on which the construction drawings are being prepared.

7.2 Limited Strip Map Surveys

The levee right-of-way (ROW) limits developed as part of section 7.1 above and the physical space occupied by the existing levee were evaluated to determine the extent of available excess levee ROW. Proposed solutions such as relief wells, cut off walls and clap caps are constructed near the levee with a relatively narrow footprint. Sufficient excess levee ROW is available to construct a significant number of these types of solutions without acquisition of additional levee ROW. However, the wide footprint of seepage berms and gravel filters will almost always require acquisition of additional levee ROW. Alternatives involving hybrid solutions may be considered at specific locations.

Given the higher than expected quality of the parcel boundary information, the clear identification of solutions requiring additional levee ROW acquisition, it was determined that the need for Limited Strip Map Surveys will be minimal. It was determined that the execution of Limited Strip Map Surveys should be delayed until the final selection repair solutions has been completed. Therefore, no Limited Strip Map Surveys were completed as part of the 30% design effort.

7.3 Full Strip Map Surveys

As part of the levee ROW evaluation completed as part of section 7.2 above, it was determined levee ROW acquisition will be required from parcels adjacent to the levee where seepage berms or gravel filters will be used.

Full Strip Map Surveys have been executed on the following parcels in PdP/Fish Lake:

COUNTY	*PARCEL ID#*	*OWNER*	*LAND USE*	*SURVEY TYPE*
ST. CLAIR	06040300003	DENNIS TRUSTEE ETAL PULCHER	AGRICULTURAL	Strip Map
ST. CLAIR	06040300004	DENNIS TRUSTEE ETAL PULCHER	AGRICULTURAL	Strip Map
ST. CLAIR	06040300004	DENNIS TRUSTEE ETAL PULCHER	AGRICULTURAL	Strip Map
ST. CLAIR	06040400025	DENNIS TRUSTEE ETAL PULCHER	VAC/UNDEV	Strip Map
ST. CLAIR	06040505001	SOUTHERN RR	VAC/UNDEV	Strip Map
ST. CLAIR	06040512001	METRO EAST SANITARY DISTRICT	INDUSTRIAL	Strip Map
ST. CLAIR	06090200006	MARY L PULCHER	AGRICULTURAL	Strip Map
ST. CLAIR	06090200006	MARY L PULCHER	AGRICULTURAL	Strip Map
ST. CLAIR	06090200012	DU PONT D & L DISTRICT PRAIRIE	INDUSTRIAL	Strip Map
ST. CLAIR	06090200012	DU PONT D & L DISTRICT PRAIRIE	INDUSTRIAL	Strip Map
ST. CLAIR	06090200014	DU PONT D & L DISTRICT PRAIRIE	INDUSTRIAL	Strip Map
ST. CLAIR	06090512001	TERMINAL RAILROAD ASSN	VAC/UNDEV	Strip Map

COUNTY	PARCEL ID#	OWNER	LAND USE	SURVEY TYPE
ST. CLAIR	06080300004	DU PONT D & L DIST PRAIRIE	INDUSTRIAL	Strip Map
ST. CLAIR	06080300006	DARYL & SANDRA CATES	AGRICULTURAL	Strip Map
ST. CLAIR	06080400001	DU PONT D & L DIST PRAIRIE	INDUSTRIAL	Strip Map
ST. CLAIR	06080400006	LLOYD H TRUSTEE PULCHER	AGRICULTURAL	Strip Map
MONROE	02-30-300-002-000	GUMMERSHEIMER EARL	RESIDENTIAL	Strip Map
MONROE	01-36-400-002-000	VOGT BERNARD J TRUST	AGRICULTURAL	Strip Map
MONROE	02-31-300-001-000	PULCHER FARMS INC	AGRICULTURAL	Strip Map
MONROE	02-30-300-001-000	GUMMERSHEIMER EARL J	AGRICULTURAL	Strip Map
MONROE	02-30-300-003-000	GUMMERSHEIMER EARL	AGRICULTURAL	Strip Map
MONROE	02-31-100-001-000	PULCHER LLOYD H	AGRICULTURAL	Strip Map
MONROE	01-36-400-001-000	PR DU PONT LEVEE & DRAINAGE	INDUSTRIAL	Strip Map
MONROE	03-01-200-001-000	PR DU PONT LEVEE & DRAINAGE	INDUSTRIAL	Strip Map
MONROE	04-06-100-001-000	PULCHER LLOYD H	AGRICULTURAL	Strip Map
MONROE		PDP/FL LEVEE DIST STA: 478+00 to 494+00	INDUSTRIAL	Strip Map
MONROE		PDP/FL LEVEE DIST STA: 457+00 to 466+00	INDUSTRIAL	Strip Map
MONROE		PDP/FL LEVEE DIST STA: 466+00 to 478+00	INDUSTRIAL	Strip Map
MONROE	03-01-400-001-000	KOMIT REALTY VENTURE	AGRICULTURAL	Strip Map
MONROE	03-12-200-001-000	KOMIT REALTY VENTURE	AGRICULTURAL	Strip Map
MONROE	03-12-200-002-000	J & M TWO RIVERS FARM CORP	AGRICULTURAL	Strip Map

Full Strip Map Surveys have been executed on the following parcels in Wood River:

COUNTY	PARCEL ID#	OWNER	LAND USE	SURVEY TYPE
MADISON	181141200000018005	WILLAREDT ACRES INC	VAC/UNDEV	Strip Map
MADISON	181141200000901002	MISSOURI PACIFIC RR	INDUSTRIAL	Strip Map
MADISON	181141200000006	WILLAREDT ACRES INC	VAC/UNDEV	Strip Map
MADISON	181141200000901	MISSOURI PACIFIC RR	INDUSTRIAL	Strip Map
MADISON	181141200000018002	FLOYD, FELIX VELTON JR & BARBARA LYNN	VAC/UNDEV	Strip Map
MADISON	181140100000012	LOSCH, CATHERINE N TR	VAC/UNDEV	Strip Map
MADISON	181141200000016001	PONTIUS, STANLEY M AND LOIS E	VAC/UNDEV	Strip Map
MADISON	181140100000901	MISSOURI PACIFIC RR	INDUSTRIAL	Strip Map
MADISON	181141200000901001	MISSOURI PACIFIC RR	INDUSTRIAL	Strip Map
MADISON	181141200000018004	WOOD RIVER DRAINAGE & LEVEE DIST	INDUSTRIAL	Strip Map
MADISON	181141200000006006	VILLAGE OF ROXANA	VAC/UNDEV	Strip Map
MADISON	182140120101007	Unknown	VAC/UNDEV	Strip Map
MADISON	181141200000013	LOSCH, CATHERINE N TR	AGRICULTURAL	Strip Map
MADISON	181141200000018	WILLAREDT ACRES INC	VAC/UNDEV	Strip Map
MADISON	181141200000007	BROADDUS, SHAUNNAN L	AGRICULTURAL	Strip Map
MADISON	141150600000901001	MISSOURI PACIFIC RR	INDUSTRIAL	Strip Map
MADISON	182140120101010	Unknown	COMMERCIAL	Strip Map
MADISON	182140120101009	Unknown	VAC/UNDEV	Strip Map
MADISON	182140120101008	Unknown	VAC/UNDEV	Strip Map
MADISON	141150600000005	WOOD RIVER DRAINAGE & LEVEE DIST	INDUSTRIAL	Strip Map
MADISON	141150700000001	LINKEMAN, ALVIN & LAVERNE D	RESIDENTIAL	Strip Map
MADISON	141150700000002001	GILLHAM, EDWARD L	AGRICULTURAL	Strip Map
MADISON	141150600000006001	GILLHAM, EDWARD L & LUCIE CIZEK	AGRICULTURAL	Strip Map

The number of Full Strip Map Surveys in MESD will be significantly affected by the type of repair solution used. It was determined that the execution of Full Strip Map Surveys in MESD should be delayed until the final selection repair solutions has been completed. Therefore, no Full Strip Map Surveys were completed in MESD as part of the 30% design effort.

7.4 Boundary Surveys

Boundary Surveys are only required when title insurance will be purchased as part of fee simple ROW acquisitions. The need for title insurance will be evaluated on a property by property basis. It was determined that the execution of Boundary Surveys should be delayed until the final selection repair solutions and property evaluations have been completed. Therefore, no Boundary Surveys were completed as part of the 30% design effort.

7.5 Topographic Surveys

Lidar based Digital Terrain Models (DTM's) were received from the Corps of Engineers and from the Madison County Geographic Information Systems (GIS) department. These DTM's were utilized for seepage berm grading, developing berm cross sections and quantifying fill material. Aerial photography data was obtained from the Madison County Geographic

Information Systems (GIS) department St. Clair County Data Processing Department, Monroe County GIS Department & the Corps of Engineers St, Louis District. This data was used in development of the 30% construction drawings. Given the quality of LiDAR and aerial photogrammetric data received, additional land-based topographic surveys were not needed for the 30% plans.

7.6 Lidar Surveys

As discussed in section 7.5 above, Lidar and aerial photogrammetric data sufficient for preparation of construction drawings was provided by others. Therefore, no Lidar Surveys were completed as part of the 30% design effort, nor will Lidar Surveys be completed as part of future phases of the project.

7.7 Utility Coordination

The utility clearance process completed as part of the subsurface investigation requires that every boring be included in a JULIE call. In conjunction with the JULIE utility locate calls, a site visit was made to identify existing above and below ground utilities at the locations of proposed solutions. The locations of above ground utilities as well as visible above ground indications of below ground utilities and JULIE flagging were sketched onto a map.

In addition, available utility maps were obtained from those utility companies that release copies of their maps. Hard copies of the following utility maps were obtained:

- Gas - Conoco Phillips - Wood River Refinery
- Gas - ExxonMobil
- Gas - MO Gas Pipe
- Gas - Nustar Energy
- Gas - TransCanada
- Gas - Buckeye Partners
- Water - American Bottoms
- Phone - AT&T
- Phone - MCI-Verizon

Because the number of Full Strip Map Surveys executed as part of the 30% design effort was limited, the number of Title Commitments and associated backup documents were also limited. Review of utility easement language proved to be of limited value.

Design criteria, policies, procedures, etc. were obtained as appropriate.

7.8 30% Complete Civil Design

For the purpose of this project, we have grouped the design improvements as follows:

Solution to Deficiency / Driver	Geotechnical Design	Appurtenant Civil Design / Civil Role
Clay Caps	Clay Caps	Grading, CDs, ROW, Utility Relocation, Surveys, etc.
Cutoff Walls	Cutoff Walls	Alignment, CDs, ROW, Utility Relocation, Surveys, etc.
Relief Wells	Relief Wells	Surface Drainage, Enclosed Drainage, Pump Stations, CDs, ROW, Utility Relocation, Surveys, etc.

Solution to Deficiency / Driver	Geotechnical Design	Appurtenant Civil Design / Civil Role
Seepage Berms	Seepage Berms	Grading, Surface Drainage, Enclosed Drainage, Pump Station Relocation, Roadway Relocation, CDs, ROW, Utility Relocation, Surveys, etc.
Graded Filters/Toe Drains	Graded Filters/Toe Drains	Grading, Surface Drainage, CDs, ROW, Utility Relocation, Surveys, etc.
Civil Improvements	n/a	Freeboard, Pump Stations, Closure Structures, CDs, ROW, Utility Relocation, Surveys, etc.

In addition to recommended improvements identified as part of the Levee Certification Inspection Report prepared by AMEC, a review of available reports and records was completed to identify potential non-geotechnical recommended improvements found by others. The available documents that were reviewed include:

- "Wood River Flood Protection Project - Mississippi River - Madison County, Illinois - Levee, Closure Structures, and Pump Stations - Periodic Inspection No. 10", Dated March 2009, Prepared by US Army Corps of Engineers St. Louis District.
- "Limited Reevaluation Report - Wood River Levee System Reconstruction Project", Dated October 2005, Prepared by US Army Corps of Engineers St. Louis District.
- "Limited Reevaluation Report and Environmental Assessment - Design Deficiency Corrections - East St. Louis, Illinois Flood Protection Project", Dated August 2010, Prepared by US Army Corps of Engineers St. Louis District.
- "East St. Louis & Vicinity Flood Protection Project - Mississippi River - Madison and St. Clair Counties, Illinois - Levee Floodwalls, Pump Stations, Gravity Drains, Instrumentation & Closure Structures - Periodic Inspection No. 9", Dated June 2010, Prepared by Reitz & Jens, Inc. & Horner & Shifrin Inc. Under Subcontract to Kaskaskia Engineering Group, LLC. Prepared for US Army Corps of Engineers St. Louis District.
- "Prairie Du Pont - Fish Lake Protection Project - Mississippi River - Monroe and St. Clair Counties, Illinois - Levee, Pump Stations, Gravity Drains, Instrumentation & Closure Structures - Periodic Inspection No. 10, Dated November 2009, Prepared by Reitz & Jens, Inc. & Horner & Shifrin Inc. Prepared for US Army Corps of Engineers St. Louis District.

Each respective levee district, as well as the Corps of Engineers St. Louis District was contacted to obtain information regarding completed projects, projects currently under construction and funded future projects. A list of civil recommended improvements was compiled and screened against the repairs that have been or will be completed by others to eliminate potential redundant effort. The list of civil recommended improvements was screened against the FEMA certification criteria to separate out into a "B" list, those improvements not required to be addressed for certification. Many of the "B" list items will be included as maintenance tasks to be addressed by the levee districts in the O&M manual that will be developed by AMEC as part of a future phase of services.

The civil recommended improvements list has been reduced to 40 corrugated metal pipe (CMP) gravity drains and one "Toe Drain". Although the condition of these CMP gravity drains has not been verified through CCTV inspection, we believed that they are in need of repair, based on

the Corps' decision to rehabilitate drains under their control of similar age. Except for these 40, all other CMP gravity drains have been slip-lined, or determined to be in satisfactory condition. It is our understanding that these 40 CMP gravity drains were not repaired by the levee districts or the Corps of Engineers St. Louis District because they are considered to be privately owned, and therefore are considered the responsibility of the owner. The slip-line repair of these 40 CMP gravity drains is included in the 30% construction drawings and is included in the 30% design construction cost estimate. An agreement with a CCTV inspection contractor has been signed and inspection is scheduled to be complete when river levels fall below the level of the gravity drain. CCTV inspection of the Toe Drain was completed in April.

7.9 30% Complete Construction Document Preparation

The 30% Complete Construction Drawings represent repair solutions required to meet FEMA certification criteria. The drawings are organized in such a way that when carried forward to final design, construction bid packages can be developed to align with levee contractor areas of practice.

The 30% Complete Construction Drawings were developed on the Bentley Microstation V8i (Selectseries 2) and Bentley InRoads Suite V8i (Selectseries 2) platform, using data from various sources to develop a representation of existing conditions as a base. Sources of data include the following:

Data Received	Data Detail	Source
Aerial Photos		USACE, St. Clair, Monroe & Madison Counties
Wetland Delineation	NWI	USACE
Parcel Boundaries	GIS Shapefiles	East West Gateway, Madison, St. Clair, and Monroe Counties
LIDAR DTM & Points		USACE, Madison County
Existing Relief Wells		URS 2010 Relief well inventory

The 30% Construction Drawings include proposed repair solutions consisting of seepage berms, fill of low areas, seepage berm cross sections, clay caps, slip-line repairs, new relief wells, existing relief well rehabilitation, gravel filters/drains, cutoff walls and preliminary construction details.

SpecsIntact^{tm} will be used as a basis for technical specifications. An outline of the technical specifications is included with the 30% deliverables.

Construction cost data was gathered from numerous sources, including IDOT, MoDOT, general contractors, specialty contractors, suppliers, available bid tabs, etc. The data source, basis, assumptions and conditions are documented for proper application. The cost data was evaluated and reduced to unit cost for the various cost items included in the construction cost estimate. The set of 30% Construction Drawings identifies and delineates all proposed improvements and are used to quantify construction based on takeoff of the various cost items.

7.10 Real Estate & Land Acquisition Services

The Scope of Work included in work order MSA01-WO02 was based on the assumption that development of repair solutions would allow land acquisition activities to start during the 30% design phase. However, because of the uncertainty of ROW needs associated with consideration of alternative solutions, it was determined that the start of ROW acquisition should be delayed until the selections of alternative solutions is complete. Land values for construction cost estimating purposes were obtained directly from the county assessors.

8.0 WORK ORDER #2 DELIVERABLES

8.1 General

The design approached used to develop the 30% design has been covered in the previous sections. Table 1 below presents a number of deliverables associated with Work Order #2 that were not specifically discussed or presented in the previous sections. Documents identified in Table 1 are stored on the CD/DVD accompanying this report.

Table 1

Discipline	Item Description	Document Number
General	30% Design Memorandum (this document)	563170001-ADM-DBM-0001
Geotechnical	Database of subsurface information	563170001-GEO-DAT-0002
	Relief Well Inventory Spreadsheet and Condition Inspection Reports	563170001-GEO-DAT-0003
	Technical Specification for specific capacity testing of Relief Wells	563170001-GEO-SPC-0001
	Geotechnical Baseline Report- Wood River	563170001-GEO-RPT-0001
	Geotechnical Baseline Report- MESD	563170001-GEO-RPT-0002
	Bill Mok White Paper, Underseepage Analysis and Hydrogeologic Parameters	563170001-GEO-RPT-0003
	Exploration Report for MESD	563170001-GEO-RPT-0004
	Exploration Report for PdP/FL	563170001-GEO-RPT-0005
	Exploration Report for Wood River	563170001-GEO-RPT-0006
	Geophysical Investigation Report	5-6317-0001-GEO-RPT-0007
	Access Agreements	563170001-ADM-ROE-0001
Hydrologic Analysis	Hydrologic report summary for the Carr Creek watershed	Carr Creek Hydrology Report.pdf 563170001-HH-RPT-0001
	Hydrologic report summary for the PDP Canal watershed	PDP Canal Creek Hydrology Report.pdf 563170001-HH-RPT-0002
	Hydrologic report summary for the Wood River system (main, East, and West Forks) and the Cahokia and Indian Creek watershed	Wood River_Cahokia Cr_Hydrology Report.pdf 563170001-HH-RPT-0003
Hydraulic and Freeboard Analysis	Hydraulic Summary Report for the study reach of Carr Creek	Carr Creek Hydraulic Evaluation.pdf 563170001-HH-RPT-0004
	Freeboard evaluation summary report for the study reach of Carr Creek	Carr Creek Freeboard Evaluation.pdf 563170001-HH-RPT-0005
	Hydraulic Summary Report for the study reach of PDP Canal	PDP Canal Hydraulic Evaluation.pdf 563170001-HH-RPT-0006
	Freeboard evaluation summary report for the study reach of PDP Canal	PDP Canal Freeboard Evaluation.pdf 563170001-HH-RPT-0007

Discipline	Item Description	Document Number
	Hydraulic Summary and Freeboard Evaluation summary for the study reaches of the Wood River System, Cahokia Creek, and Indian Creek.	Wood River_Cahokia Cr_Hydraulic and Freeboard Report.pdf 563170001-HH-RPT-0008
Survey	MESD Bore Hole Locations	563170001-CIV-LST-0001
	PDP-FL Bore Hole Locations	563170001-CIV-LST-0002
	Wood River Bore Hole Locations	563170001-CIV-LST-0003
	PDP-FL Strip Map Surveys	563170001-CIV-MAP-0001
	Wood River Strip Map Surveys	563170001-CIV-MAP-0002
	Desktop Surveys (All Levees)	563170001-CIV-MAP-0003
Civil	30% Construction Drawings	563170001-ADM-DWG-0001
	30% Cost Estimate	563170001-ADM-EST-0001
	30% Project Specifications	563170001- CIV-SPC-0001

APPENDIX A - LIMITED ENVIRONMENTAL ANALYSES

LIST OF SITES RETAINED FOR FURTHER REVIEW

LIST OF DOCUMENTS REVIEWED

ENVIRONMENTAL/HAZMAT PROTOCOL

LIST OF SITES RETAINED FOR FURTHER REVIEW

EDR Map #	Levee	Sites of Potential Concern (EDR Report No. and Name)	Site Address	Environmental Information
Focus Map 2	Wood River Levee	14.Owens-Brockway Glass Container Parc	Il Route 143, Alton, IL 62002	IL Eng. Controls, and Inst. Controls Groundwater use restriction and engineered soil barrier
Focus Map 2	Wood River Levee	16. Owens-Brockway Glass Container Parc	Foot of Vine Street, Alton, IL 62002	IL Eng. Controls, and Inst. Controls Groundwater use restriction and engineered soil/asphalt barrier
Focus Map 2	Wood River Levee	17. Laclede Steel Co Alton Works	Broadway Cut STS, Alton, IL	CORRACTS, US Inst. Controls, Iron and Steel mill, waste oil SWMU, migration of groundwater under control, soil stabilization measures implemented,
Focus Map 2	Wood River Levee	19. Owens-IL Inc. Glass Container Div	IL	IL IMPDMENT, Industrial impoundment, treatment - settling, concrete bottom,
Focus Map 2	Wood River Levee	22. Laclede Steel Co	IL	IL IMPDMENT, Industrial impoundment, waste storage, clay bottom,
Focus Map 3	Wood River Levee	12. Olin Corporation Zone 17 Plant	Illinois Route 3, East Alton, IL 62024	CERC-NFRAP, CORRACTS, PADS, RCRA Subtitle C, assigned medium corrective action priority, copper rolling, smelting, refinery, electroplating, polishing
Focus Map 16	MESD Levee	69. US Army Charles Melvin Price Supp	Rt 3/Niedringhaus, Granite City, IL 62040	IL LUST, status not reported
Focus Map 20	MESD Levee	93. A 1 Oil Corp	1 Mobile Ave, Sauget, IL 62201	CERC-NFRAP, deferred to RCRA, also known as Resource Recovery Group
Focus Map 20	MESD Levee	93. TWI Transporation Inc.	7 Mobile Ave, Site B, Sauget, IL 62201	CORRACTS, RCRA-TSD, 2001-CA process terminated, also known as Veolia Technical Solutions
Focus Map 20	MESD Levee	94. Krummrich W G PLT	Illinois Route 3 at Monsanto Ave, Sauget, IL 62201	CERCLIS, site is part of an NPL site, also known as Sauget Toxic Dump
Focus Map 20	MESD Levee	94. Afton Chemical Corp	501 Monsanto Ave, Sauget, IL 62201	IL Spills, no additional information
Focus Map 20	MESD Levee	96. Village President	IL	IL IMPDMENT, no additional information

Focus Map 20	MESD Levee	Orphan. Sauget Monsanto Landfill	1/2 mile west of Route 3, Sauget, IL 62201	IL SHWS, owner listed as Illinois Central Gulf Railroad, closed, no final cover
Focus Map 21	MESD Levee	94. Monsanto Co WG Krummrich	Route 3, Sauget, IL 62201	CERCLIS, ESI ongoing
Focus Map 21	MESD Levee	94. Krummrish W G Plt	Illinois Route 3 at Monsanto Ave, Sauget, IL 62201	CERCLIS, Site is part of NPL

Notes:
Focus Map numbers from EDR
Radius Map report

LIST OF DOCUMENTS REVIEWED

Title	Date	Author
Final NFA Record of Decision - Charles Melvin Price Support Center	Nov. 2008	Base Realignment and Closure Division; U.S. Army Environmental Command; U.S. Army corps of Engineers
HTRW Preassessment Screen Sampling and Analysis Plan Phase II ESA Design Deficiency Corrections for East St. Louis, Illinois Flood Protection Project	Aug. 2010	USACE - Environmental Quality Section
General Reevaluation Report St. Louis Harbor, Missouri and Illinois Project (Draft)	Oct. 2004	U.S. Army Corps of Engineers - St. Louis District
Regional Groundwater Flow and Contaminant Transport Model - American Bottoms Aquifer	April 2008	GSI Environmental Inc.
HTRW Initial Hazard Assessment (Phase I Environmental Site Assessment) MESD East St. Louis Flood Protection Rehabilitation Project Volumes 1-4	Nov. 2008	ARDL, Inc.
Wood River Levee System General Reevaluation Report - Appendix C - Environmental and Public Coordination	July 2005	U.S. Army Corps of Engineers - St. Louis District
Remedial Investigation Report - Sauget Area 2, Sauget, Illinois	Oct. 2008	URS Corporation
Downhole Seismic Testing, Mississippi River Bridge, St. Louis, Missouri	Nov. 7, 2008	Geotechnology, Inc.
Downhole Seismic Testing, Mississippi River Bridge, St. Louis, Missouri	Nov. 11, 2008	Geotechnology, Inc.
Downhole Seismic Testing, Mississippi River Bridge, St. Louis, Missouri	Nov. 20, 2008	Geotechnology, Inc.
Downhole Seismic Testing, Mississippi River Bridge, St. Louis, Missouri	Jan. 9, 2009	Geotechnology, Inc.
Downhole Seismic Testing, Mississippi River Bridge, St. Louis, Missouri	Jan. 12, 2009	Geotechnology, Inc.
Downhole Seismic Testing, Mississippi River Bridge, St. Louis, Missouri	Jan. 23, 2009	Geotechnology, Inc.
MRB Boring Logs and Core Photos	Sept. - Dec. 2008	HNTB
CPT Field Logs	Oct. 2008	Fugro
MRB Project Plan and Elevation	May 2008	HNTB
Mississippi River Levees - St. Louis District Aerial Photos	N/A	U.S. Army Corps of Engineers - St. Louis District

Title	Date	Author
Investigation of Underseepage, Mississippi River Levess - Soil Profiles, Peiziometer Lines, and Cross Sections	N/A	U.S. Army Corps of Engineers - St. Louis District
Long-Term Monitoring Program - 4th Quarter 2009 Data Report	Feb. 2010	URS Corporation
PCB Groundwater Quality Assessment Program - 4th Quarter 2009 Data Report	Feb. 2010	URS Corporation
Illinois Route 3 Drum Site Groundwater Sampling - 4th Quarter 2009 Data Report	Feb. 2010	URS Corporation
Limited Reevaluation Report and Envrionmental Assessment Design Deficiency Corrections for East St. Louis, IL Flood Protection Project	Aug. 2010	U.S. Army Corps of Engineers - St. Louis District
HTRW Initial Hazard Assessment Phase I Environmental Site Assessment for Wood River Levee Relief Well Installation Project	May 2008 (Amended March 2009)	U.S. Army Corps of Engineers - St. Louis District
Collection of Environmental Subsurface Samples at the Wood River Levee Along Routh 3, Wood River Illinois (Letter)	Aug. 2009	URS Corporation
Phase II Remedial Plan, Terminal Control Room Area (CP FOIA Doc)	Sept. 2004	ATC Associates, Inc.
Perimeter Sampling Plan, IEPA Site Remediation Program, Phillips Pipe Line Company	Nov. 1999	Terracon
Perimeter Sampling Report, Phillips Pipe Line Company	Sept. 2000	SECOR International Incorporated
Remediation Progress Reports, Calander Years 2000 - 2009, Phillips Pipe Line Company	2001-2010	SECOR International Incorporated
In-Situ Chemical Oxidation Plan, MW-23 & PZ-46 Area	Nov. 2004	ATC Associates, Inc.
Bioslurp Pilot Study Plan, Filter Area	July 2005	ATC Associates, Inc.
In-Situ Chemical Oxidation Report, MW-23 & PZ-46 Area, Conoco Phillips Pipe Line Company	July 2006	ATC Associates, Inc.
Separate Phase Hydrocarbon Recovery Report, Conoco Phillips Pipe Line Company	May 2007	ATC Associates, Inc.
Report of Findings, Bioslurp Pilot Test Evaluation	Aug. 2010	ATC Associates, Inc.
30% Seepage Design - Wood River Drainage and Levee District (WRLDL) Southwest Illinois Levee Project	Jan 2011	URS Corporation

ENVIRONMENTAL/HAZMAT PROTOCOL

GENERAL PROCEDURE FOR WORK IN CONTAMINATED AREAS

Applicability:

Unless alternative site-specific guidance is provided, this procedure applies to any drilling, coring, testing, or construction activities involving potential environmental contamination impacts to soil and/or water, including previously-identified restricted areas or impacts discovered during the course of site work.

Should any visible, olfactory, or other evidence of actual waste material be encountered during construction or investigation activities, immediately stop work and evacuate the immediate area. Notify the AMEC Project Manager immediately so environmental professionals can be deployed for further investigation.

Potentially-contaminated water, groundwater, equipment decontamination and rinse water, and development water associated with a geotechnical well, relief well, or excavation should not be discharged to the ground surface! Likewise, potentially-impacted waste soil (e.g., cuttings, excavations, etc.) should not be placed or spread directly on the ground surface!

Soil-Disturbing Construction Activities:

1) Implement the Environmental HASP whenever working in a restricted area or if indications of contamination become apparent (e.g., if soil or water in a well or excavation has an odor, discoloration, sheen, or floating product or other indications of another liquid phase like oil, gasoline, or chemical). In restricted areas, wearing of nitrile or similar gloves should be mandatory in accordance with the HASP.

2) Take a PID reading in the worker breathing space periodically during work. If the breathing space PID reading is > 5 ppm or > 5 ppm above background readings, stop work and allow the well or excavation to ventilate until PID readings are below 5 ppm or return to background levels.

3) When disturbing soil during construction, such as augering a new relief well, the suspected petroleum or other chemical impact should be evaluated through the use of a calibrated photoionization detector (PID) or other device to measure headspace VOC (using bag method) in samples from cuttings/split spoons (for new wells) or otherwise excavated soil, as follows:

   a) Take background PID measurements at the ground level prior to breaking ground or drilling;
   b) Take PID measurements on a regular basis after ground is broken to promptly detect organic soil contamination during the excavation or drilling;

c) Take a PID measurements at least every 5 feet during excavation or drilling and note visual or olfactory indications of contamination (e.g., brown soil becoming gray or other discoloration or solvent, gasoline, or other odors).

4) Treat waste soil as 'contaminated' if a PID reading of soil sample is > 50 ppm, or if visual or olfactory indications of contamination are present.

a) Make plastic sheeting and two to three 55-gallon drums available at locations that have not been environmentally cleared.

b) Segregate material with indications of contamination by placing on plastic sheeting. If material is to be staged overnight or longer, place additional plastic sheeting over the material to prevent precipitation from contacting it and secure sheeting.

c) Transfer contaminated materials to drum(s) or other container (e.g., roll-off box) as soon as possible.

d) Obtain representative soil sample for analysis

i) Volatile organic compounds (VOCs) by United States Environmental Protection Agency (USEPA) Solid Waste (SW)-846 Method 8260;

ii) Semi-volatile organic compounds (SVOCs) by USEPA SW-846 Method 8270;

iii) Total Priority Pollutant List (PPL) metals by USEPA SW-846 Method 6000/7000 series; and

iv) Other parameters as necessary based on the known impact in the area.

e) Arrange for shipment of contaminated soils to approved disposal facility.

5) Management of potentially-contaminated water:

a) Place small quantities of water, including decontamination and rinse waters, in drums. Collect samples per *Management of Potentially-Impacted Water* procedure (below)

b) See *Management of Potentially-Impacted Water* procedure (below) if removing large quantities of potentially-contaminated water from a relief well (during testing) or other excavation (during construction activities).

Management of Potentially-Impacted Water:

1) Implement the Environmental HASP whenever working in a restricted area or if indications of contamination become apparent (e.g., if water in the well or excavation has an odor, discoloration, sheen, or floating product or other indications of another liquid phase like oil or gasoline). In restricted areas, wearing of nitrile or similar gloves should be mandatory in accordance with the HASP.

2) Take a PID reading in the worker breathing space periodically during work. If the breathing space PID reading is > 5 ppm or >5 ppm above background readings, stop work and allow the well or excavation to ventilate until PID readings are below 5 ppm or return to background levels.

3) Take a reading near the top of the well or excavation. If a PID reading > 5 ppm or >5 ppm above background readings is measured at the top of the well or excavation, or odors, discoloration, sheen, or floating product are present, the water should be assumed to be contaminated. Liquids accumulating or withdrawn from the well or excavation must be contained and should not be discharged to the ground, sewer, or surface water bodies (including ditches and wetlands).

4) A sample of water with suspected impacts should be collected using standard environmental sampling protocols and health and safety precautions. The sample should be characterized with the following analyses, as appropriate:

   a) Volatile organic compounds (VOCs) by United States Environmental Protection Agency (USEPA) Solid Waste (SW)-846 Method 8260;

   b) Semi-volatile organic compounds (SVOCs) by USEPA SW-846 Method 8270;

   c) Total Priority Pollutant List (PPL) metals by USEPA SW-846 Method 6000/7000 series; and

   d) Other parameters as necessary based on the known impact in the area.

5) Following characterization of the water, AMEC technical staff will determine appropriate management to be implemented prior to resuming work. Options available for management of water from impacted wells or construction areas may include:

   a) Capture and transfer via vacuum truck or other means to a licensed recycling or disposal facility. Appropriate characterization and disposal paperwork should be generated and maintained to document appropriate handling of water.

b) Direct discharge to sanitary sewer without treatment. Approval from the receiving waste water treatment facility should be secured. A copy of the written approval should be obtained in advance and maintained to document appropriate handling of the water.

c) On-site treatment of the water can be accomplished through the use of granular activated carbon (GAC) secured from a vendor or by other means, depending on the nature of the impacts. Treated water should either be contained for subsequent discharge/transport or directly discharged. It should be noted that anticipated volumes may make containment difficult or impossible and discharge should only be completed following written approval. Direct discharge may be possible to the following:

   i) Local waste water treatment plant at a manhole after securing written approval from the local water treatment plant.

   ii) Nearby surface water, catch basin, wetland, or ditch after securing a **National Pollutant Discharge Elimination System (NPDES)** permit from the Illinois Environmental Protection Agency (IEPA).

   iii) Ground surface after securing a permit from IEPA.

Appendix B

30% Design Cost Estimate

CONSTRUCTION COST ESTIMATE
FOR
SOUTHWESTERN ILLINOIS LEVEE CERTIFICATION DESIGN IMPROVEMENTS

PREPARED FOR

SOUTHWESTERN ILLINOIS FLOOD PREVENTION DISTRICT COUNCIL

PREPARED BY

AMEC EARTH & ENVIRONMENTAL, INC

APRIL 2011

AMEC FILE NO. 563170001-ADM-EST-0001

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1.0 INTRODUCTION

1.1 Background

The purpose of this project is to design improvements such that, upon construction, the subject levee systems will be eligible for accreditation in accordance with 44 CFR 65.10 criteria. The proposed improvements consist of installation or construction of improvements to address deficiencies in the levee systems. The proposed improvements include:

- Clay Caps
- Cutoff Walls
- New Relief Wells
- Rehabilitation of Existing Relief Wells
- Seepage Berms
- Gravel Filters
- Pump Station Improvements
- Miscellaneous Appurtenant Civil Improvements

1.2 Purpose

The purpose of this construction cost estimate is to identify and quantify estimated construction costs at the 30% complete design phase of the project. This construction cost estimate is intended to be used for validation of the program budget and to evaluate and compare construction costs of various design solutions. The construction cost estimate will also be used along with other data to prioritize, program and schedule activities through the remainder of the project.

1.3 Classification and Level of Accuracy

As defined by the Association for the Advancement of Construction Cost Engineering International (AACEI, 1999) the construction cost estimate conforms to the criteria of a “Class 3” estimate. The expected accuracy range of a Class 3 estimate is within 20% over the estimate to 10% under the estimate. To reduce the risk of underestimation of construction costs, a contingency as described below is applied to unit costs.

1.4 Methodology & Sources of Information

A combination of estimating methods was used in the development of the construction cost estimate. The construction cost estimate was based primarily on a historical unit cost basis; however price quotes from specialty contractors, vendors and suppliers were also used.

A significant portion of the work aligns with the types of construction that are regularly procured by governmental agencies. Agencies such as IDOT, MoDOT and St. Louis MSD contract for construction on a unit cost basis and maintain historical unit cost bid records. This unit cost data is a reliable representation of local construction cost, and when applied properly produces a reliable construction cost estimate.

A considerable amount of the overall construction cost is associated with non-typical construction such as relief well installation, cutoff wall installation, etc. Because this type of work is not procured by governmental agencies on a regular basis, unit cost data is not available. This non-typical construction will be completed by specialty contractors, some of

which use proprietary methods and equipment. These specialty contractors are available to assist the design team and can provide conceptual construction cost estimates.

In addition to the above, RSMeans construction cost data was used as backup source of information and basis for developing the construction cost estimate. The national average for construction cost can be adjusted to local construction cost by applying the "City Construction cost Index". The City Construction cost Index for East St. Louis is summarized in the following table.

RSMeans City Construction cost Index

East St. Louis, Illinois	Factor
Material	94.0
Installation	106.6
Total	99.6

While material construction cost is 94.0% of the national average, installation is 106.6% of the national average. The higher installation construction cost is a result of local labor rates. The combined index for East St. Louis is 99.6% of the national average. If a specific construction cost item included a high labor to material ratio, the national average was adjusted to account for higher local labor rates. Otherwise, the national average construction cost was used.

Engineering judgment and construction cost data from specific projects were also used to develop and validate unit costs. Limited historical unit cost data was available from the USACE. USACE projects are typically bid as a lump sum; therefore construction costs for specific items cannot be discerned from other construction costs. Prior to acceptance and use, all unit costs were validated by comparison to at least on other source identified above. Refer to Appendix D – Unit cost Development for detailed documentation of the sources and build-up of the unit cost used in the construction cost estimate.

1.5 Basis

The 30% Design Construction Drawings were used a basis of construction cost estimating. The Microstation and Inroads CADD/design software package was utilized to develop construction drawings. The design features of the software were utilized to measure and quantify lengths, volumes, areas, etc. for the various construction cost items.

1.6 Allowances

Provisions for allowances are not currently included in the construction cost estimate. Allowances for certain items may be incorporated into the contract document and construction cost estimate during final design.

1.7 Owner Provided Material

Provisions for owner provided material are not currently included in the construction cost estimate. Owner provided material may be incorporated into the contract document and construction cost estimate during final design.

1.8 Assumptions

The assumptions on which the unit costs are based are identified as part of the development of the unit cost value. Refer to Appendix D – Unit cost Development for detailed documentation of assumption and build-up of the unit cost used in the construction cost estimate. Cost estimate reflects use of Union Labor.

1.9 Exclusions

The construction cost estimate specifically excludes the following:

- professional fees (design, construction management, legal, financial, etc.)
- operation construction costs
- maintenance construction costs
- life-cycle analysis

1.10 Risks and Opportunities

Risk of underestimating construction costs and opportunities to reduce estimated construction costs have been identified at this 30% design phase. As a more detailed design is developed, schedules are refined and contract documents are finalized; the risks should decrease and opportunities to reduce costs will be pursued.

1.10.1 Use of Spoil Material

The cost estimate includes costs for disposal of excess material from installation of clay caps, clay blankets, cutoff walls, etc. The cost estimate also includes costs for hauling on material for construction of seepage berms and clay caps, clay blankets, etc. Although these construction activities may not occur during the same phase of the project, there may be opportunities to use excess material from one solution as fill material for another solution.

1.10.2 Deep Cutoff Wall

We have had several conversations with two international specialty contractors concerning this project. We talked with Arturo Ressi who represented Kiewit during the initial proposal stages of the project. During that period of time Mr. Ressi indicated to us that we could use a budget of $32 per square foot of wall face as a budgetary number for the deep cutoff walls. He went on to indicate that for the quantities we had on this job, that number would include mobilization and some keying into the bedrock. We have had several other discussion since the proposal effort for this job and Arturo's has indicated that $32 per square foot of face is still a good budgeting number and has some minor contingency in it.

We also have talked to several executives and project managers from Hayward Baker Int. over the past several months. We asked if HBI would prepare a cost estimate for us on both the deep and shallow cutoff walls. They have one system for the deep walls and several alternatives for the shallow walls. This information is presented in the attached cost estimate. On the deep walls HBI indicated with the limited time they put into the cost estimate that they believe their wall would be constructed of a combination of Cement, Bentonite and Slag which would be mixed insitu with the existing site soils. They would typically expect to see the walls gain some moderate strength of approximately 300 PSI to 500 PSI. Typically the cement makes up about 15% to 20% of the mixture.

Other considerations and qualifications include:

- Each of the specialty wall contractors has their own proprietary system and piece of equipment used to install the deep cutoff walls. Because of this, comparing one company to another will be difficult to produce apples to apples comparison.
- Both of the companies we have discussed this project with have worked in this area and are familiar with the site conditions and the local manpower conditions. Both companies indicated they priced the job using union forces and their prices reflect the local market conditions.
- Both companies stated large obstructions (i.e. boulders) would be a big concern to them and their prices do not reflect dealing with these issues.
- Both companies plan on using cement in the wall. Cement is a commodity and has been subject to fluctuation in pricing although it has remained steady for the last several years.
- Both companies indicated that it will need to a fairly wide platform (about 50 feet in width) to work from.
- Both companies have the ability to key the wall into bedrock. This adds a premium to the price for the installation.

1.10.3 Hazardous and Special Waste Disposal

The Wood River and MESD levee systems are in a highly developed industrial area where several know environmental sites exist near and adjacent to select repair locations. As such, there is a potential to encounter either hazardous or special wastes in the construction relief wells or cut-off walls. The impact of encountering those type materials is the need for special handling and proper disposal of the material.

Based on a review of the EDR database report and other relevant information, AMEC environmental professionals identified areas (identified by station numbers) where specific environmental/hazmat protocols were to be used during geotechnical subsurface investigation and construction activities due to the possibility of encountering soil and/or groundwater contaminants.

1.11 Contingencies

For a Class 3 cost estimate, the AACEI recommends adding a 20% to 25% contingency to the estimated construction cost. The cost estimate was developed with a contingency for each cost item. A 30% contingency is applied to cost items associated with cutoff walls. All other cost items include a 20% contingency.

1.12 Escalation

The construction cost estimate includes a present value “Construction Estimate” total cost and a “Construction Estimate Escalated” total cost. The escalated cost was developed based on the USACE guidelines, a reference date of July 1, 2011 and 4 year construction duration. The construction estimate is escalated to the mid-point of 4 years. Refer to Appendix E – Construction Cost Escalation for detailed documentation of assumptions, sources of data and computations.

2.0 CONSTRUCTION COST ESTIMATE

2.1 Overall Construction Cost Estimate

Construction Estimate	Present Value	Escalated
Wood River	$50,435,000	$52,170,000
MESD	$57,713,000	$59,698,000
PdP/FL	$17,027,000	$17,612,000
Total Construction Estimate	**$125,175,000**	**$129,480,000**

APPENDIX A – OVERALL CONSTRUCTION COST ESTIMATE

DETAILED SUMMARY - WOOD RIVER, MESD, PdP & FISH LAKE

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%	268,311	$ 3,863,678
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%	185	$ 1,332,072
3	Clear & Grub - Wooded	AC	$ 21,625	20%	70	$ 1,816,500
4	Cutoff Wall - Deep	SF	$ 32	30%	957,418	$ 39,828,589
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%	45,453	$ 1,527,221
6	Cutoff Wall - Shallow	SF	$ 12	30%	158,600	$ 2,474,160
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%	181,813	$ 2,399,932
8	Dewatering	LF	$ 51	20%	11,455	$ 701,046
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%	569	$ 65,549
10	Drainage - Inlet Structure	EA	$ 2,200	20%	1	$ 2,640
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%	7,200	$ 1,218,240
12	Excavation	CY	$ 11	20%	191,485	$ 2,527,603
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%	47,161	$ 1,358,237
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%	70,017	$ 2,436,592
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%	709,631	$ 1,703,114
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%	29,590	$ 426,096
17	Haul Off of Excess Material	CY	$ 6	20%	187,835	$ 1,352,413
18	Mobilization (% varies)	LS	$ 1,492,890		1	$ 1,492,890
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%	1	$ 726,600
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%	1	$ 839,400
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%	1	$ 1,019,400
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%	1	$ 1,019,400
23	Pump Station - Various Improvements	EA	$ 600,000	20%	4	$ 2,880,000
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%	1,247	$ 62,849
25	Pvmt - Improved Roadway	LF	$ 122	20%	3,522	$ 515,621
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%	8,388	$ 503,280
27	Pvmt - Road Repair	LF	$ 44	20%	15,840	$ 836,352
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%	42	$ 100,800
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%	76	$ 547,200
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%	6	$ 350,640
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%	78	$ 1,123,200
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%	24	$ 365,760
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%	3,588	$ 172,224
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%	29	$ 104,400
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%	3,548	$ 212,880
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%	3,591	$ 275,789
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%	11	$ 817,740
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%	51	$ 1,014,390
39	Relief Well - New Type "D"	EA	$ 32,500	20%	215	$ 8,385,000
40	Relief Well - New Type "T"	EA	$ 40,000	20%	67	$ 3,216,000
41	RipRap Bank Protection	CY	$ 120	20%	6,252	$ 900,288
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%	135	$ 1,053,000
43	ROW Acquisition - Commercial	AC	$ 30,000	20%	9	$ 324,000
44	ROW Acquisition - Governmental	AC	$ 25,000	20%	12	$ 360,000
45	ROW Acquisition - Industrial	AC	$ 30,000	20%	68	$ 2,448,000
46	ROW Acquisition - Residential	AC	$ 18,000	20%	1	$ 21,600
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%	79	$ 2,180,400
48	Seeding	AC	$ 1,650	20%	180	$ 356,420
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%	583,346	$ 8,400,183
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%	175	$ 23,100
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%	60	$ 8,280
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%	2,340	$ 339,768
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%	2,870	$ 454,608
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%	960	$ 158,976
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%	835	$ 167,334
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%	580	$ 139,896
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%	3,190	$ 842,160
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%	5	$ 1,800,000
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%	12,190	$ 7,314,000
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%	42	$ 504,000
61	Utility Relocation - Shield OE Power	LF	$ 50	20%	4,048	$ 242,880
62	Utility Relocation - Underground Communication	LF	$ 100	20%	8,300	$ 996,000
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%	2	$ 24,000
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%	3,805	$ 1,141,500
65	Wetland Mitigation	AC	$ 25,000	20%	112	$ 3,360,000
66	Construction Estimate					$ 125,175,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 129,480,000

APPENDIX B – WOOD RIVER CONSTRUCTION COST ESTIMATE

WOOD RIVER - SUMMARY

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%	72,980	$ 1,050,912
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%	57	$ 410,472
3	Clear & Grub - Wooded	AC	$ 21,625	20%	0	$ -
4	Cutoff Wall - Deep	SF	$ 32	30%	633,418	$ 26,350,189
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%	2,253	$ 75,701
6	Cutoff Wall - Shallow	SF	$ 12	30%	50,600	$ 789,360
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%	9,013	$ 118,972
8	Dewatering	LF	$ 51	20%	4,855	$ 297,126
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%	569	$ 65,549
10	Drainage - Inlet Structure	EA	$ 2,200	20%	1	$ 2,640
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%	0	$ -
12	Excavation	CY	$ 11	20%	38,594	$ 509,441
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%	21,399	$ 616,291
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%	21,827	$ 759,580
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%	78,845	$ 189,228
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%	29,590	$ 426,096
17	Haul Off of Excess Material	CY	$ 6	20%	38,594	$ 277,877
18	Mobilization (% varies)	LS	$ 575,815		1	$ 575,815
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%	1	$ 726,600
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%	1	$ 839,400
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%	0	$ -
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%	0	$ -
23	Pump Station - Various Improvements	EA	$ 600,000	20%	1	$ 720,000
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%	1,247	$ 62,849
25	Pvmt - Improved Roadway	LF	$ 122	20%	2,662	$ 389,717
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%	7,388	$ 443,280
27	Pvmt - Road Repair	LF	$ 44	20%	5,280	$ 278,784
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%	0	$ -
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%	13	$ 93,600
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%	0	$ -
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%	3	$ 43,200
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%	6	$ 91,440
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%	2,088	$ 100,224
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%	9	$ 32,400
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%	0	$ -
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%	1,336	$ 102,605
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%	3	$ 223,020
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%	10	$ 198,900
39	Relief Well - New Type "D"	EA	$ 32,500	20%	24	$ 936,000
40	Relief Well - New Type "T"	EA	$ 40,000	20%	42	$ 2,016,000
41	RipRap Bank Protection	CY	$ 120	20%	6,252	$ 900,288
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%	31	$ 241,800
43	ROW Acquisition - Commercial	AC	$ 30,000	20%	9	$ 324,000
44	ROW Acquisition - Governmental	AC	$ 25,000	20%	12	$ 360,000
45	ROW Acquisition - Industrial	AC	$ 30,000	20%	13	$ 468,000
46	ROW Acquisition - Residential	AC	$ 18,000	20%	1	$ 21,600
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%	31	$ 855,600
48	Seeding	AC	$ 1,650	20%	3	$ 5,960
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%	209,722	$ 3,019,997
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%	175	$ 23,100
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%	60	$ 8,280
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%	860	$ 124,872
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%	1,710	$ 270,864
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%	960	$ 158,976
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%	835	$ 167,334
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%	270	$ 65,124
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%	390	$ 102,960
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%	2	$ 720,000
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%	0	$ -
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%	7	$ 84,000
61	Utility Relocation - Shield OE Power	LF	$ 50	20%	4,048	$ 242,880
62	Utility Relocation - Underground Communication	LF	$ 100	20%	700	$ 84,000
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%	0	$ -
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%	2,805	$ 841,500
65	Wetland Mitigation	AC	$ 25,000	20%	51	$ 1,530,000
66	Construction Estimate					$ 50,435,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 52,170,000

WOOD RIVER - CUTOFF WALLS

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%	72,980	$ 1,050,912
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%	3	$ 21,672
3	Clear & Grub - Wooded	AC	$ 21,625	20%		$ -
4	Cutoff Wall - Deep	SF	$ 32	30%	633,418	$ 26,350,189
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%	2,253	$ 75,701
6	Cutoff Wall - Shallow	SF	$ 12	30%	50,600	$ 789,360
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%	9,013	$ 118,972
8	Dewatering	LF	$ 51	20%		$ -
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%		$ -
10	Drainage - Inlet Structure	EA	$ 2,200	20%		$ -
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%		$ -
12	Excavation	CY	$ 11	20%	14,831	$ 195,769
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%		$ -
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%		$ -
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%		$ -
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%		$ -
17	Haul Off of Excess Material	CY	$ 6	20%	14,831	$ 106,783
18	Mobilization	LS	$ 235,315	0%	1	$ 235,315
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%		$ -
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%		$ -
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%		$ -
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%		$ -
23	Pump Station - Various Improvements	EA	$ 600,000	20%		$ -
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%	1,247	$ 62,849
25	Pvmt - Improved Roadway	LF	$ 122	20%		$ -
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%	5,915	$ 354,900
27	Pvmt - Road Repair	LF	$ 44	20%		$ -
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%		$ -
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%		$ -
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%		$ -
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%		$ -
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%		$ -
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%		$ -
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%		$ -
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%		$ -
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%		$ -
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%		$ -
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%		$ -
39	Relief Well - New Type "D"	EA	$ 32,500	20%		$ -
40	Relief Well - New Type "T"	EA	$ 40,000	20%		$ -
41	RipRap Bank Protection	CY	$ 120	20%		$ -
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%		$ -
43	ROW Acquisition - Commercial	AC	$ 30,000	20%		$ -
44	ROW Acquisition - Governmental	AC	$ 25,000	20%	3	$ 90,000
45	ROW Acquisition - Industrial	AC	$ 30,000	20%	4	$ 144,000
46	ROW Acquisition - Residential	AC	$ 18,000	20%		$ -
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%		$ -
48	Seeding	AC	$ 1,650	20%	3	$ 5,960
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%		$ -
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%		$ -
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%		$ -
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%		$ -
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%		$ -
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%		$ -
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%		$ -
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%		$ -
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%		$ -
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%		$ -
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%		$ -
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%	5	$ 60,000
61	Utility Relocation - Shield OE Power	LF	$ 50	20%		$ -
62	Utility Relocation - Underground Communication	LF	$ 100	20%	700	$ 84,000
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%		$ -
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%		$ -
65	Wetland Mitigation	AC	$ 25,000	20%	18	$ 540,000
66	Construction Estimate					$ 30,286,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 31,328,000

WOOD RIVER - RELIEF WELLS

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%		$ -
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%		$ -
3	Clear & Grub - Wooded	AC	$ 21,625	20%		$ -
4	Cutoff Wall - Deep	SF	$ 32	30%		$ -
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%		$ -
6	Cutoff Wall - Shallow	SF	$ 12	30%		$ -
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%		$ -
8	Dewatering	LF	$ 51	20%		$ -
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%	120	$ 13,824
10	Drainage - Inlet Structure	EA	$ 2,200	20%		$ -
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%		$ -
12	Excavation	CY	$ 11	20%		$ -
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%		$ -
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%		$ -
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%		$ -
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%		$ -
17	Haul Off of Excess Material	CY	$ 6	20%		$ -
18	Mobilization	LS	$ 3,437	0%	1	$ 3,437
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%		$ -
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%		$ -
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%		$ -
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%		$ -
23	Pump Station - Various Improvements	EA	$ 600,000	20%		$ -
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%		$ -
25	Pvmt - Improved Roadway	LF	$ 122	20%		$ -
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%		$ -
27	Pvmt - Road Repair	LF	$ 44	20%		$ -
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%		$ -
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%		$ -
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%		$ -
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%	3	$ 43,200
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%	6	$ 91,440
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%	932	$ 44,736
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%		$ -
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%		$ -
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%		$ -
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%	3	$ 223,020
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%	10	$ 198,900
39	Relief Well - New Type "D"	EA	$ 32,500	20%	24	$ 936,000
40	Relief Well - New Type "T"	EA	$ 40,000	20%	41	$ 1,968,000
41	RipRap Bank Protection	CY	$ 120	20%	389	$ 56,016
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%	29	$ 226,200
43	ROW Acquisition - Commercial	AC	$ 30,000	20%		$ -
44	ROW Acquisition - Governmental	AC	$ 25,000	20%	5	$ 150,000
45	ROW Acquisition - Industrial	AC	$ 30,000	20%		$ -
46	ROW Acquisition - Residential	AC	$ 18,000	20%	1	$ 21,600
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%	3	$ 82,800
48	Seeding	AC	$ 1,650	20%		$ -
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%		$ -
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%		$ -
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%		$ -
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%		$ -
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%		$ -
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%		$ -
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%		$ -
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%		$ -
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%		$ -
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%		$ -
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%		$ -
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%		$ -
61	Utility Relocation - Shield OE Power	LF	$ 50	20%	525	$ 31,500
62	Utility Relocation - Underground Communication	LF	$ 100	20%		$ -
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%		$ -
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%		$ -
65	Wetland Mitigation	AC	$ 25,000	20%	5	$ 150,000
66	Construction Estimate					$ 4,241,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 4,387,000

WOOD RIVER - SEEPAGE BERMS

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%		$ -
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%	38	$ 273,600
3	Clear & Grub - Wooded	AC	$ 21,625	20%		$ -
4	Cutoff Wall - Deep	SF	$ 32	30%		$ -
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%		$ -
6	Cutoff Wall - Shallow	SF	$ 12	30%		$ -
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%		$ -
8	Dewatering	LF	$ 51	20%		$ -
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%	449	$ 51,725
10	Drainage - Inlet Structure	EA	$ 2,200	20%	1	$ 2,640
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%		$ -
12	Excavation	CY	$ 11	20%		$ -
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%		$ -
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%		$ -
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%		$ -
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%		$ -
17	Haul Off of Excess Material	CY	$ 6	20%		$ -
18	Mobilization	LS	$ 120,497	0%	1	$ 120,497
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%		$ -
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%		$ -
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%		$ -
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%		$ -
23	Pump Station - Various Improvements	EA	$ 600,000	20%		$ -
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%		$ -
25	Pvmt - Improved Roadway	LF	$ 122	20%	2,662	$ 389,717
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%	1,473	$ 88,380
27	Pvmt - Road Repair	LF	$ 44	20%		$ -
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%		$ -
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%	13	$ 93,600
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%		$ -
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%		$ -
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%		$ -
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%	1,156	$ 55,488
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%	9	$ 32,400
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%		$ -
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%	1,336	$ 102,605
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%		$ -
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%		$ -
39	Relief Well - New Type "D"	EA	$ 32,500	20%		$ -
40	Relief Well - New Type "T"	EA	$ 40,000	20%	1	$ 48,000
41	RipRap Bank Protection	CY	$ 120	20%		$ -
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%		$ -
43	ROW Acquisition - Commercial	AC	$ 30,000	20%	7	$ 252,000
44	ROW Acquisition - Governmental	AC	$ 25,000	20%		$ -
45	ROW Acquisition - Industrial	AC	$ 30,000	20%	9	$ 324,000
46	ROW Acquisition - Residential	AC	$ 18,000	20%		$ -
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%	22	$ 607,200
48	Seeding	AC	$ 1,650	20%		$ -
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%	209,722	$ 3,019,997
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%		$ -
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%		$ -
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%		$ -
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%		$ -
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%		$ -
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%		$ -
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%		$ -
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%		$ -
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%	2	$ 720,000
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%		$ -
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%	2	$ 24,000
61	Utility Relocation - Shield OE Power	LF	$ 50	20%	2,123	$ 127,380
62	Utility Relocation - Underground Communication	LF	$ 100	20%		$ -
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%		$ -
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%	2,805	$ 841,500
65	Wetland Mitigation	AC	$ 25,000	20%		$ -
66	Construction Estimate					$ 7,175,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 7,422,000

WOOD RIVER - CIVIL IMPROVEMENTS

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%		$ -
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%	16	$ 115,200
3	Clear & Grub - Wooded	AC	$ 21,625	20%		$ -
4	Cutoff Wall - Deep	SF	$ 32	30%		$ -
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%		$ -
6	Cutoff Wall - Shallow	SF	$ 12	30%		$ -
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%		$ -
8	Dewatering	LF	$ 51	20%	4,855	$ 297,126
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%		$ -
10	Drainage - Inlet Structure	EA	$ 2,200	20%		$ -
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%		$ -
12	Excavation	CY	$ 11	20%	23,763	$ 313,672
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%	21,399	$ 616,291
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%	21,827	$ 759,580
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%	78,845	$ 189,228
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%	29,590	$ 426,096
17	Haul Off of Excess Material	CY	$ 6	20%	23,763	$ 171,094
18	Mobilization	LS	$ 216,566	0%	1	$ 216,566
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%	1	$ 726,600
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%	1	$ 839,400
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%		$ -
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%		$ -
23	Pump Station - Various Improvements	EA	$ 600,000	20%	1	$ 720,000
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%		$ -
25	Pvmt - Improved Roadway	LF	$ 122	20%		$ -
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%		$ -
27	Pvmt - Road Repair	LF	$ 44	20%	5,280	$ 278,784
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%		$ -
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%		$ -
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%		$ -
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%		$ -
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%		$ -
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%		$ -
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%		$ -
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%		$ -
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%		$ -
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%		$ -
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%		$ -
39	Relief Well - New Type "D"	EA	$ 32,500	20%		$ -
40	Relief Well - New Type "T"	EA	$ 40,000	20%		$ -
41	RipRap Bank Protection	CY	$ 120	20%	5,863	$ 844,272
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%	2	$ 15,600
43	ROW Acquisition - Commercial	AC	$ 30,000	20%	2	$ 72,000
44	ROW Acquisition - Governmental	AC	$ 25,000	20%	4	$ 120,000
45	ROW Acquisition - Industrial	AC	$ 30,000	20%		$ -
46	ROW Acquisition - Residential	AC	$ 18,000	20%		$ -
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%	6	$ 165,600
48	Seeding	AC	$ 1,650	20%		$ -
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%		$ -
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%	175	$ 23,100
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%	60	$ 8,280
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%	860	$ 124,872
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%	1,710	$ 270,864
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%	960	$ 158,976
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%	835	$ 167,334
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%	270	$ 65,124
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%	390	$ 102,960
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%		$ -
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%		$ -
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%		$ -
61	Utility Relocation - Shield OE Power	LF	$ 50	20%	1,400	$ 84,000
62	Utility Relocation - Underground Communication	LF	$ 100	20%		$ -
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%		$ -
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%		$ -
65	Wetland Mitigation	AC	$ 25,000	20%	28	$ 840,000
66	Construction Estimate					$ 8,733,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 9,033,000

APPENDIX C – MESD CONSTRUCTION COST ESTIMATE

MESD - SUMMARY

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%	183,618	$ 2,644,099
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%	90	$ 648,000
3	Clear & Grub - Wooded	AC	$ 21,625	20%	58	$ 1,505,100
4	Cutoff Wall - Deep	SF	$ 32	30%	324,000	$ 13,478,400
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%	43,200	$ 1,451,520
6	Cutoff Wall - Shallow	SF	$ 12	30%	108,000	$ 1,684,800
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%	172,800	$ 2,280,960
8	Dewatering	LF	$ 51	20%	6,600	$ 403,920
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%	0	$ -
10	Drainage - Inlet Structure	EA	$ 2,200	20%	0	$ -
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%	6,000	$ 1,015,200
12	Excavation	CY	$ 11	20%	141,178	$ 1,863,550
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%	25,762	$ 741,946
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%	48,190	$ 1,677,012
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%	630,786	$ 1,513,886
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%	0	$ -
17	Haul Off of Excess Material	CY	$ 6	20%	137,528	$ 990,202
18	Mobilization (% varies)	LS	$ 674,192		1	$ 674,193
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%	0	$ -
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%	0	$ -
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%	1	$ 1,019,400
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%	0	$ -
23	Pump Station - Various Improvements	EA	$ 600,000	20%	2	$ 1,440,000
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%	0	$ -
25	Pvmt - Improved Roadway	LF	$ 122	20%	0	$ -
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%	1,000	$ 60,000
27	Pvmt - Road Repair	LF	$ 44	20%	5,280	$ 278,784
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%	15	$ 36,000
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%	25	$ 180,000
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%	6	$ 350,640
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%	42	$ 604,800
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%	18	$ 274,320
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%	1,500	$ 72,000
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%	0	$ -
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%	0	$ -
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%	0	$ -
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%	8	$ 594,720
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%	41	$ 815,490
39	Relief Well - New Type "D"	EA	$ 32,500	20%	35	$ 1,365,000
40	Relief Well - New Type "T"	EA	$ 40,000	20%	25	$ 1,200,000
41	RipRap Bank Protection	CY	$ 120	20%	0	$ -
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%	12	$ 93,600
43	ROW Acquisition - Commercial	AC	$ 30,000	20%	0	$ -
44	ROW Acquisition - Governmental	AC	$ 25,000	20%	0	$ -
45	ROW Acquisition - Industrial	AC	$ 30,000	20%	55	$ 1,980,000
46	ROW Acquisition - Residential	AC	$ 18,000	20%	0	$ -
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%	48	$ 1,324,800
48	Seeding	AC	$ 1,650	20%	100	$ 198,000
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%	88,800	$ 1,278,720
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%	0	$ -
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%	0	$ -
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%	1,480	$ 214,896
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%	880	$ 139,392
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%	0	$ -
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%	0	$ -
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%	310	$ 74,772
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%	2,800	$ 739,200
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%	3	$ 1,080,000
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%	12,190	$ 7,314,000
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%	15	$ 180,000
61	Utility Relocation - Shield OE Power	LF	$ 50	20%	0	$ -
62	Utility Relocation - Underground Communication	LF	$ 100	20%	1,600	$ 192,000
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%	0	$ -
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%	1,000	$ 300,000
65	Wetland Mitigation	AC	$ 25,000	20%	58	$ 1,740,000
66	Construction Estimate					$ 57,713,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 59,698,000

MESD - CLAY CAPS

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%	183,618	$ 2,644,099
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%	31	$ 223,200
3	Clear & Grub - Wooded	AC	$ 21,625	20%	13	$ 337,350
4	Cutoff Wall - Deep	SF	$ 32	30%		$ -
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%		$ -
6	Cutoff Wall - Shallow	SF	$ 12	30%		$ -
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%		$ -
8	Dewatering	LF	$ 51	20%		$ -
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%		$ -
10	Drainage - Inlet Structure	EA	$ 2,200	20%		$ -
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%		$ -
12	Excavation	CY	$ 11	20%	60,753	$ 801,940
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%		$ -
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%		$ -
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%		$ -
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%		$ -
17	Haul Off of Excess Material	CY	$ 6	20%	60,753	$ 437,422
18	Mobilization	LS	$ 135,934	0%	1	$ 135,934
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%		$ -
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%		$ -
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%		$ -
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%		$ -
23	Pump Station - Various Improvements	EA	$ 600,000	20%		$ -
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%		$ -
25	Pvmt - Improved Roadway	LF	$ 122	20%		$ -
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%		$ -
27	Pvmt - Road Repair	LF	$ 44	20%		$ -
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%		$ -
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%		$ -
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%		$ -
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%		$ -
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%		$ -
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%		$ -
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%		$ -
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%		$ -
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%		$ -
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%		$ -
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%		$ -
39	Relief Well - New Type "D"	EA	$ 32,500	20%		$ -
40	Relief Well - New Type "T"	EA	$ 40,000	20%		$ -
41	RipRap Bank Protection	CY	$ 120	20%		$ -
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%	6	$ 46,800
43	ROW Acquisition - Commercial	AC	$ 30,000	20%		$ -
44	ROW Acquisition - Governmental	AC	$ 25,000	20%		$ -
45	ROW Acquisition - Industrial	AC	$ 30,000	20%	7	$ 252,000
46	ROW Acquisition - Residential	AC	$ 18,000	20%		$ -
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%	14	$ 386,400
48	Seeding	AC	$ 1,650	20%	44	$ 87,120
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%		$ -
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%		$ -
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%		$ -
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%		$ -
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%		$ -
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%		$ -
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%		$ -
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%		$ -
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%		$ -
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%		$ -
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%		$ -
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%		$ -
61	Utility Relocation - Shield OE Power	LF	$ 50	20%		$ -
62	Utility Relocation - Underground Communication	LF	$ 100	20%		$ -
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%		$ -
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%		$ -
65	Wetland Mitigation	AC	$ 25,000	20%	2	$ 60,000
66	Construction Estimate					$ 5,412,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 5,598,000

MESD - CUTOFF WALLS

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%		$ -
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%	11	$ 79,200
3	Clear & Grub - Wooded	AC	$ 21,625	20%	5	$ 129,750
4	Cutoff Wall - Deep	SF	$ 32	30%	324,000	$ 13,478,400
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%	43,200	$ 1,451,520
6	Cutoff Wall - Shallow	SF	$ 12	30%	108,000	$ 1,684,800
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%	172,800	$ 2,280,960
8	Dewatering	LF	$ 51	20%		$ -
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%		$ -
10	Drainage - Inlet Structure	EA	$ 2,200	20%		$ -
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%		$ -
12	Excavation	CY	$ 11	20%		$ -
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%		$ -
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%		$ -
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%		$ -
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%		$ -
17	Haul Off of Excess Material	CY	$ 6	20%		$ -
18	Mobilization	LS	$ 125,819	0%	1	$ 125,819
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%		$ -
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%		$ -
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%		$ -
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%		$ -
23	Pump Station - Various Improvements	EA	$ 600,000	20%		$ -
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%		$ -
25	Pvmt - Improved Roadway	LF	$ 122	20%		$ -
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%	500	$ 30,000
27	Pvmt - Road Repair	LF	$ 44	20%		$ -
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%		$ -
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%		$ -
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%		$ -
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%		$ -
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%		$ -
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%		$ -
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%		$ -
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%		$ -
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%		$ -
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%		$ -
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%		$ -
39	Relief Well - New Type "D"	EA	$ 32,500	20%		$ -
40	Relief Well - New Type "T"	EA	$ 40,000	20%		$ -
41	RipRap Bank Protection	CY	$ 120	20%		$ -
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%	2	$ 15,600
43	ROW Acquisition - Commercial	AC	$ 30,000	20%		$ -
44	ROW Acquisition - Governmental	AC	$ 25,000	20%		$ -
45	ROW Acquisition - Industrial	AC	$ 30,000	20%	6	$ 216,000
46	ROW Acquisition - Residential	AC	$ 18,000	20%		$ -
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%	8	$ 220,800
48	Seeding	AC	$ 1,650	20%		$ -
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%		$ -
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%		$ -
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%		$ -
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%		$ -
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%		$ -
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%		$ -
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%		$ -
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%		$ -
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%		$ -
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%		$ -
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%	9,790	$ 5,874,000
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%		$ -
61	Utility Relocation - Shield OE Power	LF	$ 50	20%		$ -
62	Utility Relocation - Underground Communication	LF	$ 100	20%	1,600	$ 192,000
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%		$ -
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%	1,000	$ 300,000
65	Wetland Mitigation	AC	$ 25,000	20%	2	$ 60,000
66	Construction Estimate					$ 26,139,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 27,038,000

MESD - RELIEF WELLS

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%		$ -
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%	13	$ 93,600
3	Clear & Grub - Wooded	AC	$ 21,625	20%	5	$ 129,750
4	Cutoff Wall - Deep	SF	$ 32	30%		$ -
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%		$ -
6	Cutoff Wall - Shallow	SF	$ 12	30%		$ -
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%		$ -
8	Dewatering	LF	$ 51	20%		$ -
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%		$ -
10	Drainage - Inlet Structure	EA	$ 2,200	20%		$ -
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%	4,000	$ 676,800
12	Excavation	CY	$ 11	20%		$ -
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%		$ -
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%		$ -
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%		$ -
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%		$ -
17	Haul Off of Excess Material	CY	$ 6	20%		$ -
18	Mobilization	LS	$ 31,134	0%	1	$ 31,134
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%		$ -
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%		$ -
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%		$ -
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%		$ -
23	Pump Station - Various Improvements	EA	$ 600,000	20%		$ -
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%		$ -
25	Pvmt - Improved Roadway	LF	$ 122	20%		$ -
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%	500	$ 30,000
27	Pvmt - Road Repair	LF	$ 44	20%		$ -
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%		$ -
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%	25	$ 180,000
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%	6	$ 350,640
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%	42	$ 604,800
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%	18	$ 274,320
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%	1,500	$ 72,000
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%		$ -
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%		$ -
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%		$ -
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%	8	$ 594,720
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%	41	$ 815,490
39	Relief Well - New Type "D"	EA	$ 32,500	20%	35	$ 1,365,000
40	Relief Well - New Type "T"	EA	$ 40,000	20%	25	$ 1,200,000
41	RipRap Bank Protection	CY	$ 120	20%		$ -
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%	4	$ 31,200
43	ROW Acquisition - Commercial	AC	$ 30,000	20%		$ -
44	ROW Acquisition - Governmental	AC	$ 25,000	20%		$ -
45	ROW Acquisition - Industrial	AC	$ 30,000	20%	14	$ 504,000
46	ROW Acquisition - Residential	AC	$ 18,000	20%		$ -
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%		$ -
48	Seeding	AC	$ 1,650	20%	18	$ 35,640
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%		$ -
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%		$ -
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%		$ -
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%		$ -
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%		$ -
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%		$ -
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%		$ -
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%		$ -
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%		$ -
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%		$ -
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%		$ -
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%		$ -
61	Utility Relocation - Shield OE Power	LF	$ 50	20%		$ -
62	Utility Relocation - Underground Communication	LF	$ 100	20%		$ -
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%		$ -
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%		$ -
65	Wetland Mitigation	AC	$ 25,000	20%	10	$ 300,000
66	Construction Estimate					$ 7,289,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 7,540,000

MESD - SEEPAGE BERMS

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%		$ -
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%	12	$ 86,400
3	Clear & Grub - Wooded	AC	$ 21,625	20%	25	$ 648,750
4	Cutoff Wall - Deep	SF	$ 32	30%		$ -
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%		$ -
6	Cutoff Wall - Shallow	SF	$ 12	30%		$ -
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%		$ -
8	Dewatering	LF	$ 51	20%		$ -
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%		$ -
10	Drainage - Inlet Structure	EA	$ 2,200	20%		$ -
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%	2,000	$ 338,400
12	Excavation	CY	$ 11	20%		$ -
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%		$ -
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%		$ -
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%		$ -
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%		$ -
17	Haul Off of Excess Material	CY	$ 6	20%		$ -
18	Mobilization	LS	$ 72,825	0%	1	$ 72,825
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%		$ -
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%		$ -
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%		$ -
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%		$ -
23	Pump Station - Various Improvements	EA	$ 600,000	20%		$ -
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%		$ -
25	Pvmt - Improved Roadway	LF	$ 122	20%		$ -
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%		$ -
27	Pvmt - Road Repair	LF	$ 44	20%		$ -
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%	15	$ 36,000
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%		$ -
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%		$ -
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%		$ -
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%		$ -
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%		$ -
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%		$ -
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%		$ -
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%		$ -
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%		$ -
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%		$ -
39	Relief Well - New Type "D"	EA	$ 32,500	20%		$ -
40	Relief Well - New Type "T"	EA	$ 40,000	20%		$ -
41	RipRap Bank Protection	CY	$ 120	20%		$ -
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%		$ -
43	ROW Acquisition - Commercial	AC	$ 30,000	20%		$ -
44	ROW Acquisition - Governmental	AC	$ 25,000	20%		$ -
45	ROW Acquisition - Industrial	AC	$ 30,000	20%	14	$ 504,000
46	ROW Acquisition - Residential	AC	$ 18,000	20%		$ -
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%	13	$ 358,800
48	Seeding	AC	$ 1,650	20%	38	$ 75,240
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%	88,800	$ 1,278,720
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%		$ -
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%		$ -
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%		$ -
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%		$ -
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%		$ -
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%		$ -
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%		$ -
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%		$ -
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%	3	$ 1,080,000
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%	2,400	$ 1,440,000
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%	15	$ 180,000
61	Utility Relocation - Shield OE Power	LF	$ 50	20%		$ -
62	Utility Relocation - Underground Communication	LF	$ 100	20%		$ -
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%		$ -
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%		$ -
65	Wetland Mitigation	AC	$ 25,000	20%	11	$ 330,000
66	Construction Estimate					$ 6,429,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 6,650,000

MESD - CIVIL IMPROVEMENTS

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%		$ -
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%	23	$ 165,600
3	Clear & Grub - Wooded	AC	$ 21,625	20%	10	$ 259,500
4	Cutoff Wall - Deep	SF	$ 32	30%		$ -
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%		$ -
6	Cutoff Wall - Shallow	SF	$ 12	30%		$ -
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%		$ -
8	Dewatering	LF	$ 51	20%	6,600	$ 403,920
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%		$ -
10	Drainage - Inlet Structure	EA	$ 2,200	20%		$ -
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%		$ -
12	Excavation	CY	$ 11	20%	80,425	$ 1,061,610
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%	25,762	$ 741,946
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%	48,190	$ 1,677,012
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%	630,786	$ 1,513,886
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%		$ -
17	Haul Off of Excess Material	CY	$ 6	20%	76,775	$ 552,780
18	Mobilization	LS	$ 308,481	0%	1	$ 308,481
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%		$ -
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%		$ -
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%	1	$ 1,019,400
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%		$ -
23	Pump Station - Various Improvements	EA	$ 600,000	20%	2	$ 1,440,000
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%		$ -
25	Pvmt - Improved Roadway	LF	$ 122	20%		$ -
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%		$ -
27	Pvmt - Road Repair	LF	$ 44	20%	5,280	$ 278,784
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%		$ -
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%		$ -
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%		$ -
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%		$ -
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%		$ -
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%		$ -
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%		$ -
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%		$ -
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%		$ -
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%		$ -
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%		$ -
39	Relief Well - New Type "D"	EA	$ 32,500	20%		$ -
40	Relief Well - New Type "T"	EA	$ 40,000	20%		$ -
41	RipRap Bank Protection	CY	$ 120	20%		$ -
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%		$ -
43	ROW Acquisition - Commercial	AC	$ 30,000	20%		$ -
44	ROW Acquisition - Governmental	AC	$ 25,000	20%		$ -
45	ROW Acquisition - Industrial	AC	$ 30,000	20%	14	$ 504,000
46	ROW Acquisition - Residential	AC	$ 18,000	20%		$ -
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%	13	$ 358,800
48	Seeding	AC	$ 1,650	20%		$ -
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%		$ -
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%		$ -
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%		$ -
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%	1,480	$ 214,896
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%	880	$ 139,392
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%		$ -
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%		$ -
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%	310	$ 74,772
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%	2,800	$ 739,200
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%		$ -
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%		$ -
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%		$ -
61	Utility Relocation - Shield OE Power	LF	$ 50	20%		$ -
62	Utility Relocation - Underground Communication	LF	$ 100	20%		$ -
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%		$ -
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%		$ -
65	Wetland Mitigation	AC	$ 25,000	20%	33	$ 990,000
66	Construction Estimate					$ 12,444,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 12,872,000

APPENDIX D – PDP/FL CONSTRUCTION COST ESTIMATE

PdP & FISH LAKE - SUMMARY

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%	11,713	$ 168,667
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%	38	$ 273,600
3	Clear & Grub - Wooded	AC	$ 21,625	20%	12	$ 311,400
4	Cutoff Wall - Deep	SF	$ 32	30%	0	$ -
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%	0	$ -
6	Cutoff Wall - Shallow	SF	$ 12	30%	0	$ -
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%	0	$ -
8	Dewatering	LF	$ 51	20%	0	$ -
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%	0	$ -
10	Drainage - Inlet Structure	EA	$ 2,200	20%	0	$ -
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%	1,200	$ 203,040
12	Excavation	CY	$ 11	20%	11,713	$ 154,612
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%	0	$ -
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%	0	$ -
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%	0	$ -
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%	0	$ -
17	Haul Off of Excess Material	CY	$ 6	20%	11,713	$ 84,334
18	Mobilization (% varies)	LS	$ 242,882		1	$ 242,882
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%	0	$ -
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%	0	$ -
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%	0	$ -
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%	1	$ 1,019,400
23	Pump Station - Various Improvements	EA	$ 600,000	20%	1	$ 720,000
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%	0	$ -
25	Pvmt - Improved Roadway	LF	$ 122	20%	860	$ 125,904
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%	0	$ -
27	Pvmt - Road Repair	LF	$ 44	20%	5,280	$ 278,784
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%	27	$ 64,800
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%	38	$ 273,600
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%	0	$ -
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%	33	$ 475,200
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%	0	$ -
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%	0	$ -
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%	20	$ 72,000
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%	3,548	$ 212,880
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%	2,255	$ 173,184
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%	0	$ -
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%	0	$ -
39	Relief Well - New Type "D"	EA	$ 32,500	20%	156	$ 6,084,000
40	Relief Well - New Type "T"	EA	$ 40,000	20%	0	$ -
41	RipRap Bank Protection	CY	$ 120	20%	0	$ -
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%	92	$ 717,600
43	ROW Acquisition - Commercial	AC	$ 30,000	20%	0	$ -
44	ROW Acquisition - Governmental	AC	$ 25,000	20%	0	$ -
45	ROW Acquisition - Industrial	AC	$ 30,000	20%	0	$ -
46	ROW Acquisition - Residential	AC	$ 18,000	20%	0	$ -
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%	0	$ -
48	Seeding	AC	$ 1,650	20%	77	$ 152,460
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%	284,824	$ 4,101,466
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%	0	$ -
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%	0	$ -
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%	0	$ -
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%	280	$ 44,352
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%	0	$ -
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%	0	$ -
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%	0	$ -
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%	0	$ -
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%	0	$ -
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%	0	$ -
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%	20	$ 240,000
61	Utility Relocation - Shield OE Power	LF	$ 50	20%	0	$ -
62	Utility Relocation - Underground Communication	LF	$ 100	20%	6,000	$ 720,000
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%	2	$ 24,000
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%	0	$ -
65	Wetland Mitigation	AC	$ 25,000	20%	3	$ 90,000
66	Construction Estimate					$ 17,027,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 17,612,000

PdP & FISH LAKE - CLAY CAPS

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%	11,713	$ 168,667
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%	4	$ 28,800
3	Clear & Grub - Wooded	AC	$ 21,625	20%	1	$ 25,950
4	Cutoff Wall - Deep	SF	$ 32	30%		$ -
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%		$ -
6	Cutoff Wall - Shallow	SF	$ 12	30%		$ -
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%		$ -
8	Dewatering	LF	$ 51	20%		$ -
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%		$ -
10	Drainage - Inlet Structure	EA	$ 2,200	20%		$ -
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%		$ -
12	Excavation	CY	$ 11	20%	11,713	$ 154,612
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%		$ -
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%		$ -
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%		$ -
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%		$ -
17	Haul Off of Excess Material	CY	$ 6	20%	11,713	$ 84,334
18	Mobilization	LS	$ 14,227	0%	1	$ 14,227
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%		$ -
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%		$ -
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%		$ -
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%		$ -
23	Pump Station - Various Improvements	EA	$ 600,000	20%		$ -
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%		$ -
25	Pvmt - Improved Roadway	LF	$ 122	20%		$ -
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%		$ -
27	Pvmt - Road Repair	LF	$ 44	20%		$ -
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%		$ -
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%		$ -
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%		$ -
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%		$ -
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%		$ -
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%		$ -
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%		$ -
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%		$ -
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%		$ -
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%		$ -
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%		$ -
39	Relief Well - New Type "D"	EA	$ 32,500	20%		$ -
40	Relief Well - New Type "T"	EA	$ 40,000	20%		$ -
41	RipRap Bank Protection	CY	$ 120	20%		$ -
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%	1	$ 7,800
43	ROW Acquisition - Commercial	AC	$ 30,000	20%		$ -
44	ROW Acquisition - Governmental	AC	$ 25,000	20%		$ -
45	ROW Acquisition - Industrial	AC	$ 30,000	20%		$ -
46	ROW Acquisition - Residential	AC	$ 18,000	20%		$ -
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%		$ -
48	Seeding	AC	$ 1,650	20%	6	$ 11,880
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%		$ -
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%		$ -
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%		$ -
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%		$ -
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%		$ -
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%		$ -
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%		$ -
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%		$ -
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%		$ -
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%		$ -
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%		$ -
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%		$ -
61	Utility Relocation - Shield OE Power	LF	$ 50	20%		$ -
62	Utility Relocation - Underground Communication	LF	$ 100	20%		$ -
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%		$ -
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%		$ -
65	Wetland Mitigation	AC	$ 25,000	20%		$ -
66	Construction Estimate					$ 496,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 513,000

PdP & FISH LAKE - RELIEF WELLS

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%		$ -
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%		$ -
3	Clear & Grub - Wooded	AC	$ 21,625	20%		$ -
4	Cutoff Wall - Deep	SF	$ 32	30%		$ -
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%		$ -
6	Cutoff Wall - Shallow	SF	$ 12	30%		$ -
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%		$ -
8	Dewatering	LF	$ 51	20%		$ -
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%		$ -
10	Drainage - Inlet Structure	EA	$ 2,200	20%		$ -
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%	1,200	$ 203,040
12	Excavation	CY	$ 11	20%		$ -
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%		$ -
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%		$ -
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%		$ -
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%		$ -
17	Haul Off of Excess Material	CY	$ 6	20%		$ -
18	Mobilization	LS	$ 19,833	0%	1	$ 19,833
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%		$ -
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%		$ -
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%		$ -
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%		$ -
23	Pump Station - Various Improvements	EA	$ 600,000	20%		$ -
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%		$ -
25	Pvmt - Improved Roadway	LF	$ 122	20%		$ -
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%		$ -
27	Pvmt - Road Repair	LF	$ 44	20%		$ -
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%		$ -
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%	38	$ 273,600
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%		$ -
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%	33	$ 475,200
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%		$ -
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%		$ -
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%	20	$ 72,000
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%	3,548	$ 212,880
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%	2,255	$ 173,184
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%		$ -
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%		$ -
39	Relief Well - New Type "D"	EA	$ 32,500	20%	156	$ 6,084,000
40	Relief Well - New Type "T"	EA	$ 40,000	20%		$ -
41	RipRap Bank Protection	CY	$ 120	20%		$ -
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%	33	$ 257,400
43	ROW Acquisition - Commercial	AC	$ 30,000	20%		$ -
44	ROW Acquisition - Governmental	AC	$ 25,000	20%		$ -
45	ROW Acquisition - Industrial	AC	$ 30,000	20%		$ -
46	ROW Acquisition - Residential	AC	$ 18,000	20%		$ -
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%		$ -
48	Seeding	AC	$ 1,650	20%		$ -
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%		$ -
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%		$ -
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%		$ -
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%		$ -
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%		$ -
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%		$ -
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%		$ -
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%		$ -
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%		$ -
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%		$ -
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%		$ -
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%		$ -
61	Utility Relocation - Shield OE Power	LF	$ 50	20%		$ -
62	Utility Relocation - Underground Communication	LF	$ 100	20%		$ -
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%		$ -
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%		$ -
65	Wetland Mitigation	AC	$ 25,000	20%		$ -
66	Construction Estimate					$ 7,771,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 8,038,000

PdP & FISH LAKE - SEEPAGE BERMS

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%		$ -
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%	34	$ 244,800
3	Clear & Grub - Wooded	AC	$ 21,625	20%	11	$ 285,450
4	Cutoff Wall - Deep	SF	$ 32	30%		$ -
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%		$ -
6	Cutoff Wall - Shallow	SF	$ 12	30%		$ -
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%		$ -
8	Dewatering	LF	$ 51	20%		$ -
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%		$ -
10	Drainage - Inlet Structure	EA	$ 2,200	20%		$ -
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%		$ -
12	Excavation	CY	$ 11	20%		$ -
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%		$ -
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%		$ -
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%		$ -
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%		$ -
17	Haul Off of Excess Material	CY	$ 6	20%		$ -
18	Mobilization	LS	$ 146,946	0%	1	$ 146,946
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%		$ -
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%		$ -
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%		$ -
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%		$ -
23	Pump Station - Various Improvements	EA	$ 600,000	20%		$ -
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%		$ -
25	Pvmt - Improved Roadway	LF	$ 122	20%	860	$ 125,904
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%		$ -
27	Pvmt - Road Repair	LF	$ 44	20%		$ -
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%	27	$ 64,800
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%		$ -
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%		$ -
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%		$ -
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%		$ -
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%		$ -
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%		$ -
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%		$ -
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%		$ -
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%		$ -
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%		$ -
39	Relief Well - New Type "D"	EA	$ 32,500	20%		$ -
40	Relief Well - New Type "T"	EA	$ 40,000	20%		$ -
41	RipRap Bank Protection	CY	$ 120	20%		$ -
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%	58	$ 452,400
43	ROW Acquisition - Commercial	AC	$ 30,000	20%		$ -
44	ROW Acquisition - Governmental	AC	$ 25,000	20%		$ -
45	ROW Acquisition - Industrial	AC	$ 30,000	20%		$ -
46	ROW Acquisition - Residential	AC	$ 18,000	20%		$ -
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%		$ -
48	Seeding	AC	$ 1,650	20%	71	$ 140,580
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%	284,824	$ 4,101,466
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%		$ -
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%		$ -
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%		$ -
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%		$ -
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%		$ -
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%		$ -
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%		$ -
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%		$ -
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%		$ -
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%		$ -
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%	20	$ 240,000
61	Utility Relocation - Shield OE Power	LF	$ 50	20%		$ -
62	Utility Relocation - Underground Communication	LF	$ 100	20%	6,000	$ 720,000
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%	2	$ 24,000
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%		$ -
65	Wetland Mitigation	AC	$ 25,000	20%	3	$ 90,000
66	Construction Estimate					$ 6,636,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 6,864,000

PdP & FISH LAKE - CIVIL IMPROVEMENTS

Item #	Cost Item	Unit	Unit Cost	Contingency	Quantity	Total
1	Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$ 12	20%		$ -
2	Clear & Grub - Light Vegetation	AC	$ 6,000	20%		$ -
3	Clear & Grub - Wooded	AC	$ 21,625	20%		$ -
4	Cutoff Wall - Deep	SF	$ 32	30%		$ -
5	Cutoff Wall - Hazardous Waste Premium	SF	$ 28	20%		$ -
6	Cutoff Wall - Shallow	SF	$ 12	30%		$ -
7	Cutoff Wall - Special Waste Premium	SF	$ 11	20%		$ -
8	Dewatering	LF	$ 51	20%		$ -
9	Drainage - Enclosed - 30" Pipe	LF	$ 96	20%		$ -
10	Drainage - Inlet Structure	EA	$ 2,200	20%		$ -
11	Drainage - Surface - Shallow Ditch	LF	$ 141	20%		$ -
12	Excavation	CY	$ 11	20%		$ -
13	Gravel Filter - D50=#4 Material - Haul On & Placement	CY	$ 24	20%		$ -
14	Gravel Filter - D50=2" Material - Haul On & Placement	CY	$ 29	20%		$ -
15	Gravel Filter - Geotextile - Material & Installation	SY	$ 2	20%		$ -
16	Gravel Filter - Sand Material - Haul On & Placement	CY	$ 12	20%		$ -
17	Haul Off of Excess Material	CY	$ 6	20%		$ -
18	Mobilization	LS	$ 61,876	0%	1	$ 61,876
19	Pump Station - WR - New - 220+00 UWR	EA	$ 605,500	20%		$ -
20	Pump Station - WR - New - 560+00 LWR	EA	$ 699,500	20%		$ -
21	Pump Station - MESD - Improve Existing - Phillips Reach	EA	$ 849,500	20%		$ -
22	Pump Station - PdP - Improve Existing - PdP West	EA	$ 849,500	20%	1	$ 1,019,400
23	Pump Station - Various Improvements	EA	$ 600,000	20%	1	$ 720,000
24	Pvmt - Curb & Gutter - Remove & Replace	LF	$ 42	20%		$ -
25	Pvmt - Improved Roadway	LF	$ 122	20%		$ -
26	Pvmt - Roads & Trails - Remove & Replace	SY	$ 50	20%		$ -
27	Pvmt - Road Repair	LF	$ 44	20%	5,280	$ 278,784
28	Relief Well - Existing - Abandon	EA	$ 2,000	20%		$ -
29	Relief Well - Existing - Convert to Type "T"	EA	$ 6,000	20%		$ -
30	Relief Well - Existing - Hazardous Waste Premium	EA	$ 48,700	20%		$ -
31	Relief Well - Existing - Rehabilitate	EA	$ 12,000	20%		$ -
32	Relief Well - Existing - Special Waste Premium	EA	$ 12,700	20%		$ -
33	Relief Well - Lateral Pipe (8-Inch)	LF	$ 40	20%		$ -
34	Relief Well - Manifold Manhole	EA	$ 3,000	20%		$ -
35	Relief Well - Manifold Pipe (12-Inch)	LF	$ 50	20%		$ -
36	Relief Well - Manifold Pipe (18-Inch)	LF	$ 64	20%		$ -
37	Relief Well - New - Hazardous Waste Premium	EA	$ 61,950	20%		$ -
38	Relief Well - New - Special Waste Premium	EA	$ 16,575	20%		$ -
39	Relief Well - New Type "D"	EA	$ 32,500	20%		$ -
40	Relief Well - New Type "T"	EA	$ 40,000	20%		$ -
41	RipRap Bank Protection	CY	$ 120	20%		$ -
42	ROW Acquisition - Agricultural	AC	$ 6,500	20%		$ -
43	ROW Acquisition - Commercial	AC	$ 30,000	20%		$ -
44	ROW Acquisition - Governmental	AC	$ 25,000	20%		$ -
45	ROW Acquisition - Industrial	AC	$ 30,000	20%		$ -
46	ROW Acquisition - Residential	AC	$ 18,000	20%		$ -
47	ROW Acquisition - Vacant/Undeveloped	AC	$ 23,000	20%		$ -
48	Seeding	AC	$ 1,650	20%		$ -
49	Seepage Berm Material - Haul On and Placement (Hauled)	CY	$ 12	20%		$ -
50	Slip-Line - 12-Inch Pipe	LF	$ 110	20%		$ -
51	Slip-Line - 15-Inch Pipe	LF	$ 115	20%		$ -
52	Slip-Line - 18-Inch Pipe	LF	$ 121	20%		$ -
53	Slip-Line - 24-Inch Pipe	LF	$ 132	20%	280	$ 44,352
54	Slip-Line - 27-Inch Pipe	LF	$ 138	20%		$ -
55	Slip-Line - 36-Inch Pipe	LF	$ 167	20%		$ -
56	Slip-Line - 42-Inch Pipe	LF	$ 201	20%		$ -
57	Slip-Line - 48-Inch Pipe	LF	$ 220	20%		$ -
58	Utility Relocation - High Tension Power (Raise)	EA	$ 300,000	20%		$ -
59	Utility Relocation - Natural Gas Pipeline	LF	$ 500	20%		$ -
60	Utility Relocation - Power Pole / Light Pole	EA	$ 10,000	20%		$ -
61	Utility Relocation - Shield OE Power	LF	$ 50	20%		$ -
62	Utility Relocation - Underground Communication	LF	$ 100	20%		$ -
63	Utility Relocation - Underground Communications Pedestal	EA	$ 10,000	20%		$ -
64	Utility Relocation - Various Buried Facilities	LF	$ 250	20%		$ -
65	Wetland Mitigation	AC	$ 25,000	20%		$ -
66	Construction Estimate					$ 2,124,000
67	Construction Estimate Escalated to Mid-Point of 4 Yrs @ 3.44%					$ 2,197,000

APPENDIX E – UNIT COST DEVELOPMENT

Cost Item #01 - Clay Cap/Clay Blanket Material - Haul On & Placement				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Clay Cap/Clay Blanket Material - Haul On & Placement	CY	$12.00	1.00	$12.00
Total	**$/CY**			**$12.00**
Unit Cost value used in Cost Estimate	**$/CY**			**$12.00**

Champion: Hasty

Includes:
- clay fill material
- haul on
- placement & compaction
-
-
-
-
-
-
-

Excludes:
- contingency
- mobilization
-
-
-
-
-
-
-

Basis / Assumptions:
- 12 mile one-way haul distance
- based on haul cost = $0.52 / CY / mile
- based on IDOT bid tabs
- material is non-bentonite
-
-
-
-
-
-
-
-
-

Cost Item #02 - Clear & Grub - Light Vegetation				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Cut & chip light trees to 6" dia	AC	$4,125.00	1.00	$4,125.00
Grub stumps & remove	AC	$1,950.00	1.00	$1,950.00
Total	**$/AC**			**$6,075.00**
Unit Cost value used in Cost Estimate	**$/AC**			**$6,000.00**

Champion: Safford

Includes:
- clearing
- grubbing
- removal & disposal of material
-
-
-
-
-
-
-

Excludes:
- contingency
- mobilization
-
-
-
-
-
-
-
-

Basis / Assumptions:
- based on RSMeans cost data
- validated by comparison to IDOT bid tabs
-
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-

Cost Item #03 - Clear & Grub - Wooded				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Cut & chip heavy trees to 24" dia	AC	$13,800.00	1.00	$13,800.00
Grub stumps & remove	AC	$7,825.00	1.00	$7,825.00
Total	**$/AC**			**$21,625.00**
Unit Cost value used in Cost Estimate	**$/AC**			**$21,625.00**

Champion: Safford

Includes:
- clearing
- grubbing
- removal & disposal of material
-
-
-
-
-
-
-

Excludes:
- contingency
- mobilization
-
-
-
-
-
-
-
-

Basis / Assumptions:
- based on RSMeans cost data
- validated by comparison to IDOT bid tabs
-
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Cost Item #04 - Cutoff Wall - Deep				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Cutoff wall over 50' in depth	SF	$32.00	1.00	$32.00
Average	**$/SF**			**$32.00**
Unit Cost value used in Cost Estimate	**$/SF**			**$32.00**

Champion: Sawitzki

Includes:
- design
- completed wall in place
- equipment
- material
- installation
- haul off & disposal of spoils
- staging
- restoration
- wall keyed into rock
-

Excludes:
- contingency
- mobilization
- large obstructions such as boulders
- hazardous or special waste handling
- contractor standby or delays not attributed to contractor
-
-
-
-
-

Basis / Assumptions:
- refer to section 1.11.2 for additional cutoff wall cost discussion
- applicable for cutoff walls over 90' in depth not capable by conventional techniques
- based on cost data provided by Arturo Ressi of Kiewit
- based on cost data provided by Jeff Hill of Hayward Baker (see conceptual estimated costs included in Appendix F)
-
-
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-

Cost Item #05 - Cutoff Wall - Hazardous Waste Premium				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Cutoff Wall - Hazardous Waste Premium	SF	$28.00	1.00	$28.00
Total	**$/SF**			**$28.00**
Unit Cost value used in Cost Estimate	**$/SF**			**$28.00**

Champion: Sawitzki

Includes:
- mobilization
- waste characterization
- transport & disposal of soil
- contractor extra handling and production decrease
-
-
-
-
-
-

Excludes:
- contingency
- cutoff wall construction
- special waste disposal
-
-
-
-
-
-
-

Basis / Assumptions:
- based on various costs data provided by Contractor (HBI) and past job experience
- soil must be taken to a hazardous waste disposal facility (Peoria, IL) - $23/SF
- cost est. for daily sampling, worker PPE and Equipment costs - $0.50/SF
- cost to stage waste on site, double handle and production slowdown - $4.50/SF
- assumes that within reaches identified to be "environmental areas", 50% of the wall will be in impacted soil
- assumes that 20% of impacted soil will be Hazardous Waste
- assumes that 80% of impacted soil will be Special Waste
-
-
-
-
-
-
-

Cost Item #06 - Cutoff Wall - Shallow				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Cutoff wall up to 50' in depth	SF	$12.00	1.00	$12.00
Average	**$/SF**			**$12.00**
Unit Cost value used in Cost Estimate	**$/SF**			**$12.00**

Champion: Sawitzki

Includes:
- design
- completed wall in place
- equipment
- material
- installation
- haul off & disposal of spoils
- staging
- restoration
- wall keyed into clay layer
-

Excludes:
- contingency
- mobilization
- large obstructions such as boulders
- hazardous or special waste handling
- contractor standby or delays not attributed to contractor
-
-
-
-
-

Basis / Assumptions:
- applicable for cutoff walls up to 50' in depth
- based on cost data provided by Arturo Ressi of Kiewit
- based on cost data provided by Jeff Hill of Hayward Baker (see conceptual estimated costs included in Appendix F)
-
-
-
-
-
-
-
-
-
-

Cost Item #07 - Cutoff Wall - Special Waste Premium				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Cutoff Wall - Special Waste Premium	SF	$11.00	1.00	$11.00
Total	**$/SF**			**$11.00**
Unit Cost value used in Cost Estimate	**$/SF**			**$11.00**

Champion: Sawitzki

Includes:
- mobilization
- waste characterization
- transport & disposal of soil
- contractor extra handling and production decrease
-
-
-
-
-
-

Excludes:
- contingency
- cutoff wall construction
- hazardous waste disposal
-
-
-
-
-
-
-

Basis / Assumptions:
- based on various cost data provided by HBI and past job experience
- soil must be taken to a local special waste disposal facility - $6/SF
- cost est. for daily sampling, worker PPE and Equipment costs - $0.50/SF
- cost to stage waste on site, double handle and production slowdown - $4.50/SF
- assumes that within reaches identified to be "environmental areas", 50% of the wall will be in impacted soil
- assumes that 20% of impacted soil will be Hazardous Waste
- assumes that 80% of impacted soil will be Special Waste
-
-
-
-
-
-
-

Cost Item #08 - Dewatering				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
6" Centrifugal Pump (5 cfs)	DAY	$400.00	2.00	$800.00
Labor	DAY	$360.00	1.00	$360.00
Diesel Fuel	GAL/DAY	$6.00	240.00	$1,440.00
Excavation of Diversion Ditches & Sump Hole	EA/DAY	$215.78	2.00	$431.56
Fill In of Diversion Ditches & Sump Hole	EA/DAY	$511.11	2.00	$1,022.22
Initial Drawdown	LS	$5,200.00	1.00	$5,200.00
Construction Duration Time	DAY	5	Subtotal:	$25,468.89
Total	**$/LF**			**$50.94**
Unit Cost value used in Cost Estimate	**$/LF**			**$51.00**

Champion: Safford

Includes:
- 6 hrs labor per day
- equipment rental
- 20' of suction hose
- 100' of discharge hose
-
-
-
-
-
-

Excludes:
- contingency
- mobilization
-
-
-
-
-
-
-

Basis / Assumptions:
- applicable for existing ponds and/or gravel pits with standing water identified for "Gravel Filter" installation
- groundwater flow of 2 cfs / 100'
- 5 day duration / 500'
- 24 hours / day
- required to dewater 500'
- labor = $60 / hr
- diesel cost includes transport to job site
- initial drawdown is accomplished in 2 days, w/ 2 pumps, and not included in the construction duration time
- diversion ditches are 100' long x 30' wide x 1' deep
- based on RSMeans Cost Data
-
-
-
-

Cost Item #09 - Drainage - Enclosed - 30" Pipe				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
30" dia pipe, bedding & installation	LF	$85.00	1.00	$85.00
excavation & backfill	CY	$11.00	0.98	$10.78
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total	**$/LF**			**$95.78**
Unit Cost value used in Cost Estimate	**$/LF**			**$96.00**

Champion: Hasty

Includes:
- pipe
- bedding
- installation
- excavation
- backfill
- shoring / bracing
-
-
-
-

Excludes:
- contingency
- mobilization
- sodding
- restoration
-
-
-
-
-
-

Basis / Assumptions:
- RCP class III pipe
- trench with = 4.08'
- trench depth = 6.50'
- pipe cost and installation based on standard St. Louis MSD historical unit cost
- excavation cost based on IDOT bid tabs
-
-
-
-
-
-
-
-
-

Cost Item #10 - Drainage - Inlet Structure				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Inlet structure & appurtenances	EA	$1,500.00	1.00	$1,500.00
Standard manhole construction	LF	$195.00	2.50	$487.50
Excavation	CY	$11.00	15.00	$165.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total	**$/LF**			**$2,152.50**
Unit Cost value used in Cost Estimate	**$/LF**			**$2,200.00**

Champion: Hasty

Includes:
- structure
- bedding
- installation
- excavation
- backfill
- shoring / bracing
-
-
-
-

Excludes:
- contingency
- mobilization
- sodding
- restoration
-
-
-
-
-
-

Basis / Assumptions:
- precast concrete area inlet structure
- structure cost and installation based on standard St. Louis MSD historic unit cost
- excavation cost based on IDOT bid tabs
-
-
-
-
-
-
-
-
-
-

Cost Item #11 - Drainage - Surface - Shallow Ditch				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Excavation	CY	$11.00	2.74	$30.14
Haul Off	CY	$5.20	2.74	$14.25
Riprap, IDOT, Class 3, D50 = 6"	SY	$30.00	2.80	$84.00
Clear & Grub - Light Vegetation	AC	$6,000.00	0.00	$10.20
Seeding	AC	$1,650.00	0.00	$1.82
Total	**$/LF**			**$140.40**
Unit Cost value used in Cost Estimate	**$/LF**			**$141.00**

Champion: Coronel

Includes:
- channel excavation
- clearing and grubbing
- riprap placement
- seeding along banks
- restoration
-
-
-
-
-

Excludes:
- contingency
- mobilization
-
-
-
-
-
-
-

Basis / Assumptions:
- applicable for minor shallow ditching to control/direct surface drainage from relief wells or stormwater runoff
- assumes a "V" ditch with an average depth of 4'
- 10 mile one-way haul distance
- based on haul cost = $0.52 / CY / mile
- based on IDOT bid tabs
- riprap cost based on IDOT bid tabs
- excavation cost based on IDOT bid tabs
- seeding cost based on standard MoDOT historical unit cost
- seeding cost adjust based on IDOT bid tabs
- clear & grub costs based RSMeans Cost Data
- clear & grub costs validated by comparison to IDOT bid tabs
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Cost Item #12 - Excavation				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Excavation	CY	$11.00	1.00	$11.00
				$0.00
Total	**$/CY**			**$11.00**
Unit Cost value used in Cost Estimate	**$/CY**			**$11.00**

Champion: Coronel

Includes:
- excavation of trenches, benching into levee face, etc.
- stockpiling of excavated material
- loading of excavated material
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Excludes:
- contingency
- mobilization
- mass grading
- transporting of excavated material
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Basis / Assumptions:
- applicable for linear type excavation such as trenching or benching into face of levee
- excavation cost based on IDOT bid tabs
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Cost Item #13 - Gravel Filter - D50=#4 Material - Haul On & Placement				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Gravel material (D50=#4)	CY	$10.53	1.00	$10.53
Haul on	CY	$11.34	1.00	$11.34
Placement of gravel material	CY	$1.99	1.00	$1.99
Total	**$/CY**			**$23.86**
Unit Cost value used in Cost Estimate	**$/CY**			**$24.00**

Champion: Coronel

Includes:
- gravel material
- haul on
- placement
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Excludes:
- contingency
- mobilization
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Basis / Assumptions:
- one-way haul distance = 50 miles (Winter Brothers Quarry)
- haul cost = $11.34 / CY (Butch Sigg of Winter Brothers Quarry)
- material costs = $10.53 / CY
- based on prices from local suppliers (Sinter Brothers Quarry, Keysport Sand & Gravel, etal)
- placement based on RSMeans cost data
- validated by comparison to IDOT bid tabs
- other potential sources of fill material include Bussen Quarries, Walker Aggregates, Inc., Columbia Quarry Company
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Cost Item #14 - Gravel Filter - D50=2" Material - Haul On & Placement				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Gravel material (D50=2")	CY	$15.39	1.00	$15.39
Haul on	CY	$11.34	1.00	$11.34
Placement of gravel material	CY	$1.99	1.00	$1.99
Total	**$/CY**			**$28.72**
Unit Cost value used in Cost Estimate	**$/CY**			**$29.00**

Champion: Coronel

Includes:
- gravel material
- haul on
- placement
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Excludes:
- contingency
- mobilization
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Basis / Assumptions:
- one-way haul distance = 50 miles (Winter Brothers Quarry)
- haul cost = $11.34 / CY (Butch Sigg of Winter Brothers Quarry)
- material costs = $15.39 / CY
- based on prices from local suppliers (Sinter Brothers Quarry, Keysport Sand & Gravel, etal)
- placement based on RSMeans cost data
- validated by comparison to IDOT bid tabs
- Other potential sources of fill material include Bussen Quarries, Walker Aggregates, Inc., Columbia Quarry Company,
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Cost Item #15 - Gravel Filter - Geotextile - Material & Installation				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Gravel Filter - Geotextile - Material & Installation	SY	$2.00	1.00	$2.00
Total	**$/SY**			**$2.00**
Unit Cost value used in Cost Estimate	**$/SY**			**$2.00**

Champion: Coronel

Includes:

- Geotextile fabric material
- Geotextile fabric installation
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Excludes:

- contingency
- mobilization
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Basis / Assumptions:

- based on IDOT bid tabs
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Cost Item #16 - Gravel Filter - Sand Material - Haul On & Placement				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Sand material	CY	$12.00	1.00	$12.00
Total	**$/CY**			**$12.00**
Unit Cost value used in Cost Estimate	**$/CY**			**$12.00**

Champion: Coronel

Includes:
- material
- haul on
- placement
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Excludes:
- contingency
- mobilization
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Basis / Assumptions:
- based on prices from local contractors (Baxmeyer Excavating, Luhr Brothers, etal)
- other potential sources of fill material include Bussen Quarries, Walker Aggregates, Inc., Columbia Quarry Company
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Cost Item #17 - Haul Off of Excess Material				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Haul Off of Excess Material	CY	$5.20	1.00	$5.20
Total	**$/CY**			**$5.20**
Unit Cost value used in Cost Estimate	**$/CY**			**$6.00**

Champion: Hasty

Includes:
- haul off
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Excludes:
- contingency
- mobilization
- loading
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Basis / Assumptions:
- 10 mile one-way haul distance
- based on haul cost = $0.52 / CY / mile
- loading cost included in excavation
- assumes no cost dumping
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Cost Item #18 - Mobilization				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Total				
Unit Cost value used in Cost Estimate	**LS**			**varies**

Champion: Hasty

Includes:

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Excludes:

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Basis / Assumptions:

- mobilization varies with type of construction and unit cost
- refer to individual cost estimates for lump sum mobilization cost
- mobilization cost are included in the unit cost of cost items 5, 7, 28, 29, 30, 31, 32, 37, 38, 39, 40, 58, 59, 60, 61, 62, 63, 64 & 65
- ROW acquisition cost items 42, 43, 44, 45, 46 & 47 have no mobilization
- mobilization for cost items 1, 2, 3, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 33, 34, 35, 36, 41, 48, 49, 50, 51, 52, 53, 54, 55, 56 & 57 is based on 3% of estimated construction cost
- mobilization for cost items 4 & 6 is based on proration of the quoted mobilization cost to the estimated construction costs
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Cost Item #19 - Pump Station - WR - New - 220+00 UWR				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Canopies & Enclosures	LS	$10,000.00	1.00	$10,000.00
Cast In Place Conc Wet Well	LS	$110,000.00	1.00	$110,000.00
Controls & Instrumentation	LS	$65,000.00	1.00	$65,000.00
Electric Service, Wiring & Switchgear	LS	$105,000.00	1.00	$105,000.00
Force Main - 10" Dia	LF	$95.00	400.00	$38,000.00
Gravity Drain - 12" Dia	LF	$140.00	400.00	$56,000.00
Piping, Valves & Mech Appurtenances	LS	$26,500.00	1.00	$26,500.00
Pump	EA	$97,500.00	1.00	$65,000.00
Valve Vaults & Discharge Structure	LS	$130,000.00	1.00	$130,000.00
Total	**$/EA**			**$605,500.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$605,500.00**

Champion: Hasty

Includes:
- completed pump station in place
- equipment
- material
- installation
- excavation, haul off & disposal of excess material
- electric service
- restoration
-
-
-

Excludes:
- contingency
- mobilization
- building
- VFDs
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Basis / Assumptions:
- Design Capacity = 3 cfs
- TDH = 35'
- based on RSMeans cost data
- validated by comparison to historical cost data from similar projects
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Cost Item #20 - Pump Station - WR - New - 560+00 LWR				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Canopies & Enclosures	LS	$10,000.00	1.00	$10,000.00
Cast In Place Conc Wet Well	LS	$110,000.00	1.00	$110,000.00
Controls & Instrumentation	LS	$65,000.00	1.00	$65,000.00
Electric Service, Wiring & Switchgear	LS	$105,000.00	1.00	$105,000.00
Force Main - 10" Dia	LF	$95.00	400.00	$38,000.00
Gravity Drain - 12" Dia	LF	$140.00	400.00	$56,000.00
Piping, Valves & Mech Appurtenances	LS	$26,500.00	1.00	$26,500.00
Pump	EA	$159,000.00	1.00	$159,000.00
Valve Vaults & Discharge Structure	LS	$130,000.00	1.00	$130,000.00
Total	**$/EA**			**$699,500.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$699,500.00**

Champion: Hasty

Includes:
- completed pump station in place
- equipment
- material
- installation
- excavation, haul off & disposal of excess material
- electric service
- restoration
-
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-

Excludes:
- contingency
- mobilization
- building
- VFDs
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Basis / Assumptions:
- Design Capacity = 21 cfs
- TDH = 35'
- based on RSMeans cost data
- validated by comparison to historical cost data from similar projects
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Cost Item #21 - Pump Station - MESD - Improve Existing - Phillips Reach				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Canopies & Enclosures	LS	$10,000.00	1.00	$10,000.00
Cast In Place Conc Wet Well	LS	$110,000.00	1.00	$110,000.00
Controls & Instrumentation	LS	$65,000.00	1.00	$65,000.00
Electric Service, Wiring & Switchgear	LS	$105,000.00	1.00	$105,000.00
Force Main - 10" Dia	LF	$95.00	400.00	$38,000.00
Gravity Drain - 12" Dia	LF	$140.00	400.00	$56,000.00
Piping, Valves & Mech Appurtenances	LS	$26,500.00	1.00	$26,500.00
Pump	EA	$309,000.00	1.00	$309,000.00
Valve Vaults & Discharge Structure	LS	$130,000.00	1.00	$130,000.00
Total	**$/EA**			**$849,500.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$849,500.00**

Champion: Hasty

Includes:
- completed pump station in place
- equipment
- material
- installation
- excavation, haul off & disposal of excess material
- electric service
- restoration
-
-
-

Excludes:
- contingency
- mobilization
- building
- VFDs
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Basis / Assumptions:
- Design Capacity = 50 cfs
- TDH = 35'
- based on RSMeans cost data
- validated by comparison to historical cost data from similar projects
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Cost Item #22 - Pump Station - PdP - Improve Existing - PdP West				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Canopies & Enclosures	LS	$10,000.00	1.00	$10,000.00
Cast In Place Conc Wet Well	LS	$110,000.00	1.00	$110,000.00
Controls & Instrumentation	LS	$65,000.00	1.00	$65,000.00
Electric Service, Wiring & Switchgear	LS	$105,000.00	1.00	$105,000.00
Force Main - 10" Dia	LF	$95.00	400.00	$38,000.00
Gravity Drain - 12" Dia	LF	$140.00	400.00	$56,000.00
Piping, Valves & Mech Appurtenances	LS	$26,500.00	1.00	$26,500.00
Pump	EA	$309,000.00	1.00	$309,000.00
Valve Vaults & Discharge Structure	LS	$130,000.00	1.00	$130,000.00
Total	**$/EA**			**$849,500.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$849,500.00**

Champion: Hasty

Includes:
- completed pump station in place
- equipment
- material
- installation
- excavation, haul off & disposal of excess material
- electric service
- restoration
-
-
-

Excludes:
- contingency
- mobilization
- building
- VFDs
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Basis / Assumptions:
- Design Capacity = 47 cfs
- TDH = 35'
- based on RSMeans cost data
- validated by comparison to historical cost data from similar projects
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Cost Item #23 - Pump Station - Various Improvements				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Total	**$/EA**			**$0.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$600,000.00**

Champion: Hasty

Includes:

- construction of 1 new pump station or upgrades to 2 existing pump station
- upgrades include new pumps with higher capacity and upgrades to electric service
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Excludes:

- contingency
- mobilization
- building
- VFDs
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Basis / Assumptions:

- based on RSMeans cost data
- based on standard St. Louis MSD historic unit costs
- validated by comparison to IDOT bid tabs
- validated by comparison to historical cost data from similar projects
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Cost Item #24 - Pvmt - Curb & Gutter - Remove & Replace				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Pvmt - Curb & Gutter - Remove & Replace	LF	$42.00	1.00	$42.00
Total	**$/LF**			**$42.00**
Unit Cost value used in Cost Estimate	**$/LF**			**$42.00**

Champion: Coronel

Includes:
- demolition of existing curb & gutter
- disposal of existing curb & gutter
- haul off of existing curb & gutter
- installation of new conc curb & gutter
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Excludes:
- contingency
- mobilization
- grading
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Basis / Assumptions:
- applicable for construction in parking lot areas
- based on standard St. Louis MSD unit costs
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Cost Item #25 - Pvmt - Improved Roadway				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Pvmt - Improved Roadway	SY	$50.00	2.44	$122.00
Total	**$/LF**			**$122.00**
Unit Cost value used in Cost Estimate	**$/LF**			**$122.00**

Champion: Coronel

Includes:
- demolition of existing roadway & improvements
- disposal of existing roadway & improvements
- haul off of existing roadway & improvements
- new crushed limestone base (6" thick)
- new asphalt pavement (3" thick)
- new appurtenant roadway improvements
- grading
- roadside ditches
-
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Excludes:
- contingency
- mobilization
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Basis / Assumptions:
- applicable for areas where seepage berms, fill or other improvements occur over an existing paved roadway
- based on 22' wide road
- based on IDOT bid tabs
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Cost Item #26 - Pvmt - Roads & Trails - Remove & Replace				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Pvmt - Roads & Trails - Remove & Replace	SY	$50.00	1.00	$50.00
Total	**$/SY**			**$50.00**
Unit Cost value used in Cost Estimate	**$/SY**			**$50.00**

Champion: Coronel

Includes:
- demolition of existing paved trail or road
- disposal of existing asphalt
- haul off of existing asphalt
- new crushed limestone base (4" thick)
- new asphalt pavement (2" thick)
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Excludes:
- contingency
- mobilization
- grading
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Basis / Assumptions:
- applicable for paved trails & roads on the levee crest that will be disturbed during construction
- applicable for paved trails & roads in areas that will be disturbed during construction
- based on IDOT bid tabs
- assumes that pavement will go back on original horizontal & vertical alignment
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Cost Item #27 - Pvmt - Road Repair				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Asphalt pavement overlay (2" thick)	LF	$24.00	1.00	$24.00
Failure repair & rotomilling	LF	$20.00	1.00	$20.00
Total	**$/LF**			**$44.00**
Unit Cost value used in Cost Estimate	**$/LF**			**$44.00**

Champion: Coronel

Includes:
- removal & replacement of base & pavement at locations of failures
- disposal of existing base & asphalt
- haul off of existing base & asphalt
- new asphalt pavement overlay (2" thick)
- rotomilling prior to overlay
-
-
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Excludes:
- contingency
- mobilization
- grading
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Basis / Assumptions:
- applicable for paved trails & public roads on the levee crest that will be subject to construction traffic
- applicable for paved public roads used for access during construction
- assumes that pavement will go back on original horizontal and vertical alignment
- based on a 22' wide road
- based on a 2" asphalt overlay
- based on asphalt cost of $90 / TN
- assumes 2 CY / TN of asphalt
- based on IDOT bid tabs
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Cost Item #28 - Relief Well - Existing - Abandon				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Relief Well - Existing - Abandon	EA	$2,000.00	1.00	$2,000.00
Total	**$/EA**			**$2,000.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$2,000.00**

Champion: Hladick

Includes:
- material
- grout existing well
- mobilization
- removal of well above grade
-
-
-
-
-
-

Excludes:
- contingency
- special waste costs
- hazardous waste costs
- removal of well below grade
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Basis / Assumptions:
- based on prices from local contractors (Contract Dewatering Services, Inc., Geotechnical Construction Inc. and Pensoneau Construction Inc.)
- validated by comparison to historical cost data from similar projects
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Cost Item #29 - Relief Well - Existing - Convert to Type "T"				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Relief Well - Existing - Convert to Type "T"	EA	$6,000.00	1.00	$6,000.00
Total	**$/EA**			**$6,000.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$6,000.00**

Champion: Hladick

Includes:
- material
- installation
- mobilization
- manhole
-
-
-
-
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-

Excludes:
- contingency
- special waste costs
- hazardous waste costs
- lateral piping
- manifold piping
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Basis / Assumptions:
- based on prices from local contractors (Contract Dewatering Services, Inc., Geotechnical Construction Inc. and Pensoneau Construction Inc.)
- validated by comparison to historical cost data from similar projects
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Cost Item #30 - Relief Well - Existing - Hazardous Waste Premium				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Water analysis for waste characterization	EA	$1,200.00	1.00	$1,200.00
Transportation & disposal of water	EA	$45,000.00	1.00	$45,000.00
Labor	EA	$2,500.00	1.00	$2,500.00
Total	**$/EA**			**$48,700.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$48,700.00**

Champion: Hladick

Includes:
- mobilization
- waste characterization
- transportation & disposal of water
-
-
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-
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Excludes:
- contingency
- contaminated soil media
- well rehabilitation
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Basis / Assumptions:
- water must be taken to a hazardous waste disposal facility such as Trade Waste
- maximum assumed water volume for well development
- $0.75 / gallon for disposal
- water must be treated before disposal
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Cost Item #31 - Relief Well - Existing - Rehabilitate				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Relief Well - Existing - Rehabilitate	EA	$12,000.00	1.00	$12,000.00
Total	**$/EA**			**$12,000.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$12,000.00**

Champion: Hladick

Includes:
- mobilization
- air lifting and/or chemical cleaning to achieve desired performance
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Excludes:
- contingency
- special waste costs
- hazardous waste costs
- sleeving
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Basis / Assumptions:
- based on prices from local contractors (Contract Dewatering Services, Inc., Geotechnical Construction Inc. and Pensoneau Construction Inc.)
- validated by comparison to historical cost data from similar projects
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Cost Item #32 - Relief Well - Existing - Special Waste Premium				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Water analysis for waste characterization	EA	$1,200.00	1.00	$1,200.00
Transportation & disposal of water	EA	$9,000.00	1.00	$9,000.00
Labor	EA	$2,500.00	1.00	$2,500.00
Total	**$/EA**			**$12,700.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$12,700.00**

Champion: Hladick

Includes:
- mobilization
- waste characterization
- transportation & disposal of water
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-
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Excludes:
- contingency
- contaminated soil media
- well rehabilitation
- hazardous waste disposal
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Basis / Assumptions:
- water must be taken to a special waste disposal facility American Bottoms
- maximum assumed water volume for well development
- $0.15 / gallon for disposal
- water must be treated before disposal
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Cost Item #33 - Relief Well - Lateral Pipe (8-Inch)				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
8" HDPE Type S	LF	$8.00	250.00	$2,000.00
8" HDPE Type S Elbows	EA	$125.00	3.00	$375.00
8" HDPE Type S Tees	EA	$225.00	1.00	$225.00
Trench Excavation (4' to 6' deep) 1/2 cy Excavator	CY	$11.00	170.91	$1,880.01
Compact Bedding Sand in Trench	CY	$3.39	5.14	$17.42
Trench Backfill	CY	$1.73	167.69	$290.10
Compact Backfill, vibrating roller	CY	$2.77	167.69	$464.50
Geotextile Fabric laid in trench, adverse conditions	SY	$1.96	33.33	$65.33
#2 Stone @ Outfall (12" Thick)	CY	$53.10	11.00	$584.10
Total	**$/LF**			**$39.34**
Unit Cost value used in Cost Estimate	**$/LF**			**$40.00**

Champion: Hladick

Includes:
- pipe
- bedding
- installation
- backfill
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Excludes:
- contingency
- mobilization
- sodding
- restoration
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Basis / Assumptions:
- per foot costs were built based on a 250' installation
- based on RSMeans cost data
- validated by comparison to standard St. Louis MSD historical unit costs
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Cost Item #34 - Relief Well - Manifold Manhole				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Manhole & appurtenances	EA	$1,500.00	1.00	$1,500.00
Labor	EA	$1,500.00	1.00	$1,500.00
Total	**$/EA**			**$3,000.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$3,000.00**

Champion: Hladick

Includes:
- manhole
- bedding
- installation
- backfill
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Excludes:
- contingency
- mobilization
- sodding
- restoration
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Basis / Assumptions:
- Nyloplast manholes
- based on RSMeans cost data
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Cost Item #35 - Relief Well - Manifold Pipe (12-Inch)				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
12" HDPE Type S	LF	$10.00	250.00	$2,500.00
12" HDPE Type S Elbows	EA	$144.00	3.00	$432.00
12" HDPE Type S Tees	EA	$271.00	1.00	$271.00
Trench Excavation (4' to 6' deep) 1/2 cy Excavator	CY	$11.00	225.00	$2,475.00
Compact Bedding Sand in Trench	CY	$23.14	6.17	$142.77
Trench Backfill	CY	$1.73	195.93	$338.96
Compact Backfill, vibrating roller	CY	$2.77	195.93	$542.73
Geotextile Fabric laid in trench, adverse conditions	SY	$1.96	33.33	$65.33
#2 Stone @ Outfall (12" Thick)	CY	$53.10	14.00	$743.40
Total	**$/LF**			**$50.07**
Unit Cost value used in Cost Estimate	**$/LF**			**$50.00**

Champion: Hladick

Includes:
- pipe
- bedding
- installation
- backfill
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Excludes:
- contingency
- mobilization
- sodding
- restoration
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Basis / Assumptions:
- per foot costs were built based on a 250' installation
- based on RSMeans cost data
- validated by comparison to standard St. Louis MSD historical unit costs
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Cost Item #36 - Relief Well - Manifold Pipe (18-Inch)				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
12" HDPE Type S	LF	$14.25	250.00	$3,562.50
12" HDPE Type S Elbows	EA	$289.30	3.00	$867.90
12" HDPE Type S Tees	EA	$447.50	1.00	$447.50
Trench Excavation (4' to 6' deep) 1/2 cy Excavator	CY	$11.00	240.00	$2,640.00
Compact Bedding Sand in Trench	CY	$23.14	7.72	$178.64
Trench Backfill	CY	$1.73	235.28	$407.03
Compact Backfill, vibrating roller	CY	$2.77	235.28	$651.73
Geotextile Fabric laid in trench, adverse conditions	SY	$1.96	33.33	$65.33
#2 Stone @ Outfall (12" Thick)	CY	$53.10	14.00	$743.40
Total	**$/LF**			**$63.76**
Unit Cost value used in Cost Estimate	**$/LF**			**$64.00**

Champion: Hladick

Includes:
- pipe
- bedding
- installation
- backfill
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Excludes:
- contingency
- mobilization
- sodding
- restoration
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Basis / Assumptions:
- per foot costs were built based on a 250' installation
- based on RSMeans cost data
- validated by comparison to standard St. Louis MSD historical unit costs
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Cost Item #37 - Relief Well - New - Hazardous Waste Premium				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Soil analysis for waste characterization	EA	$1,750.00	1.00	$1,750.00
Transportation & disposal of soil	EA	$10,000.00	1.00	$10,000.00
Labor	EA	$1,500.00	1.00	$1,500.00
Water analysis for waste characterization	EA	$1,200.00	1.00	$1,200.00
Transportation & disposal of water	EA	$45,000.00	1.00	$45,000.00
Labor	EA	$2,500.00	1.00	$2,500.00
Total	**$/EA**			**$61,950.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$61,950.00**

Champion: Hladick

Includes:
- mobilization
- waste characterization
- transportation & disposal of water
- transportation & disposal of soil
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Excludes:
- contingency
- well installation & development
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Basis / Assumptions:
- water must be taken to a hazardous waste disposal facility such as Trade Waste
- maximum assumed water volume for well development
- $0.75 / gallon for disposal
- water must be treated before disposal
- soil must be taken to a hazardous waste disposal facility
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Cost Item #38 - Relief Well - New - Special Waste Premium				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Soil analysis for waste characterization	EA	$750.00	1.00	$750.00
Transportation & disposal of soil	EA	$1,625.00	1.00	$1,625.00
Labor	EA	$1,500.00	1.00	$1,500.00
Water analysis for waste characterization	EA	$1,200.00	1.00	$1,200.00
Transportation & disposal of water	EA	$9,000.00	1.00	$9,000.00
Labor	EA	$2,500.00	1.00	$2,500.00
Total	**$/EA**			**$16,575.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$16,575.00**

Champion: Hladick

Includes:
- mobilization
- waste characterization
- transportation & disposal
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Excludes:
- contingency
- contaminated soil media
- hazardous waste disposal
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Basis / Assumptions:
- water must be taken to a special waste disposal facility American Bottoms
- maximum assumed water volume for well development
- $0.15 / gallon for disposal
- water must be treated prior to disposal
- soil must be taken to a special waste disposal facility
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Cost Item #39 - Relief Well - New Type "D"				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Relief Well - New Type "D"	EA	$32,500.00	1.00	$32,500.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total	**$/EA**			**$32,500.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$32,500.00**

Champion: Hladick

Includes:
- material
- installation
- mobilization
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Excludes:
- contingency
- special waste costs
- hazardous waste costs
- "T" type appurtenances
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Basis / Assumptions:
- based on prices from local contractors (Contract Dewatering Services, Inc., Geotechnical Construction Inc. and Pensoneau Construction Inc.)
- validated by comparison to historical cost data from similar projects
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Cost Item #40 - Relief Well - New Type "T"				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Relief Well - New Type "T"	EA	$40,000.00	1.00	$40,000.00
Total	**$/EA**			**$40,000.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$40,000.00**

Champion: Hladick

Includes:
- material
- installation
- mobilization
- manhole
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Excludes:
- contingency
- special waste costs
- hazardous waste costs
- lateral piping
- manifold piping
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Basis / Assumptions:
- based on prices from local contractors (Contract Dewatering Services, Inc., Geotechnical Construction Inc. and Pensoneau Construction Inc.)
- validated by comparison to historical cost data from similar projects
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Cost Item #41 - RipRap Bank Protection				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
RipRap Bank Protection	CY	$120.00	1.00	$120.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total	**$/CY**			**$120.00**
Unit Cost value used in Cost Estimate	**$/CY**			**$120.00**

Champion: Coronel

Includes:
- provide & place rock riprap
- provide & place geotextile
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Excludes:
- contingency
- mobilization
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Basis / Assumptions:
- based on standard St. Louis MSD historical unit costs
- validated by comparison to IDOT bid tabs
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Cost Item #42 - ROW Acquisition - Agricultural				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
ROW Acquisition - Agricultural	AC	$6,500.00	1.00	$6,500.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total	**$/AC**			**$6,500.00**
Unit Cost value used in Cost Estimate	**$/AC**			**$6,500.00**

Champion: Schneider

Includes:

- land costs associated with fee simple right-of-way acquisition for construction of levee improvements
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Excludes:

- contingency
- appraisal / valuation services
- acquisition / negotiation services
- legal / condemnation costs
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Basis / Assumptions:

- based on fair market land value
- based on county assessor land value data
- based on fair market values vs. total acreage performed for numerous parcels
- based on land usage type, average cost per acre, per County
- based on comparables from real estate publications, public records and appraiser
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Cost Item #43 - ROW Acquisition - Commercial				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
ROW Acquisition - Commercial	AC	$30,000.00	1.00	$30,000.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total	**$/AC**			**$30,000.00**
Unit Cost value used in Cost Estimate	**$/AC**			**$30,000.00**

Champion: Schneider

Includes:

- land costs associated with fee simple right-of-way acquisition for construction of levee improvements
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Excludes:

- contingency
- appraisal / valuation services
- acquisition / negotiation services
- legal / condemnation costs
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Basis / Assumptions:

- based on fair market land value
- based on county assessor land value data
- based on fair market values vs. total acreage performed for numerous parcels
- based on land usage type, average cost per acre, per County
- based on comparables from real estate publications, public records and appraiser
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Cost Item #44 - ROW Acquisition - Governmental				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
ROW Acquisition - Governmental	AC	$25,000.00	1.00	$25,000.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total	**$/AC**			**$25,000.00**
Unit Cost value used in Cost Estimate	**$/AC**			**$25,000.00**

Champion: Schneider

Includes:

- land costs associated with fee simple right-of-way acquisition for construction of levee improvements
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Excludes:

- contingency
- appraisal / valuation services
- acquisition / negotiation services
- legal / condemnation costs
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Basis / Assumptions:

- based on fair market land value
- based on county assessor land value data
- based on fair market values vs. total acreage performed for numerous parcels
- based on land usage type, average cost per acre, per County
- based on comparables from real estate publications, public records and appraiser
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Cost Item #45 - ROW Acquisition - Industrial				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
ROW Acquisition - Industrial	AC	$30,000.00	1.00	$30,000.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total	**$/AC**			**$30,000.00**
Unit Cost value used in Cost Estimate	**$/AC**			**$30,000.00**

Champion: Schneider

Includes:

- land costs associated with fee simple right-of-way acquisition for construction of levee improvements
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Excludes:

- contingency
- appraisal / valuation services
- acquisition / negotiation services
- legal / condemnation costs
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Basis / Assumptions:

- based on fair market land value
- based on county assessor land value data
- based on fair market values vs. total acreage performed for numerous parcels
- based on land usage type, average cost per acre, per County
- based on comparables from real estate publications, public records and appraiser
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Cost Item #46 - ROW Acquisition - Residential				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
ROW Acquisition - Residential	AC	$18,000.00	1.00	$18,000.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total	**$/AC**			**$18,000.00**
Unit Cost value used in Cost Estimate	**$/AC**			**$18,000.00**

Champion: Schneider

Includes:

- land costs associated with fee simple right-of-way acquisition for construction of levee improvements
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Excludes:

- contingency
- appraisal / valuation services
- acquisition / negotiation services
- legal / condemnation costs
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Basis / Assumptions:

- based on fair market land value
- based on county assessor land value data
- based on fair market values vs. total acreage performed for numerous parcels
- based on land usage type, average cost per acre, per County
- based on comparables from real estate publications, public records and appraiser
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Cost Item #47 - ROW Acquisition - Vacant/Undeveloped				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
ROW Acquisition - Vacant/Undeveloped	AC	$23,000.00	1.00	$23,000.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total	**$/AC**			**$23,000.00**
Unit Cost value used in Cost Estimate	**$/AC**			**$23,000.00**

Champion: Schneider

Includes:

- land costs associated with fee simple right-of-way acquisition for construction of levee improvements
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Excludes:

- contingency
- appraisal / valuation services
- acquisition / negotiation services
- legal / condemnation costs
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Basis / Assumptions:

- based on fair market land value
- based on county assessor land value data
- based on fair market values vs. total acreage performed for numerous parcels
- based on land usage type, average cost per acre, per County
- based on comparables from real estate publications, public records and appraiser
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Cost Item #48 - Seeding				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Seeding	AC	$1,650.00	1.00	$1,650.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total	**$/AC**			**$1,650.00**
Unit Cost value used in Cost Estimate	**$/AC**			**$1,650.00**

Champion: Coronel

Includes:
- surface preparation
- seed
- mulch
- fertilizer
- truck irrigation
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Excludes:
- contingency
- mobilization
- finish grading
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Basis / Assumptions:
- based on standard MoDOT historical unit cost
- adjust based on IDOT bid tabs
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Cost Item #49 - Seepage Berm Material - Haul On and Placement (Hauled)				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Seepage berm fill material	CY	$12.00	1.00	$12.00
Total	**$/CY**			**$12.00**
Unit Cost value used in Cost Estimate	**$/CY**			**$12.00**

Champion: Coronel

Includes:
- material
- haul on
- placement
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Excludes:
- contingency
- mobilization
- clearing & grubbing
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Basis / Assumptions:
- based on prices from local contractors (Baxmeyer Excavating, Luhr Brothers, etal)
- validated by comparison to historical cost data from similar projects
- potential sources of fill material include dredged material from suppliers such as Bangert with excess capacity on their existing permits
- dredged material could be delivered via a temporary barge/conveyor system
- other potential sources of fill material include Bussen Quarries, Walker Aggregates, Inc., Columbia Quarry Company
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Cost Item #50 - Slip-Line - 12-Inch Pipe				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Slip-Line - 12-Inch Pipe	LF	$110.00	1.00	$110.00
Total	**$/LF**			**$110.00**
Unit Cost value used in Cost Estimate	**$/LF**			**$110.00**

Champion: Coronel

Includes:
- rehabilitate existing gravity drain by slip-line construction methods
- cleaning & preparation
- provide & install liner
- grout annular space
- reseat flap gates & valves
- post construction CCTV inspection video
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-
-

Excludes:
- contingency
- mobilization
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Basis / Assumptions:
- based on standard St. Louis MSD historic unit costs
- validated by comparison to IDOT bid tabs
- HDPE liner pipe
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Cost Item #51 - Slip-Line - 15-Inch Pipe				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Slip-Line - 15-Inch Pipe	LF	$115.00	1.00	$115.00
Total	**$/LF**			**$115.00**
Unit Cost value used in Cost Estimate	**$/LF**			**$115.00**

Champion: Coronel

Includes:
- rehabilitate existing gravity drain by slip-line construction methods
- cleaning & preparation
- provide & install liner
- grout annular space
- reseat flap gates & valves
- post construction CCTV inspection video
-
-
-
-

Excludes:
- contingency
- mobilization
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Basis / Assumptions:
- based on standard St. Louis MSD historic unit costs
- validated by comparison to IDOT bid tabs
- HDPE liner pipe
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Cost Item #52 - Slip-Line - 18-Inch Pipe				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Slip-Line - 18-Inch Pipe	LF	$121.00	1.00	$121.00
Total	**$/LF**			**$121.00**
Unit Cost value used in Cost Estimate	**$/LF**			**$121.00**

Champion: Coronel

Includes:
- rehabilitate existing gravity drain by slip-line construction methods
- cleaning & preparation
- provide & install liner
- grout annular space
- reseat flap gates & valves
- post construction CCTV inspection video
-
-
-
-

Excludes:
- contingency
- mobilization
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Basis / Assumptions:
- based on standard St. Louis MSD historic unit costs
- validated by comparison to IDOT bid tabs
- HDPE liner pipe
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Cost Item #53 - Slip-Line - 24-Inch Pipe				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Slip-Line - 24-Inch Pipe	LF	$132.00	1.00	$132.00
Total	**$/LF**			**$132.00**
Unit Cost value used in Cost Estimate	**$/LF**			**$132.00**

Champion: Coronel

Includes:
- rehabilitate existing gravity drain by slip-line construction methods
- cleaning & preparation
- provide & install liner
- grout annular space
- reseat flap gates & valves
- post construction CCTV inspection video
-
-
-
-

Excludes:
- contingency
- mobilization
-
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-
-
-

Basis / Assumptions:
- based on standard St. Louis MSD historic unit costs
- validated by comparison to IDOT bid tabs
- HDPE liner pipe
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Cost Item #54 - Slip-Line - 27-Inch Pipe				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Slip-Line - 27-Inch Pipe	LF	$138.00	1.00	$138.00
Total	**$/LF**			**$138.00**
Unit Cost value used in Cost Estimate	**$/LF**			**$138.00**

Champion: Coronel

Includes:
- rehabilitate existing gravity drain by slip-line construction methods
- cleaning & preparation
- provide & install liner
- grout annular space
- reseat flap gates & valves
- post construction CCTV inspection video
-
-
-
-

Excludes:
- contingency
- mobilization
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-

Basis / Assumptions:
- based on standard St. Louis MSD historic unit costs
- validated by comparison to IDOT bid tabs
- HDPE liner pipe
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Cost Item #55 - Slip-Line - 36-Inch Pipe				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Slip-Line - 36-Inch Pipe	LF	$167.00	1.00	$167.00
Total	**$/LF**			**$167.00**
Unit Cost value used in Cost Estimate	**$/LF**			**$167.00**

Champion: Coronel

Includes:
- rehabilitate existing gravity drain by slip-line construction methods
- cleaning & preparation
- provide & install liner
- grout annular space
- reseat flap gates & valves
- post construction CCTV inspection video
-
-
-
-

Excludes:
- contingency
- mobilization
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Basis / Assumptions:
- based on standard St. Louis MSD historic unit costs
- validated by comparison to IDOT bid tabs
- HDPE liner pipe
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Cost Item #56 - Slip-Line - 42-Inch Pipe				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Slip-Line - 42-Inch Pipe	LF	$201.00	1.00	$201.00
Total	**$/LF**			**$201.00**
Unit Cost value used in Cost Estimate	**$/LF**			**$201.00**

Champion: Coronel

Includes:
- rehabilitate existing gravity drain by slip-line construction methods
- cleaning & preparation
- provide & install liner
- grout annular space
- reseat flap gates & valves
- post construction CCTV inspection video
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Excludes:
- contingency
- mobilization
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Basis / Assumptions:
- based on standard St. Louis MSD historic unit costs
- validated by comparison to IDOT bid tabs
- HDPE liner pipe
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Cost Item #57 - Slip-Line - 48-Inch Pipe				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Slip-Line - 48-Inch Pipe	LF	$220.00	1.00	$220.00
Total	**$/LF**			**$220.00**
Unit Cost value used in Cost Estimate	**$/LF**			**$220.00**

Champion: Coronel

Includes:
- rehabilitate existing gravity drain by slip-line construction methods
- cleaning & preparation
- provide & install liner
- grout annular space
- reseat flap gates & valves
- post construction CCTV inspection video
-
-
-
-

Excludes:
- contingency
- mobilization
-
-
-
-
-
-
-

Basis / Assumptions:
- based on standard St. Louis MSD historic unit costs
- validated by comparison to IDOT bid tabs
- HDPE liner pipe
-
-
-
-
-
-
-
-
-
-
-

Cost Item #58 - Utility Relocation - High Tension Power (Raise)				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Utility Relocation - High Tension Power (Raise)	EA	$300,000.00	1.00	$300,000.00
Total	**$/EA**			**$300,000.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$300,000.00**

Champion: Loomis

Includes:

- mobilization
- raise one double circuit transmission lattice structure tower to provide required ground clearance in areas of fill
-
-
-
-
-
-
-
-

Excludes:

- contingency
- alignment change
- right of way acquisition
-
-
-
-
-
-
-

Basis / Assumptions:

- based on cost data provided by Terry Grass of Ameren
- validated by comparison to historical cost data from nearby Mississippi River bridge project
- all work executed by utility company
-
-
-
-
-
-
-
-
-
-
-

Cost Item #59 - Utility Relocation - Natural Gas Pipeline				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Utility Relocation - Natural Gas Pipeline	LF	$500.00	1.00	$500.00
Total	**$/LF**			**$500.00**
Unit Cost value used in Cost Estimate	**$/LF**			**$500.00**

Champion: Loomis

Includes:

- mobilization
- relocation of a gas pipeline to a new alignment to avoid conflict with cutoff wall construction
-
-
-
-
-
-
-
-

Excludes:

- contingency
- right of way acquisition
-
-
-
-
-
-
-
-

Basis / Assumptions:

- based on conceptual cost data provided by Phil Davidson of ConocoPhillips
- all work executed by utility company
-
-
-
-
-
-
-
-
-
-
-
-

Cost Item #60 - Utility Relocation - Power Pole / Light Pole				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Utility Relocation - Power Pole / Light Pole	EA	$10,000.00	1.00	$10,000.00
Total	**$/EA**			**$10,000.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$10,000.00**

Champion: Loomis

Includes:

- mobilization
- relocation of a standard power pole / light pole to a new alignment to avoid conflict with levee repair construction
-
-
-
-
-
-
-
-

Excludes:

- contingency
- right of way acquisition
-
-
-
-
-
-
-
-

Basis / Assumptions:

- based on cost data provided by Terry Grass of Ameren
- all work executed by utility company
-
-
-
-
-
-
-
-
-
-
-
-

Cost Item #61 - Utility Relocation - Shield OE Power				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Utility Relocation - Shield OE Power	LF	$50.00	1.00	$50.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total	**$/LF**			**$50.00**
Unit Cost value used in Cost Estimate	**$/LF**			**$50.00**

Champion: Safford

Includes:
- mobilization
- installation of shielding on OE transmission lines as required for construction in close proximity to live lines
-
-
-
-
-
-
-
-

Excludes:
- contingency
- de-energizing lines
-
-
-
-
-
-
-
-

Basis / Assumptions:
- based on cost data provided by Terry Grass of Ameren
- all work executed by utility company
- shielding is good for a period of 60 days
-
-
-
-
-
-
-
-
-
-
-

Cost Item #62 - Utility Relocation - Underground Communication				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Utility Relocation - Underground Communication	LF	$100.00	1.00	$100.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total	**$/LF**			**$100.00**
Unit Cost value used in Cost Estimate	**$/LF**			**$100.00**

Champion: Loomis

Includes:
- mobilization
- relocation of buried communication lines to a new alignment to avoid conflict with levee repair construction
-
-
-
-
-
-
-
-

Excludes:
- contingency
- right of way acquisition
-
-
-
-
-
-
-
-

Basis / Assumptions:
- based on cost data provided by Cory Birk from Charter Communication
- all work executed by utility company
-
-
-
-
-
-
-
-
-
-
-
-

Cost Item #63 - Utility Relocation - Underground Communications Pedestal				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Utility Relocation - Underground Communications Pedestal	EA	$10,000.00	1.00	$10,000.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total	**$/EA**			**$10,000.00**
Unit Cost value used in Cost Estimate	**$/EA**			**$10,000.00**

Champion: Loomis

Includes:

- mobilization
- relocation of a communication pedestal to a new alignment to avoid conflict with levee repair construction
-
-
-
-
-
-
-
-

Excludes:

- contingency
- right of way acquisition
-
-
-
-
-
-
-
-

Basis / Assumptions:

- based on cost data provided by Cory Birk from Charter Communication
- all work executed by utility company
-
-
-
-
-
-
-
-
-
-
-
-

Cost Item #64 - Utility Relocation - Various Buried Facilities				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Utility Relocation - Various Buried Facilities	LF	$250.00	1.00	$250.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total	**$/LF**			**$250.00**
Unit Cost value used in Cost Estimate	**$/LF**			**$250.00**

Champion: Loomis

Includes:
- mobilization
- relocation of various underground utilities to a new alignment to avoid conflict with levee repair construction
- coax cable
- copper telephone
- water distribution
- gas distribution
-
-
-
-

Excludes:
- contingency
- right of way acquisition
-
-
-
-
-
-
-

Basis / Assumptions:
- based on cost data provided by Cory Birk from Charter Communication
- based on cost data provided by Harrisonville Telephone Company
- all work executed by utility company
-
-
-
-
-
-
-
-
-
-
-

Cost Item #65 - Wetland Mitigation				
Description	**Unit**	**Cost**	**Quantity / Unit**	**Total**
Wetland Mitigation	AC	$25,000.00	1.00	$25,000.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total	**$/AC**			**$25,000.00**
Unit Cost value used in Cost Estimate	**$/AC**			**$25,000.00**

Champion: Fikri

Includes:
- mobilization
- initial grading to bring site to design grade
- initial planting of mitigation site
- maintenance and monitoring for 6 years following construction
-
-
-
-
-
-

Excludes:
- contingency
- design costs
- legal documentation of conservation easements/deed restrictions
-
-
-
-
-
-
-

Basis / Assumptions:
- property may be purchased at $6,000 / AC
- extensive replacement plantings will not be necessary
- site preparation & planting costs will be approximately $10,000 / AC
- monitoring & maintenance will not exceed $4,000 / AC
- grading to bring site to design grade will not exceed $5,000 / AC
- wetland will be established in 6 years
- additional monitoring and/or maintenance beyond 6 years will not be required
-
-
-
-
-
-
-

APPENDIX F – CONSTRUCTION COST ESCALATION

Construction Cost Escalation Rate Calculation for Southwestern Illinois Flood Prevention Initiative

Estimate Reference Date: 7/1/2011

Mid-point of 4 years: 6/30/2013

Assumptions:

1. Reference year = 2011
2. Quarterly cost indexes were taken from Table A-1 of Reference 1 assuming feature code 11 (Levees and Floodwalls)
3. Quarterly escalation indices can be calculated for the quarter of interest by dividing its cost index by that of the preceding quarter

			4Q11	4Q11	1Q12	2Q12	3Q12	4Q12	1Q13	2Q13	3Q13
			April - Jun	Jul - Sep	Oct - Dec	Jan - Mar	April - Jun	Jul - Sep	Oct - Dec	Jan - Mar	April - Jun
Cost Index, Base year = 1967:			742.25	745.3	748.84	751.85	754.87	757.88	761.28	764.54	767.79
Escalation Index:				1.00411	1.00475	1.00402	1.00402	1.00399	1.00449	1.00428	1.00425

Period			Quarter	x	Escalation Index
7/1/2011	to	9/30/2011	1		1.00411
10/1/2011	to	12/31/2011	1		1.00475
1/1/2012	to	3/31/2012	1		1.00402
4/1/2012	to	6/30/2012	1		1.00402
7/1/2012	to	9/30/2012	1		1.00399
10/1/2012	to	12/31/2012	1		1.00449
1/1/2013	to	3/31/2013	1		1.00428
4/1/2013	to	6/30/2013	1		1.00425

Compound Escalation =		1.03440889	or	3.44%

Reference:

1. Civil Works Construction Cost Index System, US Army Corps of Engineers, Tables Revised as of 30 September 2010 (EM-1110-2-1304)

APPENDIX G – HAYWARD BAKER CONCEPTUAL CONSTRUCTION COST ESTIMATE

Conceptual Estimated Costs - SW Illinois Levee Project

22-Apr-11

Technology		Price per Sq Ft Shallow Wall	Deep Wall		Pros	Cons
	Mobilization	< 50'	> 50'< 90'	> 90'		
TRD Method*	$250,000 - 400,000	$20 - 25	$25 - 30	$30 - 35*	Continuous Wall, ultimate in quality control, effectivly cuts rock and boulders, can work in 25' of headroom, spoils can be utilized as fills, inexpensive for deep walls	High Mobilization costs
TRD Method	$250,000 - 400,000	$20 - 26	$25 - 30	$25 - 30&		
Conventional Excavated Slurry Wall, CB	$50,000	$10 - 12	$14- 18	NA	inexpensive	caving walls at depth, quality control?, cannot cut rock or boulders, requires headroom, spoils will be landfilled
Vinyl Sheeting	$50,000	12	NA	NA	Predictable performance	no tolerance for obstructions, depth limit, splitting sheets will reduce effectiveness
Jet Grout Wall					Ideal for work around utilties and other crossings, can be used beneath structures, can drill through obstructions, ability to treat at depth only, vs back to grade, with small equipment, can work on a limited bench	Single panel wall lacks redundancy, concern with vertical alignment of tools resulting in windows
Single Panel Wall	$80,000	$24-26	$24-26	$24-26		
Double Panel Wall	$80,000	$30 - 35	$32 - 35	$35 - 38		
Full Column Wall	$80,000	$50 - 60	$60 - 80	$60 - 80		
Vibrating Beam	$80,000	$12- 15	$12- 15+	NA	inexpensive, for contaminated areas can be completed without spoils	concern with durability and permeability, limited by very dense sands, may require high pressure method, thinest wall

* Assumes Rock Toe

\+ May not be effective at this depth, profile dependent

& Must know elevation of top of rock, for machine to work at top of rock

HAYWARD BAKER
Geotechnical Construction
KELLER

Appendix C

Financial Plan

SOUTHWEST ILLINOIS FLOOD PREVENTION DISTRICT COUNCIL

2011 FINANCIAL PLAN

Prepared by

BUTCHERMARK FINANCIAL ADVISORS LLC

June 15, 2011

2010 FINANCING PLAN

The Council retained ButcherMark Financial Advisors LLC ("ButcherMark" or "Financial Advisor") to develop a financing plan that would provide the funds necessary to pay all the expected costs to construct the repairs to the levees. It was the counties' expectation, in forming the Council, that the incremental sales tax approved by the State of Illinois should be the primary source of payment for the costs related to completing the repairs to the levee system in order to be able to certify to the 100-year level of protection.

To meet this goal ButcherMark prepared an initial plan of finance in 2010.That plan recommended the Council leverage the three county's sale tax income by issuing bonds in combination with surplus monies from sales tax receipts that will be used on a "pay as you go" basis. This plan for bond financing was structured with a "gross pledge" flow of funds using a "locked box" with the bond trustee to receive all sales tax receipts sent by the state on behalf of the three counties and pledging them first to pay debt service on senior bonds and second to pay debt service on subordinated ("junior" or "second lien") bonds. The Bond Indenture, governing the terms of the bond issue, and the initial plan of finance was approved by the Council in 2010 and led to an initial issuance of three Series of bonds in November 2010 for a par amount of $94,195,000.

This initial transaction produced $87.4 million in Project Fund monies for levee repairs. The financing took advantage of very beneficial tax subsidies offered by the Federal government under the American Recovery and Reinvestment Act of 2009, Public Law 111-5 (the **"**Recovery Act**"**), a program which ended on December 31, 2010, by issuing Build America Bonds ("BABs"), Recovery Zone Economic Development Bonds and tax exempt bonds. It was assumed in light of very preliminary engineering cost estimates from AMEC, the Council's design and project management engineers, that these Project Fund monies would be sufficient to complete the initial phase of the project planning and design and allow initial construction to begin once the design was completed and all permits were issued. The financing plan was also designed to delay using bond financing for certain estimated costs of levee to avoid losing a large amount of money because of negative arbitrage (meaning the rate on the investment of unused Project funds will be much less than the interest rate on the bonds) as Project Fund monies wait to be spent. Further, tax law spending requirements, monitored by the IRS, requires that the Council must reasonably expect to spend Project Fund proceeds within three years from the closing of the bond transaction. If the Council bonded for the full amount possible against the then existing sales tax revenue stream, it was uncertain that all the proceeds could be spent within the IRS time frame. ButcherMark also advised the Council that by delaying future bond issuances against sales tax revenues, the Council could maximize its leverage of those tax receipts by taking advantage of the growth in sales tax that is expected in the future.

In this initial plan, ButcherMark projected that the Council could generate a total aggregate amount of $166.5 million by leveraging all of the sales tax monies through August of 2015. This assumed executing three bond transactions: one in 2010; another in 2012 and a final bond issuance in 2014. The plan also assumed that all accumulated surplus funds in the three county sales tax funds would only be spent on a "pay as you go" basis for levee repairs in the latter years after all bonding capacity was exhausted. The plan recommended that the first bond transactions be issued as a senior debt obligation of the Council in 2010, followed by two subordinated debt transactions in 2012 and 2014.

2011 FINANCING PLAN

In May 2011, subsequent to the first bond financing, AMEC submitted a design and cost estimate to the Council based upon a 30% design for the project. The cost of the construction based upon that level of design has now been estimated to be approximately $150 million. Financial costs and administrative costs estimated by the Council would add an additional $10-11 million to this cost estimate, resulting in a total estimated project cost of $161 million.

The Council involved ButcherMark in the AMEC construction review process so that it could update its financial model based upon the most current construction cost estimates and schedule

for completing construction. ButcherMark revised its debt capacity model (see Attachment I) to include the revised project cost estimates including assumptions based upon a new projected schedule of the use of monies from the 2010 project financing (to be fully spent by the end of the first quarter of 2013), the demise of the favorable BAB program at the Federal level, the latest sales tax receipts from the State of Illinois, the use of the subordinated bond structure authorized by the Council in the Bond Indenture and the continued access to the surplus in the three county sales tax funds for "pay as you go" financial support for the levee project.

As a result, *ButcherMark is recommending a financial plan to the Council in June 2011 that can generate an additional $75.2 million on a conservative basis that will finance, together with the $87.4 million already raised in the 2010 bond transaction, a total of approximately $162.2 million dollars for levee reconstruction.*

In preparing financial plans many judgments and estimates need to be made about components of the plan, most of which are subject to variability over time. The goal of a financial advisor is to incorporate conservative estimates for each element of the plan, track them over time and modify them as events take place during the planning horizon. ButcherMark has also prepared a sensitivity analysis (see Attachment II) for all of its variable financing assumptions in the plan to assist the Council in determining the impact of financial plan decisions today and over time.

The following conservative assumptions have been built into ButcherMark's planning model to project out for the Council the leveraging capacity of the sales taxes to meet the cost estimates of the levee rehabilitation:

1. Sales Tax Revenues – ButcherMark noted that sales taxes increased from 2009 into 2010 and is using the total calendar year deposits from 2010 ($11.047 million) as its starting point for revenue projections into the future. The model builds in a modest growth rate in those sales taxes of 3% per year over the life of the outstanding bonds. Sales tax revenues are the major source of revenues for leveraging debt to pay for levee reconstruction. Prudent management and rating agency criteria only allows financial plans to leverage growth in these taxes by looking backward at the actual documented historical growth pattern. Although one also would expect to stress test sales tax revenues to account for the impact of any economic downturn, we note that the historical examination of the three SW Illinois county sales taxes (adjusting for the $0.25 sales tax increase authorized for levee reconstruction) has already been severely stress tested by the 2008 national economic downturn, so the projection has not been further stress tested. As mentioned above, we have provided a sensitivity analysis of varying growth rates in these revenues.

2. Administrative and Operating Expenditures – These are the funds that are budgeted by the Council to annually operate the Council and oversee design and construction activities. It also

includes funds to reimburse the counties for funds spent by them on the project prior to the existence of the FPD sales tax. This expenditure category is grown at a modest growth rate of 3% per year. We do not plan on providing any sensitivity analysis on this element of the plan because this is an item that is under the control of the Council and not subject to market variability.

3. Financing Assumptions – Following discussions with the Chief Supervisor and AMEC, ButcherMark made a projection of the timing of expenditures of the $87.4 million leveraged in the Council's 2010 bond transaction. The current estimate of spending has those monies fully expended during the first quarter of 2013.

As a result, ButcherMark recommends approval by the Council of a financial plan that pays for future construction costs from April 2013 to April 2015 by using the surplus monies in the three county FPD sales tax funds, estimated to be approximately $25.5 million during that time, supplemented by a small subordinated Council bond transaction in the first quarter of 2013 in the net amount of approximately $8.3 million. The plan also recommends that interest earned through 4/15/2016 on the Construction Fund ($1.9 million) and the Debt Service Reserve Fund ($1.1 million) be used to pay project costs during this period. It should be noted that the estimate of surplus from the three county sales tax funds is based upon a calculation made about how much money will flow out of the Bond Indenture from the 2010 bond transaction as excess to the counties and assumes that those monies are modestly invested by the counties and that they are not spent for any purpose other than levee reconstruction in accordance with Council approvals and directives. It continues to be ButcherMark's recommendation that no excess monies should flow out of the Indenture to the county FPD sales tax funds, but rather they should be retained and protected under the Bond Indenture by being placed in the Project Fund, invested and then spent as "pay as you go" for levee reconstruction in accordance with the approved financial plan of the Council. This would be a credit enhancement to the bond issue structure (those monies would be available to avoid a potential bond payment default), simplify accounting and management of those monies and guarantee that they would be spent on the levee reconstruction costs in accordance with the Council approved AMEC plan.

ButcherMark's financial plan then recommends that the Council plan for a final (second) subordinated bond transaction in early 2015, which, using current conservative assumptions is projected to raise approximately $38.4 million in net additional bond proceeds to pay for construction costs.

As mentioned above, financial plans are dynamic and adjusted periodically to take account of changes in the financial markets, construction costs, and other variables. Consequently, the two subordinated bond transactions projected to be needed in 2013 and 2015 will most likely be sized differently based on better knowledge of final construction costs and the actual revenues from

growth in the sales taxes as well as more clear information on market interest rates. The Council will also have received from the rating agencies the precise coverage and reserve requirements for the subordinated debt structure.

4. Coverage and Rating of Subordinated Debt – The most important determinant of bonding capacity for a sales tax bond will be the debt service coverage ratio necessary to achieve an "A" rating from the ratings agencies for a subordinated bond issue. This rating level is important in order to present a strong credit to bond investors and an optimal financing. The coverage ratio is the amount of revenue received annually by the issuer divided by the annual debt service amounts (principal and interest on the bonds). The coverage level we will focus on here is the additional bonds test (ABT) that will be dependent on the ratio between the previous year's sales tax revenues and the maximum annual debt service on all bonds. This margin of safety or comfort is a variable in the plan and directly impacts the rating on the bonds. For planning purposes ButcherMark recommends that the coverage requirement be established at the lowest possible net coverage ratio to achieve a single "A" rating, which we judge is approximately 1.25, and that also achieves a reasonable cost of capital in the market. This excess coverage will also be needed to provide funds to annually fill up the Administrative Account in the Bond Indenture to permit the Council to continue to manage the overall project during construction and post-construction until the bonds are paid off. The sensitivity analysis shown in Exhibit II illustrates the impact of varying the net coverage ratio on the leveraging capacity of the sales taxes.

5. Market Interest Rates – Predicting future interest rates is a problematic but necessary exercise to arrive at a financial plan. ButcherMark approached this issue by grounding its estimated yields on tax exempt market interest rates derived from the Municipal Market Monitor Index (MMD) published for June 7, 2011. To produce a conservative future yield estimate, ButcherMark took the current MMD rate and added the actual interest rate spread from the pricing of the Council's 2010 bond financing and the current spread difference between the yields in the single-A MMD index and the double-AA MMD index. This was done because future Council bond issues are planned to be executed as subordinated bonds with a single-A rating rather than with the double-AA on the senior bonds issued in 2010. Bonds issued under an Indenture that are called "senior" are legally first in line for repayment. Bonds issued that are subordinate in an Indenture means that they are repaid (second) from revenues left over after senior bonds are repaid. Senior bonds usually have higher coverages (more protection for bondholders) than subordinated bonds and, therefore, are rated higher than subordinated bonds. Issuers use subordinated bonds to maximize their leveraging capacity, because subordinated bonds require less coverage (see discussion above). Finally, ButcherMark added another 50 basis points (.50%) to this interest rate scale to provide a more conservative estimate. For example, the total conservative interest rate yield for a current interest bond issued by the Council maturing in 2029 (16 years after the anticipated issue date of 2013) would be 5.75%. This spread was calculated by taking the actual interest rate yield for 2029 from the MMD Index on June 7, 2011 of 3.50%, adding 95 basis points to it (which was

the 2029 spread to MMD in the 2010 bond issue), adding another 80 basis points (reflecting the current difference between the single-A index and the double-AA index) and finally adding another 50 basis points of margin because of the length of time in the future that we project issuing the next two bond issues.

ButcherMark believes that this is a very conservative projection because the bond transaction priced in November 2010 also included an "Illinois interest penalty" that added significantly to the cost of the Council's bond transaction. Over time, as the State of Illinois failed to pass budgets on time and accumulated massive obligations to make payments to local governments and school districts, the bond market imposed a very harsh cost on all Illinois bond transactions, whether they were State issues or local issues. This increased cost became known as "the Illinois interest penalty". More recently, the State of Illinois passed its budget and began to address their fiscal problems. Those actions were favorably viewed by the bond market and this penalty has declined by at least 25 basis points in recent Illinois financings. Since we are using the spreads from the 2010 Council bond financing that include up to a 100 basis point Illinois interest rate penalty, every reduction in that penalty going forward makes our future spread calculation in the 2011 Financing Plan even more conservative. The sensitivity analysis we prepared in Attachment II measures the impact from varying our base case interest rate assumptions.

6. Reserve Fund – A debt service reserve fund is normally required by the rating agencies and the market to ensure that there is a liquidity facility in place to meet timely principal and interest payments to bondholders. These reserve funds stay in place for the life of the debt, are normally sized at the maximum annual debt service obligation on the issued bonds, are conservatively invested and readily available and are usually scheduled to pay for the last debt service obligation of the bonds at maturity. ButcherMark's conservative recommendation for the financial plan at this time includes a reserve fund on subordinated debt, sized at the maximum annual debt service on the respective bonds in 2013 and 2015. Again, ButcherMark's sensitivity analysis will demonstrate the impact on the capacity of the sales taxes from varying this requirement to a lesser required amount.

POSSIBLE ADDITIONAL REVENUE SOURCES

The Council's recommended financing plan has been designed to maximize the leveraging capacity of the FPD sales tax for levee reconstruction. However, the estimated cost of construction, including inflation and contingencies. is very close to the total amount of money that the Council can raise by leveraging the FPD sales tax. Although the plan is based upon conservative assumptions, it is not inconceivable that those assumptions might not be realized or costs may increase, resulting in the Council being unable to generate the full amount of proceeds it needs to fund total construction costs for the levee reconstruction.

Fortunately, there are other feasible alternatives that might be considered, exclusive of requesting the State of Illinois to increase in the amount of the sales tax that can be levied.

Metro East Sanitary District (MESD)

The Metro-East Sanitary District has the statutory authority to generate revenues to carry out their responsibilities and issue debt. The law sets a maximum tax rate and an overall maximum debt limit for the District. MESD has historically provided flood protection to many properties that were not included within District boundaries, and therefore not paying taxes to the District. Illinois legislation approved in 2010 and effective in 2011 (70 ILCS 2905 Sec. 2-11) provided for such areas to be annexed by the District. The increment of taxes paid by these annexed areas could be used to support the project. Current estimates suggest that the assessed value of annexed properties would be about $208 million. Applying existing tax rates results in estimated addition annual revenue to MESD of about $649,000.

As a Sanitary District, MESD has a maximum statutory debt limit of 5.75%. Against its 2008 assessed valuation of approximately $730 million MESD had a debt capacity of almost $42 million. As of its 2008's audited financials, MESD had no outstanding debt.

Based on the following assumptions MESD could generate approximately $3.4 million through borrowing:

- 20 year term
- 2 times annual debt service coverage
- 7% average interest rate

With the approval of MESD, these funds could be used to help pay for the project.

Wood River Levee and Drainage District (WRDD)

The Wood River Levee and Drainage District has the statutory authority (70 ILCS 605/) to levy assessments on all properties within the district and to issue drainage and levee improvement bonds to finance capital projects necessary to carry out their public purpose.

The District has previously obtained judicial approval to increase assessments to generate an additional $450,000 annually, of which approximately $350,000 could be available to support the debt service obligations of a bond issue for levee reconstruction. As a drainage district, WRDD has no statutory debt limit. Wood River currently has issued bonds for levee work and has outstanding debt of $436,491.

ButcherMark has made an estimate of the leveraging capacity of the incremental WRDD revenue of $350,000 and determined that, using the assumptions below, WRDD could raise an additional $1.9 million.

- 20 year term
- 2 times annual debt service coverage
- 7% average interest rate
- Estimated bond size: $1,870,000

With the approval of the Board of the Wood River district, these funds could be used to support the project.

US Army Corps of Engineers

The Corps of Engineers is now authorized to spend federal funds on portions of the project and should be fully authorized to spend for eligible projects on the entire levee system by federal fiscal year 2013. However, the availability of funds is determined annually by the federal budgeting process. The outcome of that process is uncertain in the best of times. Given the stresses on the federal budget and the reluctance of Congress to earmark funds, the federal funding environment is even more difficult and unpredictable.

Once a federal project is authorized, the Corps of Engineers can undertake design and construction with the agreement of a local sponsor to provide a share of the cost and meet a number of other conditions. Typically, the federal share of project costs is 65%, but it can be greater. Certain costs, such as land acquisition or treatment and disposal of toxic and hazardous waste must be paid by the local sponsor.

While it would not be prudent for the Council to incorporate an unknown or unpredictable funding source into the financial plan, the expectation by the Corps is that over the next five year period there will be some federal appropriations for elements of the project that are coincident with the Corps projects in the American Bottom. Based on discussions with the Corps, it is reasonable to expect a minimum of $20 million in appropriations for projects in MESD and Wood River over the next few years. If the Council and the Corps can agree on directing these funds toward high priority projects that are part of the project, it could effectively reduce the Council's costs. However, the Council would still be responsible for the local cost-share and other costs that are not eligible for federal funding.

Table 2 summarizes the latest estimates of fiscal capacity of the Council and others to pay for the project. The total estimate of fiscal capacity potentially available to the project is nearly $188 million. However, achieving this total will require reliance on other agencies to contribute to the project, either by building components of the project or providing cash to the Council. The Council has indicated its strong preference is to build the project solely with revenues provided through the FPD sales tax. While the added fiscal capacity provided by third-parties will be useful as a backstop source of funding if the sales tax unexpectedly proves inadequate, the levee districts can make good use of the excess funds they will collect for maintenance and ongoing

capital improvements that will be needed in the future. Further, reliance on parties over which the Council has no control such as the federal government, diminishes confidence in the Council's ability to meet its cost and schedule goals.

Table 1
Estimated Fiscal Capacity Including "Backstop" Funding

Organization	Amount
FPD Council	$162,600,000
Metro-East Sanitary District	3,470,000
Wood River Levee and Drainage District	$1,870,000
Corps of Engineers	$20,000,000
Total	**$187,940,000**

At this point, the financial plan concludes that with prudent decision-making by the Council and the counties, with continuing efforts to control costs, and barring unforeseen developments in the financial markets, FPD sales tax receipts should be sufficient to pay for construction of the project and ongoing Council operations.

ATTACHMENT I

Southwestern Illinois Flood Prevention District Council 6/8/2011

Capacity Analysis for Levee Construction

Results		
2010 Net Proceeds	**87,409,570**	
2013 Net Proceeds	8,282,700	
2015 Net Proceeds	38,447,201	
Construction Fund Earnings	1,950,359	(4/15/16)
Reserve Fund Earnings	1,059,273	(4/15/16)
Surplus Draws	25,492,166	
MESD & WRDD Net Proceeds	0	
Total Other than 2010 Net Proceeds	**75,231,698**	
Total Capital Improvement Fund Draws	**162,641,267**	
Maximum SemiannualDraw after 4/15/2013	14,218,211	

Projected Revenues, Debt Service, Expenses, and Surplus

Date	Tax Revenues	BAB Subsidy	Senior Debt Service	Remaining Revenues	Subordinate Debt Service	Remaining Revenues	Administrative Expenses	Surplus
11/23/2010								
4/15/2011	5,420,374	359,000	1,835,129	3,944,245	0	3,944,245	300,000	3,644,245
10/15/2011	5,420,374	455,070	2,326,220	3,549,224	0	3,549,224	300,000	3,249,224
4/15/2012	5,582,985	455,070	4,781,220	1,256,836	0	1,256,836	309,000	947,836
10/15/2012	5,582,985	455,070	2,301,670	3,736,386	0	3,736,386	309,000	3,427,386
4/15/2013	5,750,475	455,070	4,806,670	1,398,875	0	1,398,875	318,270	1,080,605
10/15/2013	5,750,475	455,070	2,276,620	3,928,925	229,377	3,699,549	318,270	3,381,279
4/15/2014	5,922,989	455,070	4,831,620	1,546,439	229,377	1,317,063	327,818	989,245
10/15/2014	5,922,989	455,070	2,251,070	4,126,989	229,377	3,897,613	327,818	3,569,795
4/15/2015	6,100,679	455,070	4,936,070	1,619,679	229,377	1,390,303	337,653	1,052,650
10/15/2015	6,100,679	455,070	2,210,795	4,344,954	1,425,192	2,919,762	337,653	2,582,109
4/15/2016	6,283,699	455,070	4,965,795	1,772,974	1,425,192	347,782	347,782	0
Totals	63,838,702	4,909,699	37,522,874	31,225,527	3,767,891	27,457,637	3,533,264	23,924,373

Assumptions

Bonds	2010	2013	2015
Tax Revenues	11,047,000	11,719,810	12,433,546
Net Coverage	1.75x	1.25x	1.25x
Gross Coverage	1.5x	1.1x	1.1x
Rating	AA-	A	A
Spread to Market (June 7, 2011)		0.50%	0.50%
2010 & Future Rev Growth		3%	3%
Surplus Fund Balance 11/23/2010 (Est.)		1,500,000	
Annual Administrative Expenditures		600,000	
Ann. Exp Growth		3.00%	
Construction Fund Earnings		0.87%	
Surplus Earnings		0.50%	
Reserve Earnings		2.32%	
Fixed Costs per Issuance		100,000	
Per bond costs of issuance		$7	
Minimum Surplus Fund Balance		25,000	
Reserve Percentage		100%	

Surplus Fund Balances **Projected Bond Proceeds, Construction Fund Balances, Earnings, and Draws**

Date	Surplus Before Construction	Construction Draws from Surplus	Surplus Fund Earnings	Surplus Fund Balance	Bond Proceeds	Earnings on Construction Fund	Earnings on Debt Service Reserve	Capital Improvement Plan	Construction Draws from Surplus	Construction Fund Draws	Construction Fund Balance
11/23/2010				1,500,000	87,409,570						87,409,570
4/15/2011	5,144,245	0	2,938	5,147,183		297,935	57,442			0	87,764,946
10/15/2011	8,396,408	0	12,903	8,409,311		382,823	72,813	8,000,000		8,000,000	80,220,583
4/15/2012	9,357,146	0	21,081	9,378,227		349,916	72,813	17,000,000		17,000,000	63,643,311
10/15/2012	12,805,613	0	23,510	12,829,123		277,607	80,565	24,000,000		24,000,000	40,001,484
4/15/2013	13,909,728	13,916,713	31,985	25,000	8,282,700	173,530	80,565	28,332,000	13,916,713	14,415,287	34,122,992
10/15/2013	3,406,279	3,381,341	63	25,000		148,842	80,565	14,218,211	3,381,341	10,836,870	23,515,529
4/15/2014	1,014,245	989,307	62	25,000	0	102,012	80,565	14,218,211	989,307	13,228,904	10,469,202
10/15/2014	3,594,795	3,569,857	63	25,000		45,666	133,486	14,218,211	3,569,857	10,648,354	(0)
4/15/2015	1,077,650	1,052,712	62	25,000	38,447,201	0	133,486	14,218,211	1,052,712	13,165,499	25,415,188
10/15/2015	2,607,109	2,582,172	63	25,000		110,859	133,486	14,218,211	2,582,172	11,636,039	14,023,493
4/15/2016	25,000	63	63	25,000		61,169	133,486	14,218,211	63	14,218,149	0
Totals		25,492,166	92,793		134,139,471	1,950,359	1,059,273	162,641,267	25,492,166	137,149,102	

ATTACHMENT II

Sensitivity to Financing Assumptions

Maximum Additional Leveraging of Sales Tax Revenue Post-2010 Bond Issue ($millions)			
	Spread to Current Rates		
Net Coverage	+50 bp	0	-50 bp
1.40x	65.2	67.0	68.7
1.25x	**75.2***	77.5	79.8
1.10x	80.0	82.6	85.4

Maximum Additional Leveraging of Sales Tax Revenue Post-2010 Bond Issue ($millions)			
	Reserve Requirement, as Pct of Maximum "Reasonably Required"		
Tax Rev. Growth	100%	50%	0%
2%	69.3	71.3	73.5
3%	**75.2***	77.6	80.0
4%	81.0	83.7	86.4

* Base Case