2013

Elkhart River and Christiana Creek Dams

Appendix C- Civil Design

Chicago & Detroit Districts
US Army Corps of Engineers
7/30/2013

CITY OF ELKHART DAMS
EASIBILITY STUDY

APPENDIX C
CIVIL DESIGN

March 2013

INTRODUCTION

General

1. The purpose of this volume is to present the engineering analysis for the formation of FEASIBILITY STUDY plans for the removal of Elkhart Dam and Christiana Dam along the Elkhart River in Indiana. Refer to plan sheets C-001 through C-006 following this appendix.

Purpose and Scope

2. The purpose of this section is to: 1) describe design criteria, engineering methods and procedures that were used layout and perform preliminary design analysis of the alternatives; 2) present the methods used and calculations developed for earthwork quantities 3) present the requirements for the real estate needed; 4) present criteria and requirements for utility interferences; and 5) discuss the engineering design analysis requirements for the next phase of the project.

DESIGN ANALYSIS

General

3. The main report discusses the alternatives considered for this report; this design analysis will cover only the recommended plan.

4. The recommended plan includes complete removal both Elkhart and Christiana Creek dams. A plan view of each site is shown on plates C-003 and C-004.

5. The full removal of Elkhart Dam will be done without use of a coffer dam, or other water diversion structure. The dam will be breached at the south bank to divert flow of the river and lower the pool. A work platform will then be installed, from which the remainder of the removal will take place, starting at the breach and working towards the north bank. The concrete cap will be broken up and removed with the contractor's equipment, then the river cobbles underneath will be removed.

6. To protect against erosion upstream of Elkhart dam, the existing bridge abutments on both banks will be armored with stone. The south bank downstream of the dam will be restored with erosion control blanket and native plantings once construction work is complete.

7. The full removal of Christiana Creek Dam will use a ramp from the staging area down to the river bed. This dam contains sheet pile which must be completely removed, so small coffer dams will be used. Ideally the dam will be removed by blocking off half the river at a time, using access from both banks.

8. Just upstream of Christiana Creek Dam is an existing inlet structure into Duck Mill Pond. The sheet pile surrounding this inlet is damaged and will be removed completely. The existing inlet structure will be modified and improved, with new pipe and a new concrete structure if necessary.

9. Excavated material will be either disposed of, or in the case of river cobbles stockpiled and kept for future use in the project, potentially as erosion control.

Quantity Calculations

9. Quantity takeoffs were computed by hand calculations and by using software package Microstation. Estimates were made for material removal of Elkhart Dam and Christiana Creek Dam. Please refer to the cost estimating appendix for more information.

Utility/Facility Relocations

11. Utility information has not been collected at this point in the project effort. Since no excavation is planned outside of the river area, utility conflicts are not anticipated to be an issue. Detailed utility surveys will be conducted in the design phase and reviewed to determine the possibility of impacts to existing utilities.

12. Construction access to each dam is anticipated to potentially impact existing site facilities. At Christiana Creek Dam, minor damage is anticipated to existing park paths, which will be restored to their original condition at project completion. At Elkhart Dam, access from the north bank of the river will be largely avoided due to extensive developments including sidewalk, guardrail and riprap. Any damage done to the facilities will need to be restored by the contractor at project completion. The south bank will be used for access, and concrete sidewalk and riprap at that location will be damaged. These will either be restored to their existing conditions or planted with native vegetation.

Staging/Storage/Access

13. Staging and Storage areas during construction operations will be required for each dam area. Elkhart Dam will make use of a previously cleared parcel owned by the city, just north of the dam location. Additional access to the river will be from the south bank, which is mostly clear with some existing sidewalk. The north bank will be avoided as much as possible, as

extensive improvements such as walkway and guardrail have been built recently along the river. Christiana Creek Dam will make use of the park to the east of the dam for staging, storage and access. The area used will be fenced off to prevent public access. Equipment will avoid damage to existing sidewalks and facilities, but any damaged areas will be restored post construction to previous conditions. Access to all these areas is available from public roads near each damn location. All of these features will be further defined during the next phase of design.

Real Estate Requirements

14. Permanent Easement. No permanent easement will be required for this project. Once dam removal and restoration of riverbeds and banks is complete, the area will be turned back over to the local sponsor.

142. Temporary Easement. Temporary easements, which are also called work limits, consist of property that is needed during the construction phase. The amount of property required for the work limits will include the riverbanks surrounding each damn, as well as the previously identified staging and storage areas. Full details are available in the real estate report. See Plates C-001 and C-002 showing the work limits/temporary easements.

WORK LIMITS		
POINT	NORTHING	EASTING
1	2345380.08	245663.01
2	2345273.29	245626.46
3	2345213.80	246239.95
4	2345123.56	246109.18
5	2345138.28	246061.69
6	2344941.32	245902.04
7	2344904.69	245867.11
8	2344834.83	245830.47
9	2344788.63	245826.54
10	2344769.97	245744.64
11	2344746.43	245670.45
12	2344746.43	245610.75
13	2344760.91	245561.89
14	2344803.80	245472.13
15	2344694.16	245435.96
16	2344671.77	245450.57
17	2344667.29	245503.05
18	2344640.20	245655.65
19	2344631.17	245791.09
20	2344640.09	245857.51
21	2344644.41	245901.12
22	2344652.18	245950.85
23	2344678.36	246069.71
24	2344736.27	246047.71
25	2344920.19	246148.98
26	2344989.24	246242.70
27	2345002.40	246214.75

NOTES:

1. WORK LIMITS ARE BASED ON EXISTING GEOSPATIAL DATA AND WILL NEED TO BE UPDATED BASED ON SITE SURVEY FOR COMPLETE DESIGN.
2. ALL POINTS ARE IN THE INDIANA STATE PLANE EAST SYSTEM OF 1983 (NAD83).

0 200' 400'

SCALE:1"=200'

US Army Corps of Engineers
Chicago District

MARK	DESCRIPTION	DATE	APPR.
1	ACCORDANCE W/MODIFICATION NO. 1	7/1/2005	TSR

U.S. ARMY CORPS OF ENGINEERS
CHICAGO DISTRICT
CHICAGO, IL

DESIGNED BY: XXX
DWN BY: XXX
CKD BY: XXX
SUBMITTED BY: XXX
DATE: XXXXX
SOLICITATION NO.: XXXXXXXXXX
CONTRACT NO.: DACW27-XX-X-XXXX
PLOT SCALE: 1.0000 '= 1 UNIT
PLOT DATE: XXXXX
FILE NUMBER: XXXXX
SIZE: XXXXX
FILE NAME: C-001.dgn

CITY OF ELKHART DAMS
SECTION 506

ELKHART DAM
WORK LIMITS

SHEET IDENTIFICATION
C-001
SHEET 01 OF 06

$FILEPATH$

WORK LIMITS		
POINT	NORTHING	EASTING
28	2348933.98	245153.58
29	2348941.81	245169.10
30	2348767.86	245265.47
31	2348558.23	245283.90
32	2348506.33	245312.11
33	2348483.20	245312.11
34	2348445.45	245327.32
35	2348419.10	245327.32
36	2348362.35	245369.90
37	2348339.90	245413.10
38	2348308.76	245441.55
39	2348168.51	245591.97
40	2348149.41	245584.77
41	2348087.15	245571.64
42	2348071.35	245548.50
43	2348073.13	245530.78
44	2348206.45	245389.74
45	2348331.74	245247.17
46	2348479.26	245052.44
47	2348487.15	245094.34
48	2348466.27	245116.91
49	2348430.73	245143.42
50	2348423.96	245171.63
51	2348474.30	245269.37
52	2348525.51	245265.85
53	2348611.27	245256.82
54	2348615.22	245227.49
55	2348766.42	245246.67
56	2348812.17	245201.50
57	2348821.14	245224.10

NOTES:

1. WORK LIMITS ARE BASED ON EXISTING GEOSPATIAL DATA AND WILL NEED TO BE UPDATED BASED ON SITE SURVEY FOR COMPLETE DESIGN.
2. ALL POINTS ARE IN THE INDIANA STATE PLANE EAST SYSTEM OF 1983 (NAD83).

0 200' 400'

SCALE:1"=200'

US Army Corps of Engineers
Chicago District

MARK	DESCRIPTION	DATE	APPR.
1	ACCORDANCE W/MODIFICATION NO. 1	7/1/2005	TSR

DESIGNED BY: XXX
DWN BY: XXX
CKD BY: XXX
SUBMITTED BY: XXX
DATE: XX/XX/XX
SOLICITATION NO.: XXXXXXXXXX
CONTRACT NO.: DACW27-XX-X-XXXX
PLOT SCALE: 1=XXXX
PLOT DATE: XX/XX/XX
FILE NUMBER: XXXXX
SIZE: XXXXXX
FILE NAME: C-002.dgn

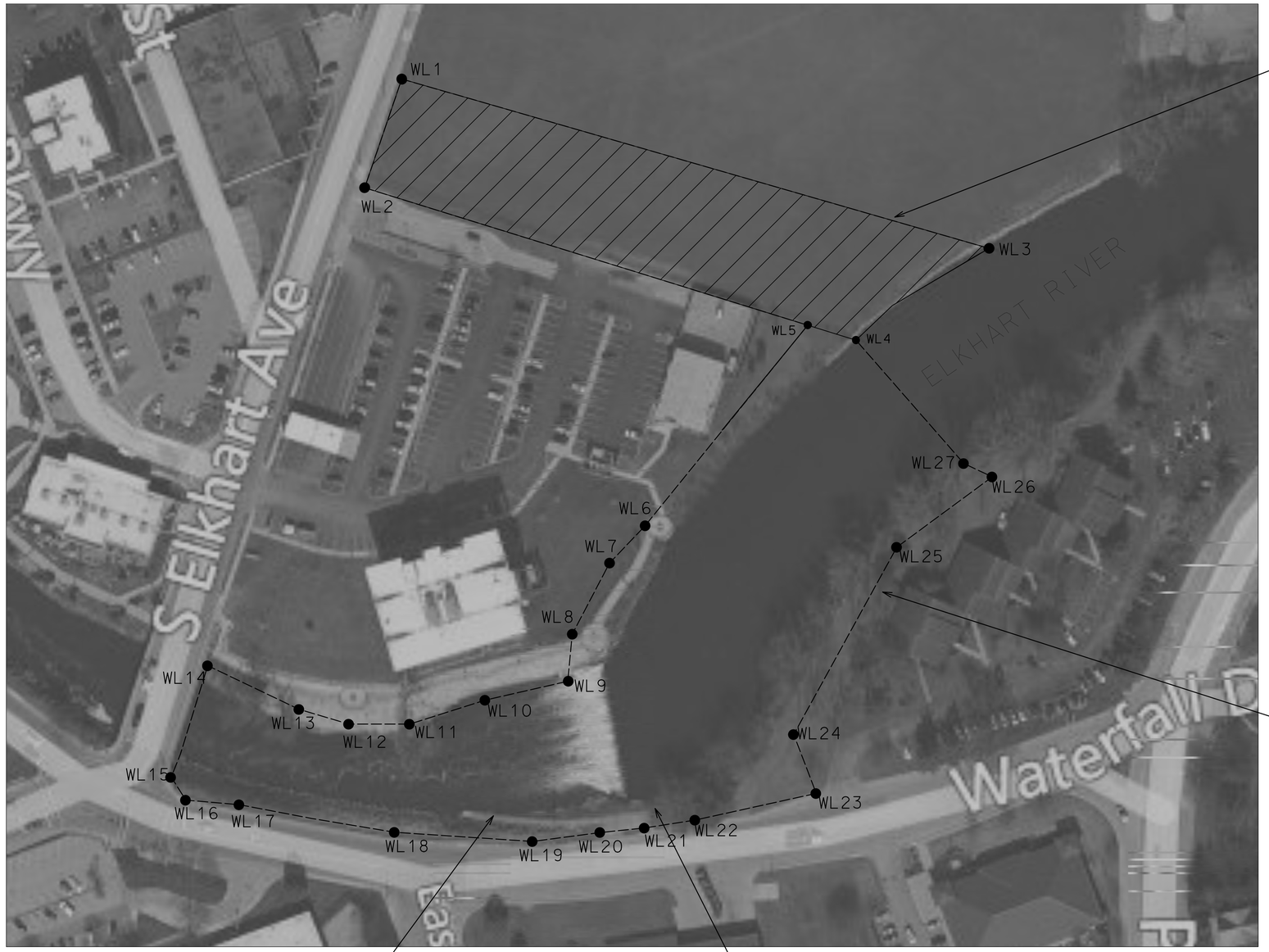
U.S. ARMY CORPS OF ENGINEERS
CHICAGO DISTRICT
CHICAGO, IL

CITY OF ELKHART DAMS
SECTION 506

CHRISTIANA CREEK DAM
WORK LIMITS

SHEET IDENTIFICATION
C-002
SHEET 02 OF 06

$FILEPATH$



ELKHART DAM PLAN VIEW
SCALE: 1" = 200'

NOTES:
1. UPON CONSTRUCTION COMPLETION, CONTRACTOR SHALL RETURN ALL DAMAGED FEATURES TO EXISTING CONDITIONS, INCLUDING ALL SIDEWALKS AND GUARDRAILS.
2. DAM WILL BE BREACHED FIRST AT THE SOUTH BANK, THEN REMOVED VIA A FLOATING PLATFORM.

0 200' 400'
SCALE:1"=200'

US Army Corps of Engineers
Chicago District

MARK	DESCRIPTION	DATE	APPR.
1	ACCORDANCE W/MODIFICATION NO. 1	7/1/2005	TSR

U.S. ARMY CORPS OF ENGINEERS CHICAGO DISTRICT CHICAGO, ILLINOIS	DESIGNED BY: LAURA VANDEN BERG	DATE: XXXXX	SOLICITATION NO.: XXXXXXXXXX
	DWN BY: LCV	CKD BY: XXX	CONTRACT NO.: DACW27-XX-X-XXXX
	SUBMITTED BY: XXX	PLOT SCALE: XXXXXXXX ARCS	FILE NUMBER: XXXXX
	SIZE: XXXXX	PLOT DATE: XXXXX	FILE NAME: C-003.dgn

CITY OF ELKHART DAMS
SECTION 506

ELKHART DAM
PLAN VIEW

SHEET IDENTIFICATION
C-003
SHEET 03 OF 05

$FILEPATH$

PROPOSED STAGING AREA. ELKHART
STAGING AREA USED FOR ADDTIONAL STORAGE

EXISTING INLET STRUCTURE
TO BE IMPROVED

WORK LIMITS

REMOVE EXISTING SHEET PILE
SURROUNDING INLET

CHRISTIANA CREEK DAM PLAN VIEW
SCALE: 1" = 200'

NOTES:

1. UPON CONSTRUCTION COMPLETION, CONTRACTOR SHALL RETURN ALL DAMAGED FEATURES TO EXISTING CONDITIONS.
2. CONTRACTOR SHALL AVOID DISRUPTION AND/OR DAMAGE TO EXISTING PARK ACCESS AND FACILITIES AS MUCH AS POSSIBLE.

0 200' 400'
SCALE:1"=200'

US Army Corps of Engineers
Chicago District

MARK	DESCRIPTION	DATE	APPR.
1	ACCORDANCE W/MODIFICATION NO. 1	7/1/2005	TSR

DESIGNED BY: LAURA VANDEN BERG
DWN BY: LCV
CKD BY: XXX
SUBMITTED BY: XXX
PLOT SCALE: XXXXXXX
PLOT DATE: XX/XX/XX
SIZE: ANSI D
FILE NAME: C-004.dgn
DATE: XX/XX/XX
SOLICITATION NO.: XXXXXXXXXX
CONTRACT NO.: DACW27-XX-X-XXXX
FILE NUMBER: XXXXXX

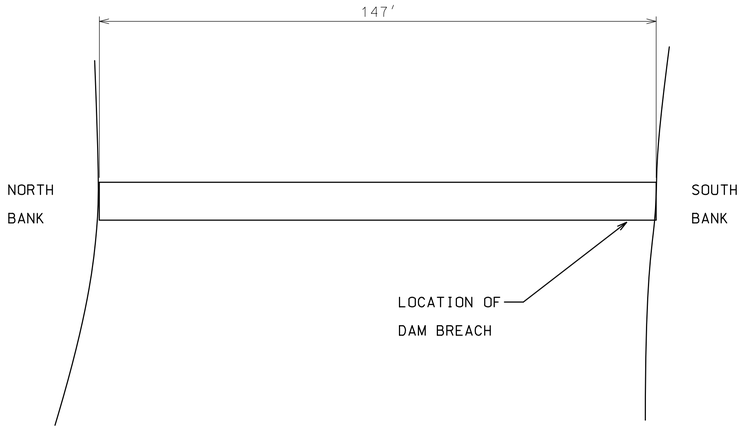
U.S. ARMY CORPS OF ENGINEERS
CHICAGO DISTRICT
CHICAGO, ILLINOIS

CITY OF ELKHART DAMS
SECTION 506

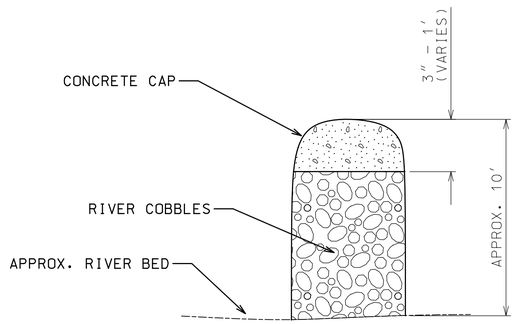
CHRISTIANA CREEK DAM
PLAN VIEW

SHEET IDENTIFICATION
C-004
SHEET 04 OF 06

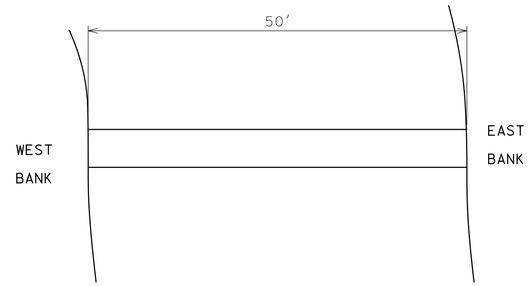
$FILEPATH$



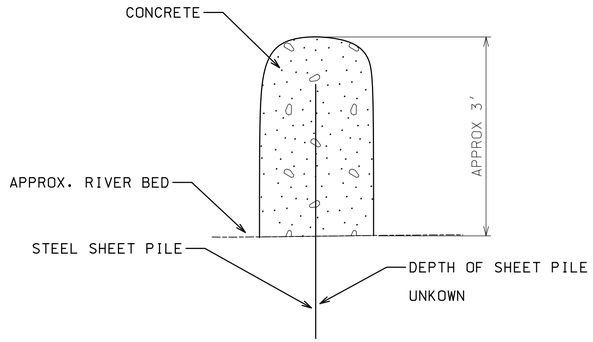
ELKHART DAM: PLAN VIEW
SCALE: 1" = 20'



ELKHART DAM: CROSS SECTION VIEW
N.T.S.



CHRISTIANA DAM: PLAN VIEW
SCALE: 1" = 10'



CHRISTIANA DAM: CROSS SECTION VIEW
N.T.S.

NOTES:

1. DIMENSIONS AND ELEVATIONS ARE APPROXIMATE FROM SITE INVESTIGATIONS. NO AS BUILTS ARE AVAILABLE FOR EITHER DAM.
2. VOIDS ARE PRESENT WITHIN THE STRUCTURE OF ELKHART DAM.
3. CROSS SECTIONS ARE VARIABLE ACROSS BOTH DAMS.

US Army Corps of Engineers
Chicago District

MARK	DESCRIPTION	DATE	APPR.
1	ACCORDANCE W/MODIFICATION NO. 1	7/1/2005	TSR

U.S. ARMY CORPS OF ENGINEERS
CHICAGO DISTRICT
CHICAGO, IL

DESIGNED BY: LAURA VANDEN BERG
DWN BY: LCV
CKD BY: XXX
SUBMITTED BY: XXX
PLOT SCALE: 1.250'
PLOT DATE: AUTOCAD
DATE: 2/15/13
SOLICITATION NO.: XXXXXXXXX
CONTRACT NO.: DACW27-XX-X-XXXX
FILE NUMBER: XXXXX
SIZE: ANSI D
FILE NAME: C-005.dgn

CITY OF ELKHART DAMS
SECTION 506

ELKHART AND CHRTIANA DAMS
SECTION VIEWS

SHEET IDENTIFICATION
C-005
SHEET 05 OF 05

$FILEPATH$

PLAN VIEW

NOTES:

1. PERFORM ARMORING AS NECESSARY IN CASE OF EROSION AT BASE OF PRAIRIE RD BRIDGE AND RAILROAD BRIDGE.

0 100' 200'

SCALE:1"=100'

US Army Corps of Engineers
Chicago District

MARK	DESCRIPTION	DATE	APPR.
1	ACCORDANCE W/MODIFICATION NO. 1	7/1/2005	TSR

U.S. ARMY CORPS OF ENGINEERS
CHICAGO DISTRICT
CHICAGO, IL

DESIGNED BY: XXX	CKD BY: XXX	DATE: XXXXX	
DWN BY: XXX		SOLICITATION NO.: XXXXXXXXXX	
SUBMITTED BY: XXX		CONTRACT NO.: DACW27-XX-X-XXXX	
PLOT SCALE: XX.XXXX ='1 UNITS	PLOT DATE: XX/XX/XX	FILE NUMBER: XXXXX	
SIZE: XXXXXX	FILE NAME: C-006.dgn		

ELKHART DAMS
SECTION 506

BRIDGE PROTECTION

SHEET IDENTIFICATION
C-006
SHEET 06 OF 06

$FILEPATH$