

2013

Spring Creek Valley

Section 206 Aquatic Ecosystem Restoration

Appendix C – Civil Design



Table of Contents

CHAPTER 1 – INTRODUCTION	1
1.1 – PURPOSE AND SCOPE	1
1.2 – EXISTING SURVEY DATA	1
CHAPTER 2 – ALTERNATIVE FEATURES	2
2.1 – DRAIN TILE DISABLEMENT	2
2.2 –DITCH REGRADING	2
2.3 – NATIVE PLANT ESTABLISHMENT, INVASIVE TREE AND SHRUB CLEARING	2
2.4 – RIFFLES	3
CHAPTER 3 – REAL ESTATE	3
CHAPTER 4 – UTILITIES	4

List of Plates

G-001, VICINITY AND LOCATION MAPS
G-002, SHEET INDEX, GENERAL NOTES AND LEGEND
C-001, OVERALL SITE MAP
C-101, SITE MAP 1
C-102, SITE MAP 2
C-103, SITE MAP 3
C-104, SITE MAP 4
C-105, SITE MAP 5
C-106, SITE MAP 6
C-107, SITE MAP 7
C-108, SITE MAP 8
C-109, SITE MAP 9
C-110, SITE MAP 10
C-111, SITE MAP 11
C-112, SITE MAP, OTHER MEASURES
C-501, CIVIL DETAILS

List of Enclosures

Bid Schedule and Quantity Takeoff
Spring Creek South Restoration Area, Existing Drain Tile Investigation
Spring Creek North Restoration Area, Existing Drain Tile Investigation

Chapter 1 – Introduction

The purpose of this report is to present the engineering analysis for the formation of Great Lakes Mississippi River Interbasin Study plans. Each Alternative contains several of the following project features. For an explanation of how each of these project sites fit into each alternative, please refer to the Main Report Chapter 3.

1.1 – Purpose and Scope

The purpose of this section is to: 1) describe design criteria, engineering methods, procedures, and assumptions that were used for layout and perform preliminary design analysis of the alternatives; 2) present the methods used and calculations developed for 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.

1.2 – Existing Survey Data

Local GIS data was used for the design of this study represents conditions existing at that time. The GIS data used includes 2-ft contours, real estate parcels, streets and highways, streams and water bodies, and others. The GIS data was provided by Tele Atlas North America, Northeastern Illinois Planning Commission, IDOT Bureau of Information Processing, and Lake County GIS/Mapping Division.

Disclaimer: While the United States Army Corps of Engineers, Chicago District (hereinafter referred to USACE) has made a reasonable effort to insure the accuracy of the maps and associated data, it should be explicitly noted that USACE makes no warranty, representation or guarantee, either express or implied, as to the content, sequence, accuracy, timeliness or completeness of any of the data provided herein. The USACE, its officers, agents, employees, or servants shall assume no liability of any nature for any errors, omissions, or inaccuracies in the information provided regardless of how caused. The USACE, its officers, agents, employees or servants shall assume no liability for any decisions made or actions taken or not taken by the user of the maps and associated data in reliance upon any information or data furnished here. By using these maps and associated data the user does so entirely at their own risk and explicitly acknowledges that he/she is aware of and agrees to be bound by this disclaimer and agrees not to present any claim or demand of any nature against the USACE, its officers, agents, employees or servants in any forum whatsoever for any damages of any nature whatsoever that may result from or may be caused in any way by the use of the maps and associated data.

The horizontal coordinates referenced the Illinois State Plane Coordinate System, East Zone, North American Datum of 1983 (NAD83) U.S. feet for Illinois sites. For Indiana sites, the horizontal coordinates reference the Indiana State Plane Coordinate System, West Zone, North American Datum of 1983 (NAD83) U.S. feet. The elevations used for the reservoir weirs and levee crests all reference NAD 88 in U.S. feet.

Preliminary utility coordination with utility companies was not performed at this level of design to identify existing utilities in significant conflict with the proposed features. Existing utility information was pulled from GIS and any existing project information for the sites in question. Any major conflicts were reviewed, with more minor relocations and coordination to be performed at a further date. A detailed survey of all existing utilities within and adjacent to the project site will be required during the design phase.

Chapter 2 – Alternative Features

The chosen alternative is described in detail in the main report. The following features are a part of this alternative.

2.1 – Drain Tile Disablement

This measure seeks to restore natural groundwater and surface water hydrology to all areas that have been previously drained for agricultural purposes. To permanently disable these valves, they will be grouted shut with bentonite grout. Permanently grouting these shut will not only prevent water from draining through the tiles at first, but over a period of years will cause the tiles to fill with soil and collapse on themselves. This methodology is more cost effective and has much less impact to the soils and environment than physically smashing or removing the drain tiles. In addition, gravel will be placed at the outlets of the valves that were identified as draining to exterior land parcels, to avoid offsite flooding. Based on the site study performed, 165 valves were identified to be grouted and 21 exterior valves identified which will require gravel placement. Refer to the attached final report from Huddleston McBride attached to this appendix for full details of their drain tile investigation and findings.

2.2 –Ditch Regrading

This measure provides for the filling in and naturalizing of the contours along the existing ditch on site. An 4,800 foot ditch was once constructed to drain this portion of the preserve for agricultural purposes. The existing small berms on each side of this ditch will be regraded to become level with the existing ditch water elevation, by regrading the existing berms into the ditch, and pulling the adjacent slopes gradually back to meet the floodplain. This grading will cover an area of up to 50 feet from each edge of the current ditch. Eventually, native vegetation will overcome the ditch foot print and transform it into a small meandering swale, which is evident in the uppermost reaches of this same ditch. Care will be taken during work not to damage areas that may be existing wetlands. A topographic survey will be performed in the design phase for this measure area. See sheet C-112 for the measure layout.

2.3 – Native Plant Establishment, Invasive Tree and Shrub Clearing

For a full explanation of these measures, refer to the main report. The site has been divided into its existing habitat conditions, and each area designated will be treated accordingly with native planting, invasive species herbiciding, tree and shrub removal, and other measures. Refer to sheets C-101 through C-111 for a layout of the planting and invasive removal measure locations.

2.3.1 – Mass Tree Clearing

This item refers to the following habitat areas on the plans: Invasive Tree and Shrub Clearance (ITSC), Invasive Tree and Shrub Clearance Pines (ITSCPI), Invasive Tree and Shrub Clearance Pop Del (ITSCP), Invasive Tree and Shrub Clearance Robinia (ITSCR), Invasive Tree and Shrub Clearance Que Rub (QITSC). This bid item will be applied in project areas A, B and C for a total of 230.5 acres. Mass Tree Clearing in project area D will be an option item with 75 acres.

2.3.2 – Selective Brush Clearing

This item refers to the following habitat areas on the plans: Invasive Shrub Clearance (ISC), Invasive Shrub Clearance Sal Int (ISCS), Invasive Shrub Clearance with Oaks (QISC). This bid item will be applied in project areas A, B and C for a total of 275 acres. Selective Brush Clearing in project area D will be an option item with 278 acres.

2.3.3 Native Seeding

Seeding will be performed per the measure descriptions in the main report, in project areas A, B and C. The Eurasian meadow seeding will be limited to project areas A and B, with area C as an option area. Seeding in Area D will be included as option items only.

2.4 – Woody Debris Structures

About 300 small woody debris jams of various designs would be placed in Spring Creek in the sections where the stream is not recovering on its own, has incised too much or exhibits a lack of water longevity. These woody structures would be positioned to start to provide localized habitat, increase water longevity within the stream channel, rehydrate the floodplain areas and promote the meandering process. These woody structures would be sacrificial as they will be assimilated once they decompose and/or natural cut and fill alluviation takes over. All the woody structures would have varying crests, ranging between 3 inches to 2 feet high, and between 5 and 20-feet wide, but various designs would be fleshed out during design to achieve the needs of the particular stream reach.

Primary Design - Log Weirs: A log weir consists of a header log and a footer log placed in the bed of the stream channel, perpendicular or at an angle to stream flow, depending on the size of the stream. The logs extend into the stream banks on both sides of the structure to prevent erosion and bypassing of the structure. The logs are installed flush with the channel bottom upstream of the log. The footer log is placed to the depth of scour expected, to prevent the structure from being undermined. This weir structure creates a “step” – or abrupt drop in water surface elevation – that serves the same functions as a natural step created from bedrock or a log that has fallen into the stream. The weir typically forms a very deep pool just downstream, due to the scour energy of the water dropping over the step. Weirs are typically installed with a maximum height of 3 to 6 inches so that fish passage is not impaired. Log weirs provide bedform diversity, maintain channel profile, and provide pool and cover habitat.

Secondary Design - Cover Logs: A cover log is placed in the outside of a meander bend to provide cover and enhanced habitat in the pool area. The log is buried into the outside bank of the meander bend; the opposite end extends through the deepest part of the pool and may be buried in the inside of the meander bend, in the bottom of the point bar. The placement of the cover log near the bottom of the bank slope on the outside of the bend encourages scour in the pool, provides cover and ambush locations for fish species, and provides additional shade. Cover logs are often used in conjunction with other structures, such as vanes and root wads, to provide additional structure in the pool. Refer to sheet C-112 for a layout of the riffle locations, and C-501 for a typical detail.

Chapter 3 – Real Estate

All real estate for this project is owned by the Cook County Forest Preserve, who will provide the easements necessary for the work on site. Access is available directly off several roads running through the site, so no additional access easements should be needed on private property.

Chapter 4 – Utilities

The majority of this project will not involve significant excavation beyond grubbing and planting, and so will not disturb existing utilities. In the area of the ditch regrading a full utility investigation will be performed at a further design level. It is expected that the majority of the existing utilities have been identified via the drain tile survey investigation. See the attached plans from Huddleston McBride for full details of the investigation performed and utilities/drain tiles discovered.

Enclosure

Bid Schedule and Quantity Calculations

Title: Bid Schedule - Section 00010
Project Name: Spring Creek Valley 206
Phase: Feasibility
Date: 4/7/2015
Estimator: Rana Mishra

ITEM	DESCRIPTION	Quantity	U/M	Unit Price	Amount
00 01	MOBILIZATION/DEMOLITION	1	LS	\$	-
00 02	TEMPORARY CONSTRUCTION FACILITIES	1	LS	\$	-
00 03	MASS TREE CLEARING (Areas A, B and C)	230	AC	\$	-
00 04	SELECTIVE BRUSH CLEARING (Areas A, B and C)	275	AC	\$	-
00 05	PRESCRIPTION BURNING	1,997	AC	\$	-
00 06	PLUGS (Areas A, B and C)	400,000	EA	\$	-
00 07	NATIVE SEEDING				
00 07 A A	WOODY CLEARANCE MIX 1 (Areas A, B and C)	305	AC	\$	-
07 A B	WOODY CLEARANCE MIX 2 (Areas A, B and C)	100	AC	\$	-
07 A C	SAVANNA MIX (Areas A, B and C)	100	AC	\$	-
07 A D	EURASIAN MEADOW MIX 1 (Areas A and B)	130	AC	\$	-
07 A E	EURASIAN MEADOW MIX 2 (Areas A and B)	125	AC	\$	-
00 08	DRAIN TILE ABANDONMENT	1	LS	\$	-
00 09	DITCH: BERM REGRADING	4,881	LF	\$	-
00 10	STREAM MEANDER: WOODY DEBRIS	300	EA	\$	-
00 11	INVASIVE SPECIES CONTROL AND ESTABLISHMENT	1	LS	\$	-
00 12	PERFORMANCE AND PAYMENT BOND	1	LS	\$	-
Total Base Bid used in ARA and TPCS					\$ -

ITEM	OPTION ITEMS	Quantity	U/M	Unit Price	Amount
00 13	OPTION AREA D				
00 13 A A	MASS TREE CLEARING (AREA D)	75	AC		
00 13 A B	SELECTIVE BRUSH CLEARING (AREA D)	278	AC		
00 13 A C	WOODY CLEARANCE MIX	273	AC		
00 13 A D	SAVANNA	80	AC		
00 13 A E	EURASIAN MEADOW	46	AC		
00 13 A E	PLUGS	100,000	EA		
00 14	EURASIAN MEADOW IN AREA C	196	AC		
00 15	Year 6 Herbiciding and Invasive Species Control	1	JOB		
00 16	Year 7 Herbiciding and Invasive Species Control	1	JOB		

	PROJECT TITLE: SPRING CREEK VALLEY	COMPUTED BY: LAURA VANDENBERG	DATE: 4/9/2015
	COMPUTATION TITLE: FEASIBILITY QUANTITIES	CHECKED BY: RANA MISHRA	DATE: 4/9/2015

Quantities from Planning

Project Boundary	Area A	Area B	Area C	OPTION Area D	Total				
	540	253	407	797	1997				
ALTERNATIVE 4							applied acres		
MSI - Phalaris	44	16	25	86	171	80%	136.8		
MSI - Typha	27	7	32	89	155	40%	62		
MSI - Phragmites	1	0	5	1	7	100%	7		
MSI - Native Phrag	0	0	0	2	2	100%	2		
ISC - Invasive Shrub Clearance	75	78	48	204	405	80%	324		
ITSC - Invasive Tree and Shrub Clearance	40	48	12	69	169	60%	101.4		
QITSC - Invasive Tree and Shrub Clearance Que rub	41	21	41	0	103	100%	103		
QISC - Invasive Shrub Clearance with Oaks	57	0	11	71	139	100%	139		
Open Water	6	3	8	68	85	100%	85		
C - Carex	7	9	16	148	180	100%	180		
MSI - Sch flu	2	3	3	0	8	25%	2		
MSI - Spa eur.Aco ame	0.5	0	0	0.5	1	0%	0		
ITSC - Pop del	14	1	0	0	15	50%	7.5		
ISC - Sal int	3	2	1	3	9	25%	2.25		
EM - Eurasian Meadow	204	65	196	46	511	90%	459.9		
ITSC - Robinia	0.5	0	9	3.5	13	100%	13		
EP - Existing Prairie	15	0	0	4	19	100%	19		
ITSC - Pines	3	0	0	2	5	100%	5		
TOTAL	540	253	407	797	1997				
Total Tree clearing	98.5	70	62	74.5	305				
Total Shrub clearing	135	80	60	278	553				
Bid Item 0011: Stream Meander: Woody Debris									
	No.								
Log Weir structure	150								
Cover Log structure	150								
*See sheet c-501 for structure details									
Bid Item 0008: Drain Tile Abandonment									
Existing drain tile valves will be grouted with bentonite	Valves:	165							
	Exterior drains to be treated with gravel	21	Volume Gravel (CY)*	10	Total volume gravel	210			
*Assume CA-6 gravel or similar									
Bid Item 0012: Bridge Removal									
	Demolition:	40' x 25' box culvert							
Replace with Flagstones across creek, 40' width									
Regrade adjacent roadway embankment: Approximately 5 foot raise, based on contour measurements in GIS. 100' length raised road, by 50' width. All measurements GIS.									
	Regrading:	50000	CF						
	Volume Regraded:	1852	CY						
Bid Item 0009: Ditch Regrading									
	Length:	4981							
	Cross Sectional area (SF):	60.00							
	Total volume (CY):	10847							
*see plan sheet C-501 for assumed ditch cross section									
Bid Items 0003 and 0004: Tree and Shrub clearing									
	Areas A, B and C	Option Area D							
Tree and Shrub clearing (ITSC, QITSC)	230.5	74.5							
Shrub clearing only (ISC, QISC)	275	278							
Total Project Area, Alternative 4									
A	33987280	sf							
B	19137747	sf							
C	10542418	sf							
D	23499186	sf							
Total:	87,166,631	sf							
	2001	AC							

*Area measurements from GIS