Charleston Side-Channel Reservoir
Sedimentation Basin
Project Final Report

For
Illinois Environmental Protection Agency
Financial Assistance Agreement
Number 3190321

July 10, 2007

Prepared for:
Illinois Environmental Protection Agency
Bureau of Water – Watershed Management Section
1021 North Grand Avenue Springfield, IL. 62794-9276
(217) 782-3362

Prepared By: Alan L. Alford
City of Charleston W.T.P.
2600 McKinley Ave.
Charleston, Illinois 61920
(217) 345-2977 (217) 345-8446 FAX

This report was prepared using United States Environmental Protection Agency funds under Section 319 of the Clean Water Act distributed through the Illinois Environmental Protection Agency. The findings and recommendations contained herein are not necessarily those of the funding agencies.

The project period for Financial Assistance Agreement 3190321 was November 15, 2003 through August 30, 2007

Project History

The Charleston Side-Channel Reservoir (CSCR) was the subject of a USEPA Clean Lakes Program (314) diagnostic/feasibility report in 1992. This document developed hydrologic, nutrient and sediment budgets for the CSCR. The CSCR has two watersheds: one that flows directly into the reservoir (the immediate watershed) and one whose water is selectively pumped into the reservoir. The immediate watershed was the number one source of sediment loading, third highest for nitrate loading and fourth for phosphorus loading of the reservoir. The largest source of loading for phosphorus was internal phosphorus cycling. Second largest source was from shoreline erosion. In 1996 a large aeration system was installed in order to curtail internal phosphorus loading. In 1994 the first in a series of erosion control projects was started in an effort to reduce erosion related loading.

The first recommendations for sedimentation basins came from the Soil Conservation Service (now known as the Natural Resources Conservation Service). This plan was developed prior to the completion of the 314 report and called for basins to control loading in four different areas of the watershed. After completing the 314 report, three of the areas were ruled out for basin construction. Two areas were eliminated due to their small contribution to runoff or loading. A third area contributed a large volume of runoff but most of the nutrient and solids loading was being stripped out of the water by stands of equisetum and other vegetation.

In 1993 the Natural Resources Conservation Service developed plans and a budget for the construction of a sedimentation basin system in the fourth area of the CSCR immediate watershed. Funding was made possible through a Section 319 Non-point Source Pollution Grant. During the permitting process for the basin the Illinois Department of Natural Resources raised objections to the location of the basin. IDNR felt that the basin would cause too much destruction of habitat. A compromise was achieved by placing the dam in the water of the northwest cove instead of placing it further up the ravine system. Unfortunately this caused the price of construction to more than double leading to the cancellation of the project in 1995.

An archaeological reconnaissance for the proposed basin site was completed in August of 1995. The reconnaissance was done to determine the presence or absence of historic or prehistoric materials within the project location. The reconnaissance report recommended project clearance.

Land use changes have occurred just outside the northern edge of the CSCR's immediate watershed. This shift has led to increased development within the watershed upstream of the sedimentation basin site. This led the City of Charleston to revisit the concept of a sedimentation basin in the northwest cove of the CSCR. In 2003 the City submitted an application for a Section 319 grant to build the proposed basin. The grant was approved

and the official start date was November 15, 2003. The original end date was September 30, 2005. Due to permit problems the end date was pushed back to August 30, 2007.

The 2003 proposal called for the construction of a sedimentation basin at the CSCR. The basin would serve to trap nonpoint source pollution before it enters the CSCR. The original design called for the construction of a road to gain access to the proposed dam location. The construction method was modified to employ barge transport thus eliminating the need for a roadway. Because the shoreline and adjacent hillside were severely eroded on either side of the proposed dam, riprap areas were included in the project.

Mid-America Dredging Inc. was awarded the contract for construction of the basin dam and shoreline work in April of 2006. Construction started in August of 2006. Mid-America Dredging had completed the basin and shoreline work in September of 2006. Post construction activities included mapping the basin area and planting aquatic vegetation. A summary of project cost is provided in Appendix A. Photos of the sign used at the construction site are included in Appendix B.

Project Location:
The CSCR is located southwest of Charleston Illinois. The basin location is in a cove at the northwest corner of the Reservoir (see attachments).

State:	Illinois
County:	Coles
Township:	T12N
Range:	R9E
Section:	24
Latitude:	39 28’ 27’’
Longitude:	88 08’ 07’

The work area is located in the northwest cove of the CSCR. The project was formed in three segments. The first segment was the sedimentation basin dam. The dam was flanked at either end by a riprap area. The second and third segments were riprap shoreline. The second area started at the east end of the dam and extended southward for 120 feet. The third segment started at the west end of the sedimentation basin dam and extended southward for 340 feet. The south end of the third segment connects with an existing erosion control structure.

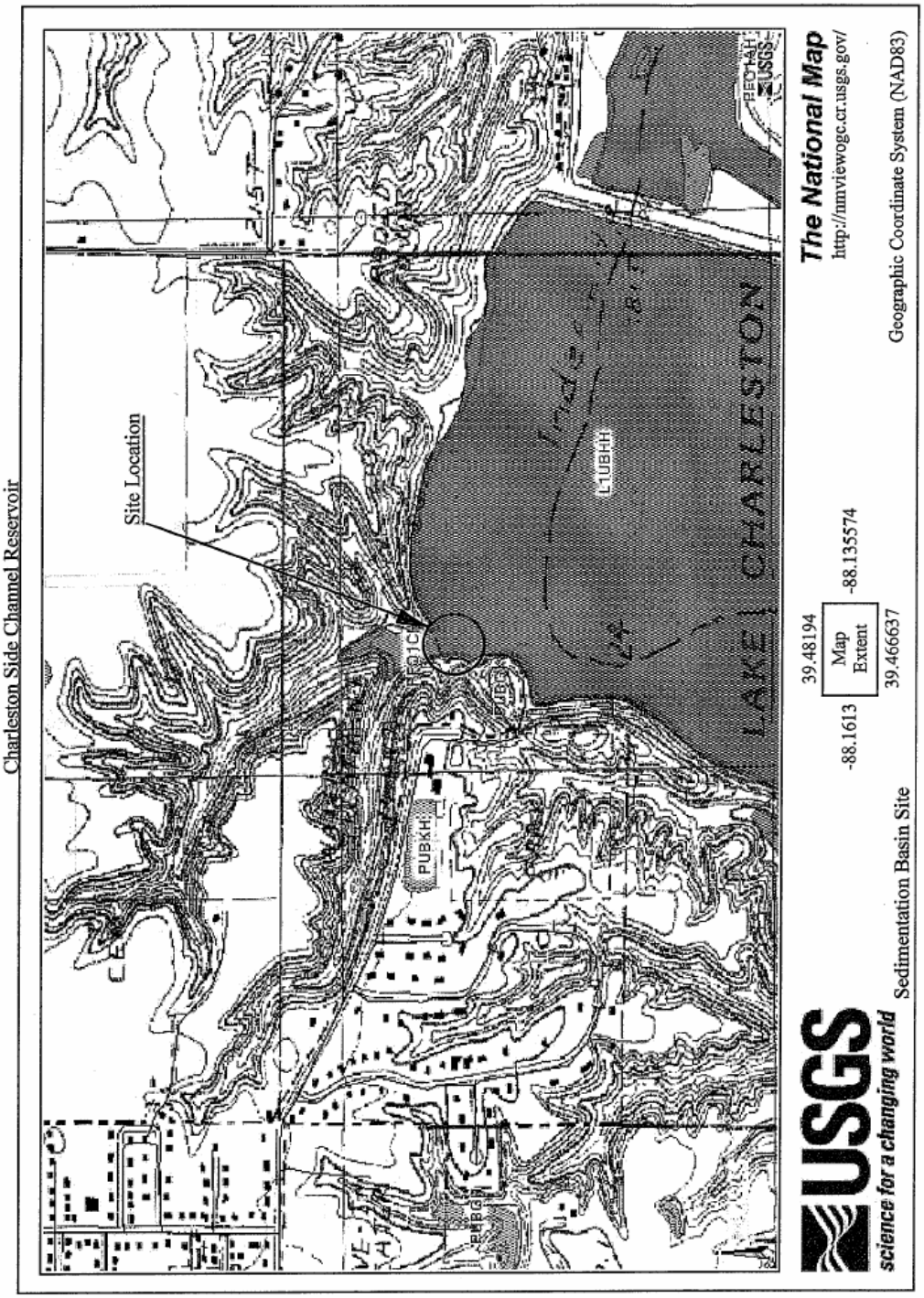


Figure 1. Project Location Map

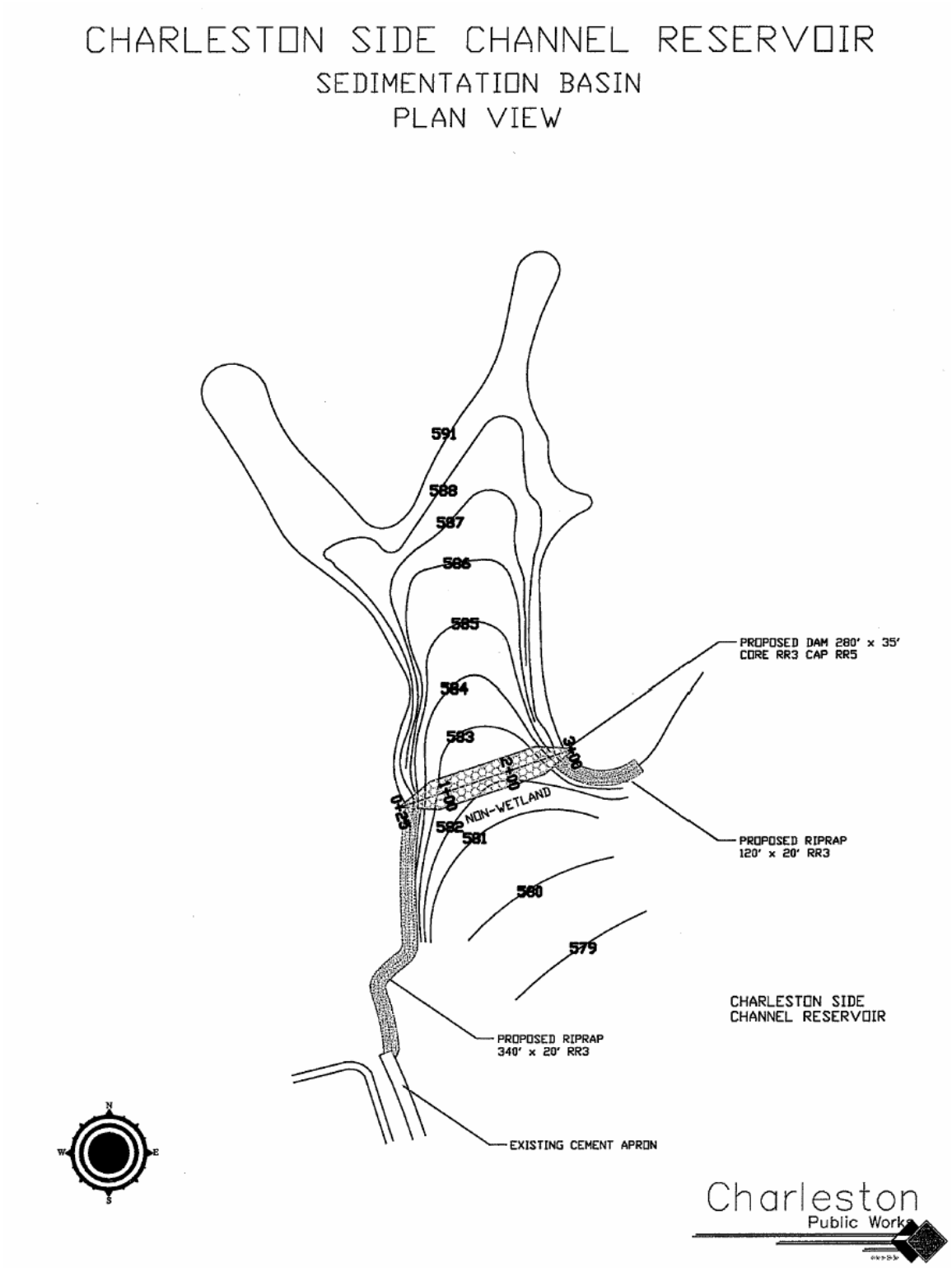


Figure 2. Plan View

Figure 3. Pre-construction photo east shore of cove

DESCRIPTION

The City of Charleston accepted bids for the construction of a sedimentation basin dam and riprap revetment in the northwest cove of the Charleston Side-Channel Reservoir.

This work included:

- the purchase and installation of 3767 tons of rock
- 20,700 square feet of filter fabric
- construction of a rock dam across a cove to form a sedimentation basin
- dam contained 751 tons of RR 5 and 2324 tons of RR 3 riprap
- 13,800 square feet of filter fabric underlay the dam
- 431 feet riprap and 261 feet of breakwater
- 692 tons of RR3 rock used on shoreline
- 6,900 square feet of filter fabric used shoreline riprap
- the rock was transported to its final destination via a barge

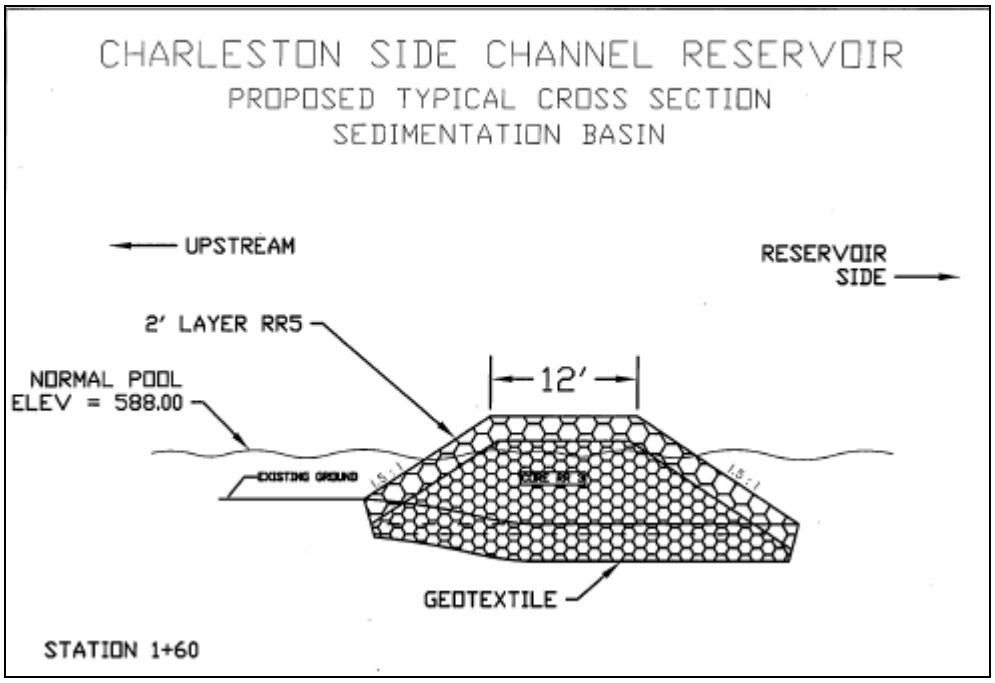


Figure 4. Basin Dam Typical Cross Section

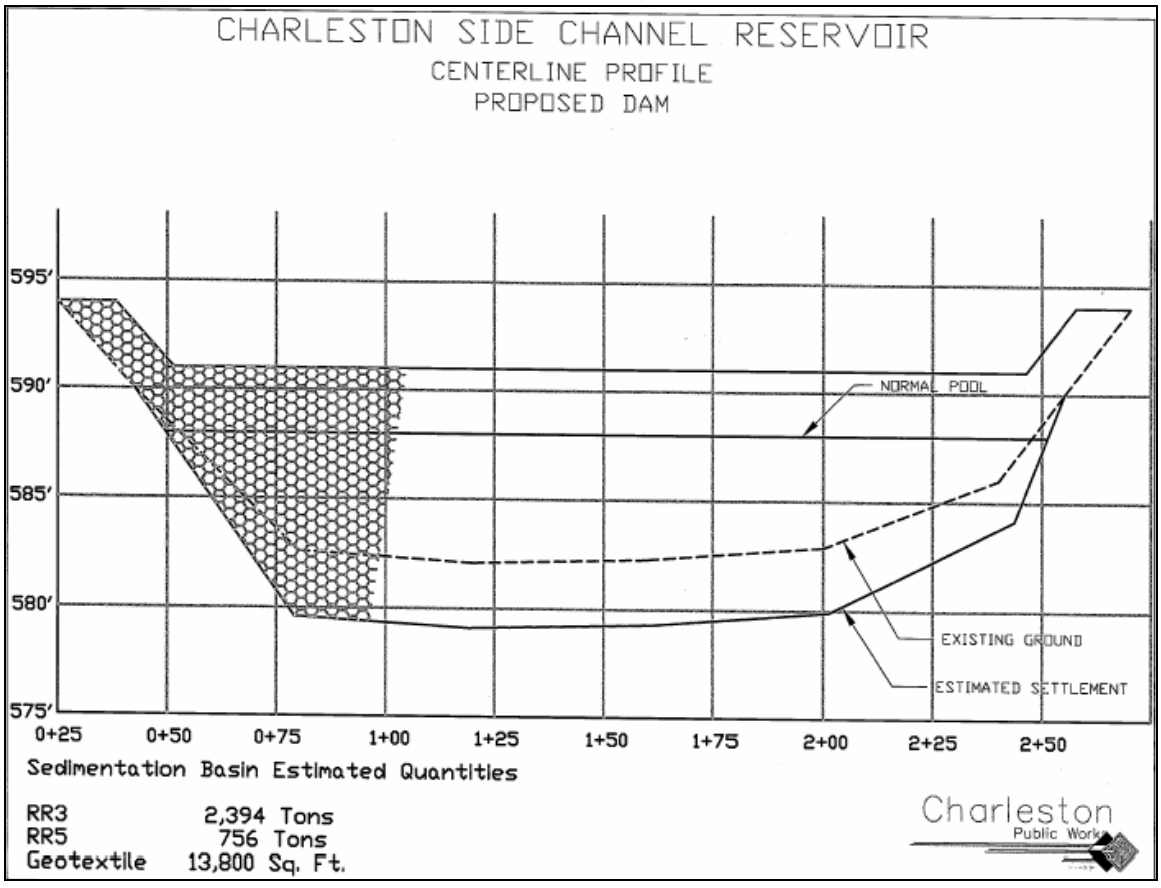


Figure 5. Basin Dam Centerline Profile

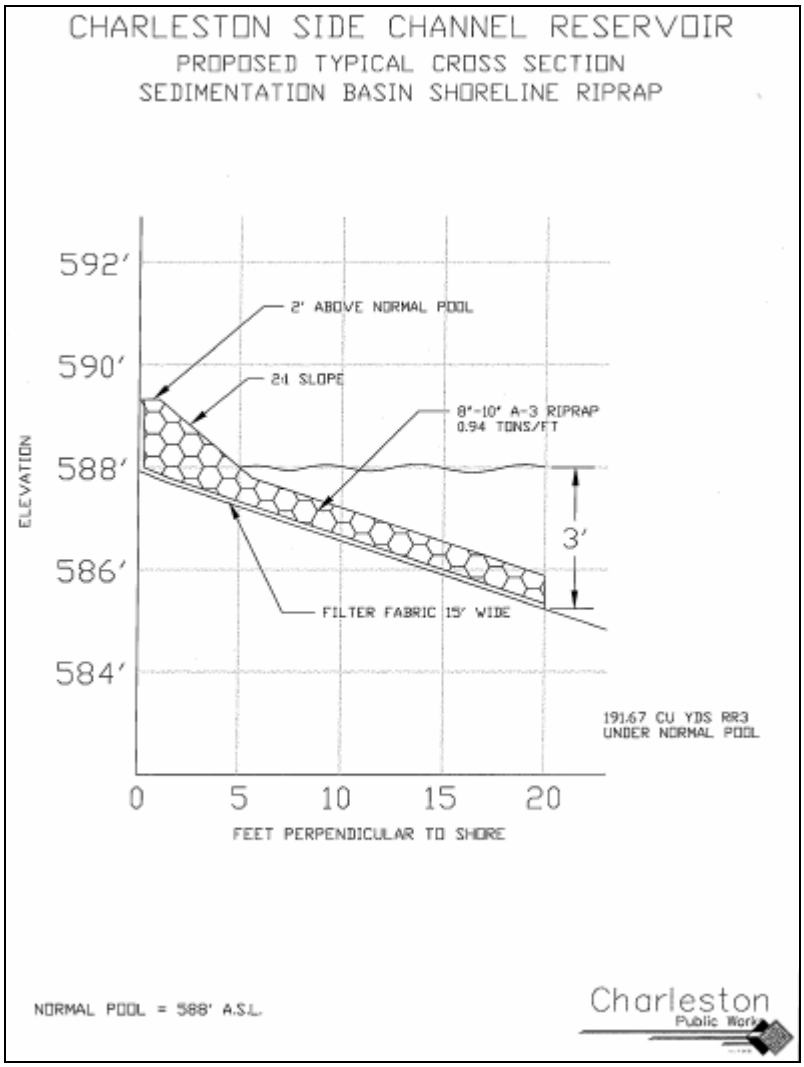


Figure 6. Shoreline Rip Rap Cross Section

Additions

During construction it was discovered that less RR3 rock was needed to construct the dam than had been estimated. This may have been due to two factors. One factor was that the length of the dam was shorter than had been determined during the planning stage of the project. In addition it appears that settling was less of a component than the original Natural Resource Conservation Services estimates had indicated. Since the contract for construction was based on tons placed and the RR3 was the same rock being used in the shoreline stabilization we elected to extend the shoreline work. The extended portion of the project is located east of the dam and along the north shore. While working in this area the contractor ran into an unusual problem for this reservoir. The slope of the near shore area was apparently too shallow for the contractor to reach the base of the eroded scarp. Instead of direct shoreline stabilization the contractor used the rock to build a breakwater. This distance from the middle of the top of the breakwater to the shore

ranged from 10 to 25 feet. This left a narrow channel of water between the shoreline and the backside of the breakwater. When supplementary funding was made available the breakwater was lengthened eastward.

Table 1. Plan and As built Lengths

Construction Segment	Original Length	As Built
West Side Rip Rap	340 feet	301 feet
Basin Dam	280 feet	212 feet
East Side Rip Rap	120 feet	130 feet
Break Water	0 feet	261 feet
Total	740 feet	904 feet

Figure 7. Barge building dam, shoreline work in background

Permit history

The original joint Illinois and U.S. Army Corps of Engineers permit application paper work was mailed by Charleston on July 14, 2004. The Illinois Department of Natural Resources reviewed the application and on July 27, 2004 issued a "Permit Not Required Notification" letter. The City of Charleston received the IDNR letter on August 3, 2004.

In 1995 the City of Charleston received a Nationwide permit from the USACE for the construction of a sedimentation basin in this same location. That type of permit is no longer available. On July 29, 2004 Mr. Sam Werner of the Newburgh, Indiana USACE office conducted a site visit of the proposed project site. He took some photographs and requested additional information on landowners and construction materials. A letter containing the appropriate information was faxed to the Newburgh, Indiana office on August 4, 2004. City staff members were given the impression that the project would be posted and the 30-day public review period would begin. On August 19, 2004 Mr. Werner informed us that the project application file had been shipped down to the USACE office in Louisville, Kentucky. After making a number of unsuccessful attempts to speak with someone at the Louisville office Mr. Werner was re-contacted. He was able to provide a name and phone number of an employee for the Louisville office. On September 29, 2004, I was informed by the Louisville office that the City of Charleston's permit application had been lost.

Replacement documents were mailed to Doug Shelton of the Louisville USACE on October 4, 2004. I called Mr. Shelton on October 13, 2004 to see what progress had been made on the permit. He was unable to tell me who the project manager was who would be reviewing the application. Later that day I received a call from Norma Condra of the USACE. She had been assigned to review the project application. She stated that she would be sending a letter from the USACE requesting additional information.

In October of 2004, the Illinois Environmental Protection Agency's permit section was contacted to see what action they had taken on the application. A Mr. Thad Faught told me that my application was on hold waiting for a determination from the US Army Corps of Engineers regarding the type of permit that it was going to issue for this project.

In November of 2004 the City of Charleston received a letter from the USACE. This letter rejected the format of our original application and most of our drawings. Most of the material that had been provided was originally drawn in 1995. The standard for what is acceptable has changed in this time. The City of Charleston decided to resurvey the project area and develop modern drawings and maps (i.e. AutoCAD and GIS). A new location map was developed using the USGS's National Map. The National Map is an online program.

The USACE letter mentioned wetland delineation and a mitigation plan. The national wetlands inventory map shows two wetlands in the cove where this project has been planned. How this area came to be listed as part of the wetlands inventory was researched. The City staff believes that one of the two wetlands was incorrectly identified in the mid 1980s. The area where the project was located did not support wetland vegetation.

In 2005 the City of Charleston was engaged in a process of placing a new water treatment plant in service. This necessity precluded City staff from a more sustained execution of

tasks required to secure permitting from the USACE. By autumn more normal activities had resumed.

An attempt was made to use GPS units for resurveying the project site. It was discovered that the topography blocked the differential signal that is necessary for accurate measurements. Two alternate methods for surveying were used. New maps and drawings were developed based on this information.

A review of the USACE "Wetlands Delineation Manual" was conducted as part of re-filing for a USACE permit. A decision was made that the 'Wetlands Delineation" determination would be prepared by City staff members. In January of 2006, upon completion of the new maps and drawings, Norma Condra of the USACE was contacted. It was hoped that all of the information that the USACE had requested with the exception of the Wetlands Delineation could be sent in. We were directed to not send anything in until the delineation was completed.

After reviewing the "Wetlands Delineation Manual" City staff compiled the necessary information for making a determination. To augment our information and knowledge base two local experts were contacted. Dr. John Ebinger, a plant taxonomist who is familiar with the project area, provided us with information on the flora. An employee of the Natural Resource Conservation Service knowledgeable about the soils in the project area was located. Mr. Ken Goutch visited the project site on January 13, 2006. He collected samples and made a determination that the soils in this area are not hydric. The new maps, drawings and the Wetlands Delineation paper work were mailed to the Louisville Kentucky office USACE on January 18, 2006. Copies of the Wetlands Delineation and other paper work were mailed to IEPA on January 20, 2006.

On February 10, 2006 City staff was informed that the Louisville office had received our correspondence but they would be reassigning our files to the Newburg, Indiana office. Two permits were received from the USACE on March 13, 2006. One of the permits still needed to have "Water Quality Determination" work performed by the IEPA.

On April 24, 2006, documents regarding the Section 401 "Water Quality Determination" for one of the permits was received from the IEPA. The public notice period ran from April 17th until May 17th. In June we received the Water Quality Certification fee worksheet. The work sheet with a check covering the fee was mailed on July 3rd. On July 19, 2006 the final papers for the Section 401 Water Quality Certification arrived at the Charleston Water Treatment Plant.

Operation and Maintenance:

The Inspection and Maintenance operations for the sedimentation basin are performed by the Charleston Water Treatment Plant staff in coordination with the City's engineering staff. Funding is provided through the Water Treatment Plant budget. The dam face and sides are inspected once a year and after rainfall events of 2 inches of rain or greater in 24 hours.

Inspection List

1) Check dam face and ends for possible damage from overtopping or wave action.
2) Keep trees and brush from growing on the dam or in the abutment.
3) Check for burrowing animal holes near abutment and fill as they occur
4) Check for settling of dam.
5) Inspect for hillside erosion above rock structure.
6) Record elevation of the sediment within the basin.
7) Take corrective actions when it is warranted.

Figure 8. The Dam and Shoreline RipRap.

Photo shows the completed dam and some riprap. Note riprap was not yet finished on left side of photo.

Table 2. Estimating Pollutant Load Reductions For Nonpoint Source Pollution Control BMPs

Basin Dam	Sediment tons/year	P lb./year	N lb./year
Gully Stabilization	563	563	1125
Ponds and WAASCBs	899	563	1125
Agricultural Fields and Filter Strips	337	550	1036
Bank Stabilization	232	232	463

Shoreline RipRap			
Bank Stabilization	27	27	55

Figure 9. Basin and CSCR after April 2007 storm event

Mapping

Surveying and mapping was performed by the Gamma Theta Upsilon, GHO chapter from the Department of Geology/Geography at Eastern Illinois University. The work was under the direction of Dr. Vincent Gutowski and Steven Di Naso. Students contributing to this process included Rob Queer III and Neal Pleskunas. The objective of this task is to document the post construction condition of the project. With subsequent measurements the City will be able to track the rate of deposition in the basin. This could potentially provide evidence as to the impact of land use changes.

Three permanent benchmarks have been established around the Charleston Side Channel Reservoir to aid with future surveying. The benchmarks were set in March of 2007. The surveying work was performed on April 16, 2007. The finished maps were delivered June 5, 2007. The results of this mapping work can be seen in Figure 11 and Appendix C.

Figure 10. Survey crew working in the basin

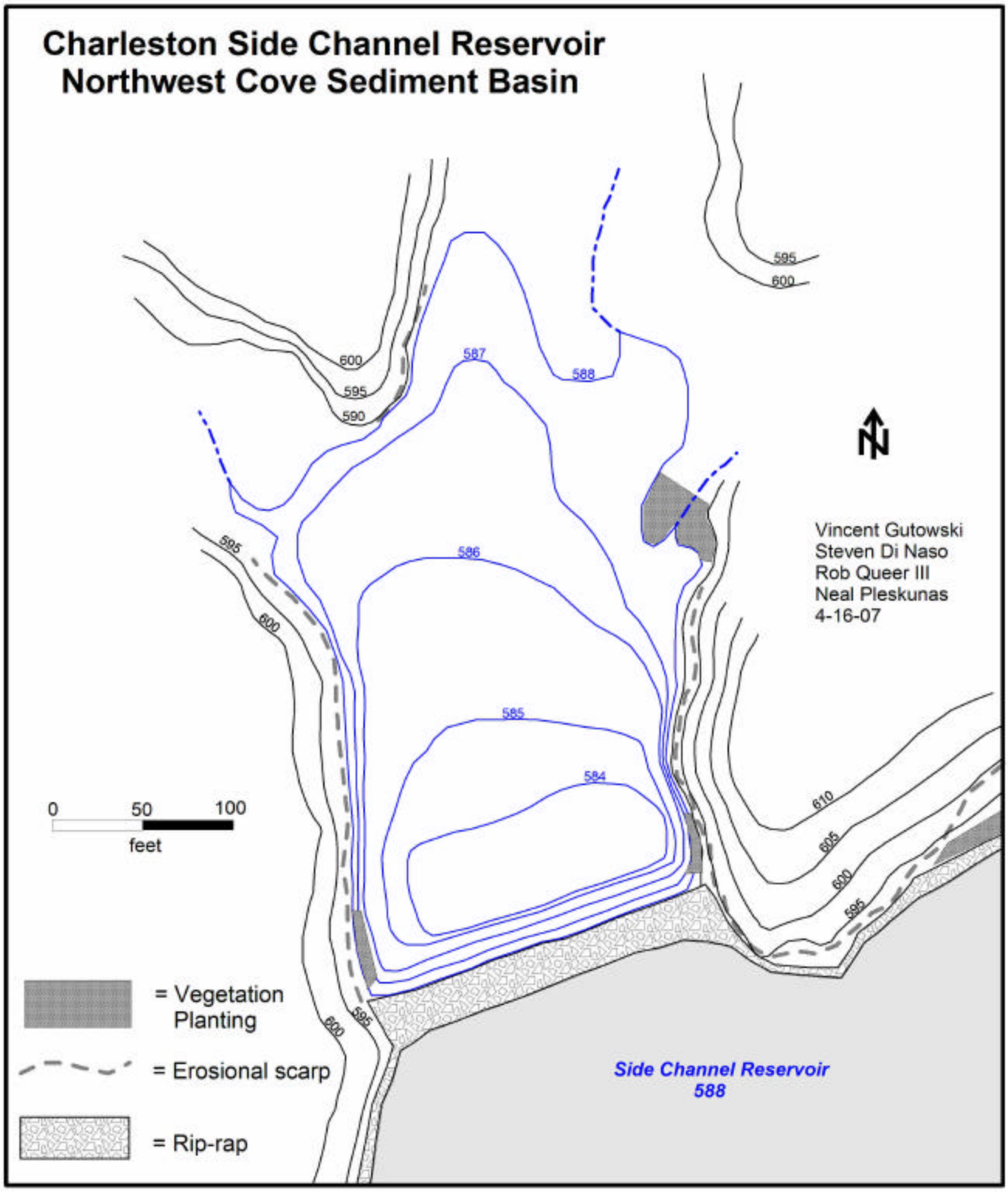


Figure 11. Map of sedimentation basin depths, riprap and vegetation plots

Aquatic Plants

This task called for the purchase and installation of aquatic plants. The shoreline in the project area has been subjected to continued erosion for 25 years. The basin dam and riprap will reduce the impact of wave energy. We are attempting to aid in the natural re-vegetation of the project site through the limited reintroduction of aquatic plants. A map of the project shows the area were vegetation was planted, see Figure 11and Appendix C.

Plant material was purchased from JFNew of Walkerton, Indiana. Contact was first made with this company in 2005. The plant installation needs to be done during a time favorable to growing and after basin and riprap construction. The spring of 2007 became our target for planting. The order for the plants was made on February 21, 2007. The plant plugs and bulbs were received on April 9, 2007. A grow area was setup to maintain the viability of the material until we could plant it. This aquatic vegetation was planted on April 23 and 24. It was originally intended that $1000.00 of aquatic vegetation would be planted. This was scaled back due to the limited amount of suitable planting space. Some areas would have had a very low probability of sustaining plant growth. Table 2, provides a list of plant material and cost. The labor for the planting involved 3 people over 2 eight-hour days. The operation involved the use of one pontoon boat, one canoe and one truck.

Table 3. Aquatic Plant List

Plant material

common name	variety	type	quantity	price	
Hard-stemmed bulrush	Scirpus acutus	plug	190	$ 1.10	$209.00
great bulrush	Scirpus validus creber	plug	76	$ 1.10	$83.60
common bur reed	Sparganium eurycarpum	plug	190	$ 1.10	$209.00
arrow head	Sagittaria latifolia	bare root	80	$ 1.10	$88.00
blunt spike rush	Eleocharis obtusa	plug	76	$ 1.50	$114.00
			612		$703.60
Shipping cost					$120.00
Total					$823.60

Figure 12. Planting aquatic vegetation behind breakwater

Figure 13. A portion of planting area behind breakwater

Appendix A

Project Costs

Project Costs

Dam and Riprap Construction	$211,194.28
Mapping	$1,000.00
Aquatic Plants	$824.07
Materials	$110.70
Direct Labor Administrative	$14,465.27
Indirect Costs	$6,034.59

Total		**$233,628.91**
Illinois EPA Share	60%	**$140,177.34**
City of Charleston Share	40%	**$93,451.57**

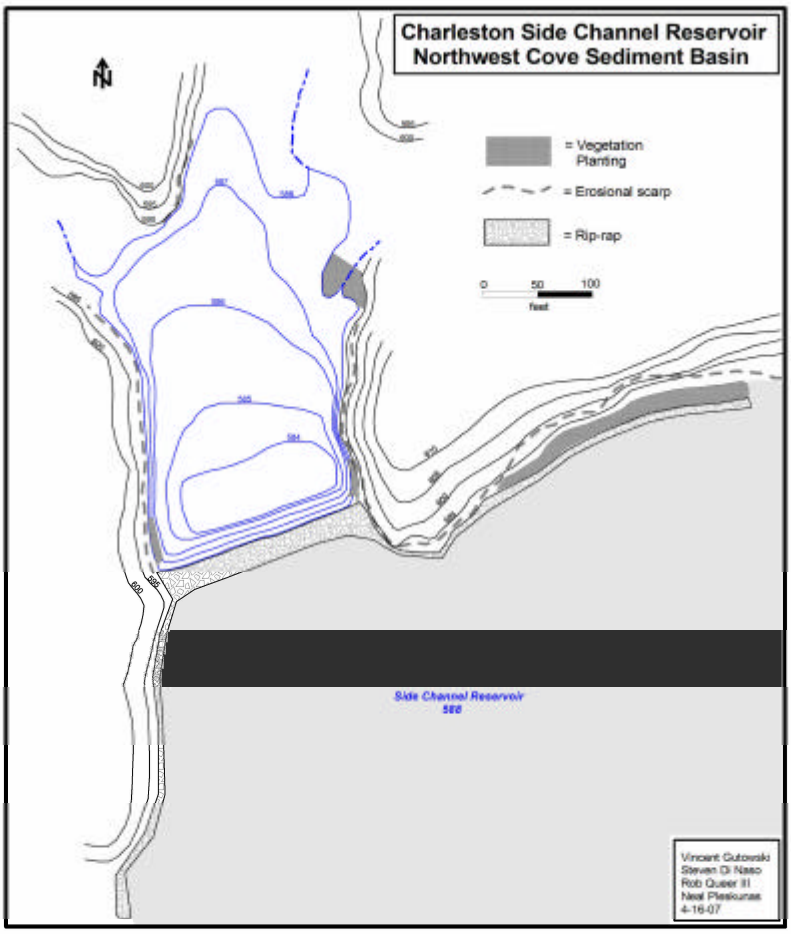
Appendix B

Project Sign

Project Sign

Appendix C

Project Map


Charleston Side Channel Reservoir
Northwest Cove Sediment Basin
N
= Vegetation Planting
= Erosional scarp
= Rip-rap
0
50
100
feet
Side Channel Reservoir
588
Vincent Gutowski
Steven Di Naso
Rob Queer III
Neal Pleskunas
4-16-07