

Sediment Removal Plan

Lake Wawawsee Channel

Purpose

The purpose of the proposed sediment removal project is to remove accumulated sediment from the channel located at the Southwest area of Lake Wawasee, to construct and dismantle the dewatering basin, and to construct a sediment trap to minimize future sediment deposits. Foreign sediment has been deposited into the channel through numerous sources, most notably a drainage culvert at the western most end of the channel that is a final collection point of water from area agricultural fields as well as the street drainage system. On one documented heavy rain event, sediment laden water was photographed flowing into the channel from the culvert (See figure 1) and down the channel to the lake.



Figure 1

Contacts

Wawasee Property Owners Association (WPOA) is the sponsoring organization for the project, Kay Young, President. David Maenhout-9990 Marine Key Dr., Syracuse, IN 46567. Phone number 574-220-9557 is the project coordinator. The president of Marineland Gardens, the neighborhood where the project will take place, is Roger Steuer, 9950 N. Lincoln Rd., Syracuse, IN., 46567 ph. 219-877-7001.

Location

The location of the proposed project is in the Marineland Gardens subdivision on Lake Wawasee in Kosciusko County, Turkey Twp., in Syracuse IN. The general legal description of the channel is in the Northeast Quarter of Section 26, Township 34 North, Range 7 East. The GPS coordinates are 41 deg. 22' 37.67''N, 85 deg. 41' 003.00 W.



Public Involvement

We have a volunteer committee who has done considerable research into the feasibility of the project and have solicited input from the affected residents of the area. We gave a community presentation as to the project details and the estimated cost of the project. The president of WPOA, Kay Young, and the president of Wawasee Area Conservation Foundation (WACF) Heather Harwood has been apprised of the project.

Sediment Deposits

The estimated amount of sediment to be removed was derived from taking soil depth measurements every 50 feet down the channel, which is twice as often as was recommended. In the winter of 2009, we drilled 3 holes abreast; one in the middle of the channel and 1 on either side of the middle hole half way to the shore. We inserted a 3/4" PVC pipe into the hole and noted where it touched the deposited sediment. We then inserted it further until it stopped on the hardpan. The resulting measurement was the presumed depth of the deposited sediment. We then interpolated the amount of sediment to be removed by only calculating the amount through the middle of the channel to within 15 feet of the shore.

An average soil sample was taken (See appendix 4) and tested in September of 2010 to check the organic and nutrient makeup of the sediment. There was only 6.8 % organic matter indicating most of the sediment is foreign. Much of the sediment deposited in the first 500 ft. of the channel is coarse soil from agricultural land west and south of the mouth of the channel. The grade is approximately 10 % and encompasses about 15 acres (see appendix 1). There are also surface drains along area streets and roads that add to the sediment accumulation. We contacted the Kosciusko County Highway Dept. and the County Drainage Board to see about the possibility of maintenance being performed on the drains to limit the amount of sediment being deposited into the channel, thus into the



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their upkeep. Most of the drains empty into the inflow area of the channel. We included a sediment mitigation plan into the dredging specifications to address the inflow of new sediment.

Channel Bottom Contour

**See appendix 2. The sediment measurements were taken in February of 2009 when the water depth was higher than average due to a recent snowmelt. The average depth of the lake is listed as 22 ft. so it is estimated the samples were taken when the lake was at 22.5 feet. We intend to have the channel dredged to an approximate water depth of 8 to 10 feet through the middle 25 feet of channel so that with natural sloughing of the edges, the final average water depth will be approximately 6 feet. The dredging will not go within 15 feet of the seawalls in order to maintain the integrity of the base of the seawalls and to minimize the impact on beneficial plant species. Post project measurements will be taken to ensure conformity.

The most common identified invasive plants are the Hydrilla and Watermilform, both of which are controlled annually by commercial herbicide application. Water lilies are mainly concentrated in the area depicted on appendix 2.

Chemical Composition of the Sediment

Permits along with the corresponding soil tests will be taken in late winter or early spring. There is no industry uphill from the channel so no adverse chemicals or metals are anticipated in the soil tests.

Land Easements

A lease agreement is secured for a dewatering site approximately 3000 yards west of the project site. The agricultural ground is owned by Don Buhrt, 3412 E. Bowser St., Syracuse, IN., 46567. Residents have been apprised of the location of water pipe that will run along Lakeview Rd. to the dewatering site. The project will take place in the fall when the road traffic will be at a minimum.

Excavation

Two methods of sediment removal were considered for the project; Hydraulic dredging and mechanical dredging. Both are still being considered depending on the ability to economically dispose of the sediment and ensure uniform removal. Each method has its advantages and disadvantages. Preliminary cost estimates point to the method of hydraulic dredging being the most efficient and predictable. We will utilize a bidding process with specific requirements and specifications. A group of area resident volunteers will be on site to retrieve any cut weeds so as not to allow them to float to the lake.

Contractor

A list of qualified contractors approved by the INDNR is made available online. I looked at the qualifications and specialties of the listed contractors and chose 3 contractors who have experience in the project we are undertaking. Representatives from the 3 contractors came to the site and consulted with me as to ideas on sediment removal and dewatering. They each later sent a non-binding estimate for the project just to use as an estimated cost figure to present to the neighborhood association. One of the contractors has successfully completed many projects in the county as well as the Midwest and has worked within the constraints of INDNR guidelines. A formal bidding process will be administered with specific criteria to be met. JF New consultants have been offering guidance as to specifications that should be expected. A binding contract will be signed to ensure full compliance. David Maenhout, project manager and a committee will be on site to take periodic measurements to monitor work performance.

Sediment Disposal

The method of sediment removal will dictate the method of disposal. The anticipated process of hydraulic dredging will require enough 8" pipe and a pump with the capacity to move the water and sediment up to 3000 feet. With the estimated 9200 cubic yards of sediment, a basin (appendix 3) will be constructed 600' long by 200' (4 acres) with berms on 3 sides and the natural slope of the land on the 4th side. Top soil from the basin area will be used for the berms and after sufficient drying, will be replaced on top of the spoil once it is graded level. Any temporary erosion control measures, such as silt fences, etc., will be removed. The land to be used for dewatering is agricultural land that is currently being tilled and the spoil left over from dewatering will be used for subsoil since it is high in potassium relative to the resident soil. The affected area will be deep tilled to break up compacted soil. Overflow pipes from the basin will carry return water either to an adjoining wooded property to be leached back to the lake or pumped back to lake Wawasee with a second pump and piping.

Permits

An application for a permit to INDNR Division of Water is required and will be submitted as soon as weather permits. David Maenhout, project manager, has the application and will be responsible for its submission to INDNR.

Construction Schedule

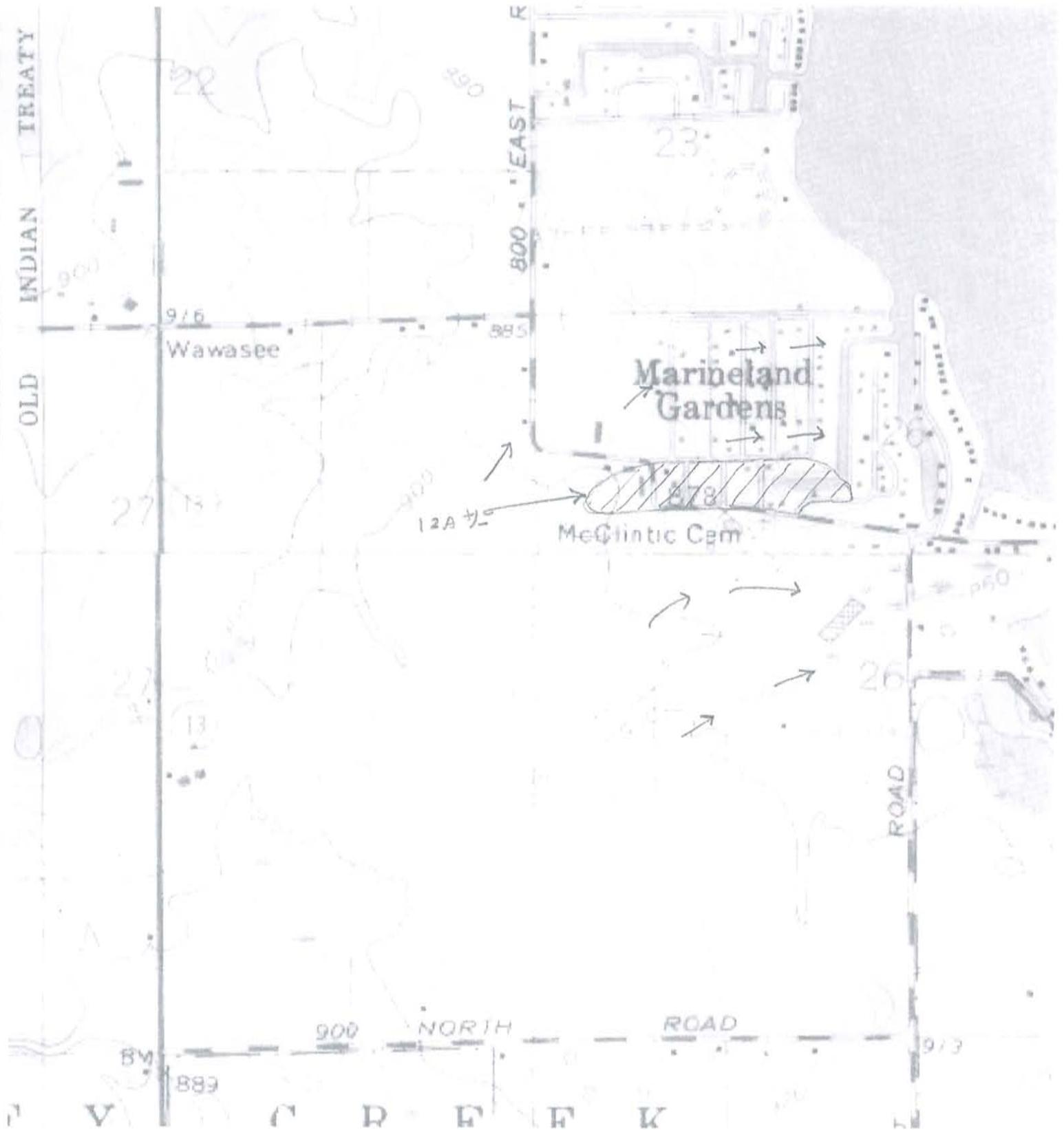
We are anticipating a September/October of 2012 commencement of the project. The sediment basin will be constructed at the earliest convenience of the landlord of the field due to the fact that he will have a crop to harvest prior to excavation. Also, a fall construction schedule will result in the least amount of inconvenience to area residents. In the event of an unusually early freeze of the channel, it gives us the option of completing the dredging in March if necessary. If the dredging is completed in November and dewatering is sufficient by March or April of 2013, a spring crop may be planted in the field. The landlord, Don Buhrt, is aware the land may be needed to be leased for 2 crop years.

Cost

Three contractors with proper credentials were contacted off the approved contractor list supplied by INDNR and inspected the area to be dredged and submitted non-binding cost estimates. The range was from Heartland Dredging at a cost of \$187,000 to Tenant Dredging at \$110,000. Heartland was to use enviro-tubes for dewatering and will haul spoil away after dewatering is complete. Tenant will be all inclusive, from sediment basin construction to basin dismantling and land restoration. George Hardy of EarthWerks in Syracuse submitted a proposal in 2011 for a sediment trap to be constructed in the west end of the channel at an approximate cost of \$12,000.00. We have a lease agreement with Don Buhrt for 4 acres of agricultural ground at \$520.00 an acre, \$2800.00 total per year. I have also logged at least 160 hrs. in research, meetings, and report prep time which may count towards Like Kind credit.

David Maenhout
Project Manager
9990 Marine Key Dr.
Syracuse, IN., 46567
574-220-9557
dm349sb@aol.com

Appendix 1



Appendix 2

Water Lilies

4/7

4/6

4/8

4/6

4/6

4/6

4/9

4/13

4/14

4/14

4/14

4/14

4/14

4/14

4/11

4/7

4/6

Average water depth along both seawalls is 1-2 feet.

Channel depth values

The blue value denotes water depth and the brown value denotes the sediment depth down to the hardpan.

© 2012 Google
Image IndianaMap Framework Data.

41°22'39.96" N 85°41'02.76" W elev 859 ft



Appendix 3

Imagey Date: 2/28/2005 1995

© 2012 Google
Image LandsatMap Framework Data
41° 23' 41.57" N 85° 41' 11.95" W, elev. 882 ft

Eye alt: 4658 ft

Appendix 4



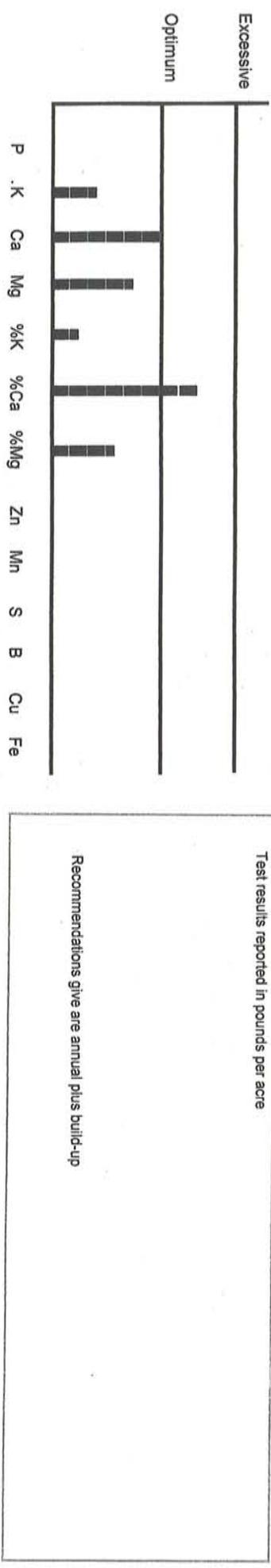
Sample Submitted By		DAVID MAENHUNT 60900 CRUMSTOWN HWY NORTH LIBERTY, IN 46554		DAVID MAENHUNT CHANNEL		Date of Report	09/14/10	Report Number	290.013	Record Number	21383	Lab #	84202A	Field	A	Sample	1
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Organic Matter %	Phosphorus Bray P1	Potassium K	Magnesium Mg	Calcium Ca	pH		Cation Exchange Capacity	Percent Base Saturation			Sulfur S	Zinc Zn	Manganese Mn	Boron B	Copper Cu	Iron Fe
					Soil	Buffer		%K	%Mg	%Ca						
6.8	5	121	636	8764	7.4	7.4	24.7	0.6	10.7	89						

Crop/Yield	Previous Crop	Nitrogen Lbs/A	P2O5 Lbs/A	K2O Lbs/A	Lime		Magnesium Mg Lbs/A	Sulfur S Lbs/A	Zinc Zn Lbs/A	Manganese Mn Lbs/A	Boron B Lbs/A	Copper Cu Lbs/A	Iron Fe Lbs/A
					T/A	Type							

Comments:

Test results reported in pounds per acre



130 South State Street
Westerville, OH 43081
614-523-1005

Sediment depth measurements

From Feb. 2009

Lincoln NORTH/SOUTH CHANNEL

	West	Center	East	
Water		3' 10"	3' 8"	Start North End - Every 50', 10' off seawall
Mud		9' 4"	7' 10"	
Water	1' 2"	4' 8"	2' 4"	Across channel corner to corner
Mud	5'	12' 6"	7'	
Water	1' 6"	4' 10"	2' 8"	seam in seawall
Mud	6'	13'	7'	
Water	1' 8"	4' 10"	2' 4"	seam in seawall
Mud	7' 6"	11' 10"	6'	
Water	1' 6"	4' 10"	2' 4"	seam in seawall
Mud	7' 6"	14'	7'	
Water	1' 4"	4' 10"	2' 8"	seam in seawall
Mud	9'	14' +	8'	
Water	1'	5'	2'	seam in seawall
Mud	8'	14' +	8'	
Water	1' 4"	4' 10"	1' 8"	new seawall
Mud	9' 6"	14' +	10' 6"	
Water	2'	4' 7"	2' 4"	new seawall
Mud	7' 6"	14' +	6' 6"	
Water	2' 2"	4' 8"	2' 4"	new seawall
Mud	8' 10"	14' +	7' 6"	
Water	2' 2"	4' 6"	1' 8"	new seawall
Mud	9' 6"	14' +	6' 6"	
Water	2'	4' 5"	1' 8"	new seawall
Mud	9' 3"	14' +	6' 6"	
Water	1' 2"	4' 6"	1' 8"	new seawall
Mud	9' 6"	14' +	9' 6"	
Water	1' 3"	4' 6"	1' 4"	new seawall
Mud	9' 6"	14' +	9'	
Water	1' 3"	4' 3"	1' 3"	new seawall
Mud	9' 4"	14' +	9' 4"	
Water	1' 9"	4' 6"	2' 6"	new seawall
Mud	8' 10"	14' +	8' 10"	
Water	2' 6"	4' 4"	10"	new seawall
Mud	7'	11' 6"	8' 4"	
Water	2' 6"	4' 4"	10"	south inside ramp
Mud	8' 6"	11' 6"	7'	
Water	1' 10"	3' 11"	1' 4"	seam in seawall + 8' south
Mud	12'	8' gravel	3' 8" gravel	
Water	1' 10"	4'	1' 11"	seam in seawall + 8' south
Mud	7' 6"	7' 6"	4' 11"	
Water	1' 10"	4' 3"	1' 3"	90 bend
Mud	9' 4"	6' solid	6' 6" solid	
	North	Center	South	Channel turns west
Water		4' 2"	3' 3"	
Mud		7' 8" gravel	8' gravel	

Water	2' 5"	3' 11"	3' 8"
Mud	11'	14' +	11'
Water	2' 11"	3' 11"	2' 11"
Mud	12'	14' +	12'
Water	2' 6"	3' 9"	2' 4"
Mud	10' 9"	10' 11"	9' 9"
Water	2' 10"	3' 8"	2' 9"
Mud	9' 8"	9' 9"	7' 11"
Water	3' 11"	4' 2"	2' 10"
Mud	11' 6"	12' 6"	11' 10"
Water	2' 3"	3' 3"	2' 4"
Mud	10' 6"	14' +	11'
Water	2'	3' 9"	2' 3"
Mud	7' 6" gravel	9' 6" gravel	8' 6"

2' 3" West
8' West

LAKEVIEW EAST/WEST CHANNEL

	North	Center	South
Water	3'	4' 3"	
Mud	6' 7"	7' 3"	
Water	2' 3"	4' 4"	2'
Mud	7' 3"	6' 6"	5' 8"
Water	2' 9"	4' 3"	2' 8"
Mud	7'	6' 6"	4'
Water	3' 9"	3' 9"	2' 9"
Mud	5' 6"	8'	5'
Water	2' 6"	3' 8"	2' 4"
Mud	5' 9"	6' 4"	4' 6"
Water	1' 9"	4' 3"	2' 9"
Mud	6' 3"	7'	5'
Water	1' 6"	4'	2' 6"
Mud	5'	7' 3"	5'

Start diagonal center west end

25' from east end of channel

MARINE KEY NORTH/SOUTH CHANNEL

	West	Center	East
Water		4' 3"	
Mud		10' 6"	
Water	5'	6' 9"	4' 10"
Mud	8' 6"	12' 6"	10' 6"
Water	4' 9"	7' 9"	5' 2"
Mud	8' 8"	15' 3"	9' 9"
Water	4' 6"	9' 3"	6' 3"
Mud	8' 6"	14' 9"	9' 3"
Water	2' 2"	9' 3"	6' 6"
Mud	8' 6"	14' 3"	8' 8"
Water	3' 6"	9' 6"	6' 6"
Mud	8' 9"	18'+	8' 8"
Water	3"	10' 9"	6' 6"

Start at Hatchery Road

Mud	9'	18'+	8' 9"
Water	4' 8"	12'	5' 8"
Mud	9'	18'+	10' 8"
Water	5' 8"	12'	5' 6"
Mud	7' 8"	16' 6"	8'
Water	3' 3"	13'	6' 6"
Mud	4'	18'+	10' 3"
Water	4' 9"	13'	4' 4"
Mud	5' 6"	16' 6"	4' 9"
Water	5' 6"	15'	6' 6"
Mud	6' 9"	18'+	9' 3"
Water	3'	17'	8'
Mud	4'	18'+	8' 6"
Water	5'	16'	4'
Mud	6' 6"	18'+	6'
Water	2' 8"	15' 6"	5' 4"
Mud	4' 8"	18'+	5' 6"
Water	3' 3"	16'	7' 6"
Mud	4' 8"	18'+	7' 8"
Water	1' 8"	16' 4"	6' 6"
Mud	3' 6"	18'+	7' 3"
Water	1' 6"	14' 6"	6'
Mud	4'	18'+	6' 8"
Water	3' 3"	13' 4"	4' 6"
Mud	4'	18'+	5'
Water	3' 8"	13'	5' 8"
Mud	5' 3"	18'+	6' 6"
Water	3' 8"	12' 8"	8'
Mud	4' 10"	18'+	10'
Water	4' 3"	12' 4"	7' 3"
Mud	6' 6"	18'+	8' 8"
Water	2' 6"	12' 6"	5' 3"
Mud	6' 8"	18'+	6' 9"
Water	2' 6"	11'	4' 3"
Mud	6' 6"	18'+	8'
Water	3' 8"	10' 3"	4' 4"
Mud	5'	17' 6"	8'
Water	4' 6"	10'	4' 6"
Mud	5' 6"	17' 6"	7' 6"
Water	3'	10'	5' 6"
Mud	4' 3"	17' 6"	8' 8"
Water	2' 4"	9'	5' 3"
Mud	3' 6"	17' 6"	9' 8"
Water	4' 9"	8' 8"	5' 3"
Mud	7' 9"	17' 6"	8' 8"
Water	1' 8"	8' 3"	5' 6"
Mud	3' 8"	17' 6"	9' 3"

Channel breaks west

Channel breaks north

Center East/West channel

Water	1' 6"	8' 4"	4' 8"
Mud	3' 8"	17' 6"	9' 3"
Water	1' 6"	5' 10"	4' 3"
Mud	6'	16' 6"	8' 8"
Water	2'	4'	2' 10"
Mud	8'	12' 6" sand	8'
Water	3'	3' 6"	2'
Mud	9' 6"	14' sand	8' 6"
Water	2' 8"	3' 4"	2' 6"
Mud	5' 4"	14' 6" sand	9'
Water	3'	3' 3"	3' 3"
Mud	5'	14' 6" sand	14'
Water	3' 3"	3' 6"	3' 6"
Mud	4'	7' 6"	5' 3"

West drain covert

20' in from end of MLG channel

80' into lake

130' into lake

180' into lake