

PLANNING AND CARING FOR YOUR POND



3rd Edition

Prepared by

The Delaware Soil & Water Conservation District

and

USDA Natural Resources Conservation Service

Delaware SWCD / USDA-NRCS
557-A Sunbury Road
Delaware, Ohio 43015
(740) 368-1921, ext. 4
FAX: (740) 369-8321
www.delawareswcd.org
E-mail: dswcd@delawareswcd.org

The Delaware SWCD provides programs and services on a nondiscriminatory basis without regard to race, color, national origin, sex, religion, age, disability, political beliefs, and marital or family status.

Pond Planning & Construction Checklist

- ✓ Meet with staff from the Delaware Soil & Water Conservation District to evaluate the potential pond site. Discuss existing drainage patterns, soil types, watershed size, spoil placement, design needs, construction techniques, and legal requirements.
- ❑ Contact your local Township Zoning Officer for any zoning ordinances relevant to pond construction.
- ❑ Check deed for drainage or flood easements or other restrictions.
- ❑ Devise a preliminary sketch of your pond site and spoil area.
- ❑ Conduct subsoil exploration and log.
- ❑ Contact contractors for cost estimates (at least 3 recommended).
- ❑ Check contractors' references.
- ❑ Construct pond.
- ❑ Vegetate all disturbed areas around the pond for erosion and sediment control.
- ❑ Stock pond with fish.
- ❑ Enjoy pond.



Bulletin

Extension

Ohio Pond Management

Bulletin 374-99

Sources of Assistance

	Private Fish Hatcheries ¹	SWCD ²	Private Consultant ³	ODNR Division of Water/ Local Zoning Officials ⁴	Construction Contractor ⁵	ODNR Division of Wildlife ⁶	Ohio State University Extension ⁷	Agri-chemical Dealers ⁸	Licensed Pesticide Applicators ⁸
Planning		XXX	XXX		XXX				
Construction		XXX	XXX		XXX				
Vegetation management			XXX				XXX	XXX	XXX
Fish stocking and management	XXX	XXX	XXX			XXX	XXX		
Nuisance wildlife						XXX			
Herbicide/algacide applications			XXX						XXX
Fish kills						XXX	XXX		
Construction laws and regulations		XXX		XXX					
Purchase aquatic pesticides								XXX	

¹ Call ODNR Division of Wildlife (DOW) (614-265-6300) and ask for the publication Fish and Fish Food Propagators. This is a list, by county, of licensed fish propagators in Ohio.

² Look in the local phone book under "county government" listings.

³ Contact your county OSU Extension or SWCD office to inquire about consultants in the area.

⁴ Contact local zoning officials regarding local permits; contact ODNR Division of Water (614-265-6717) about dam laws and permits.

⁵ Contact your local SWCD office for a list of private pond construction contractors.

⁶ Contact your county OSU Extension or SWCD office for the name and phone number of the county wildlife officer, or contact ODNR Division of Wildlife (614-265-6300).

⁷ Look in the local phone book under "county government" listings, or call the State Extension Office (614-292-4077).

⁸ Look in the local phone book under "farm supplies" or "garden centers."

⁹ Look in the local phone book under "farming services," "farm supplies," or "pest control," or call your county OSU Extension office.

[Back](#) | [Table of Contents](#)

EXCAVATED PONDS

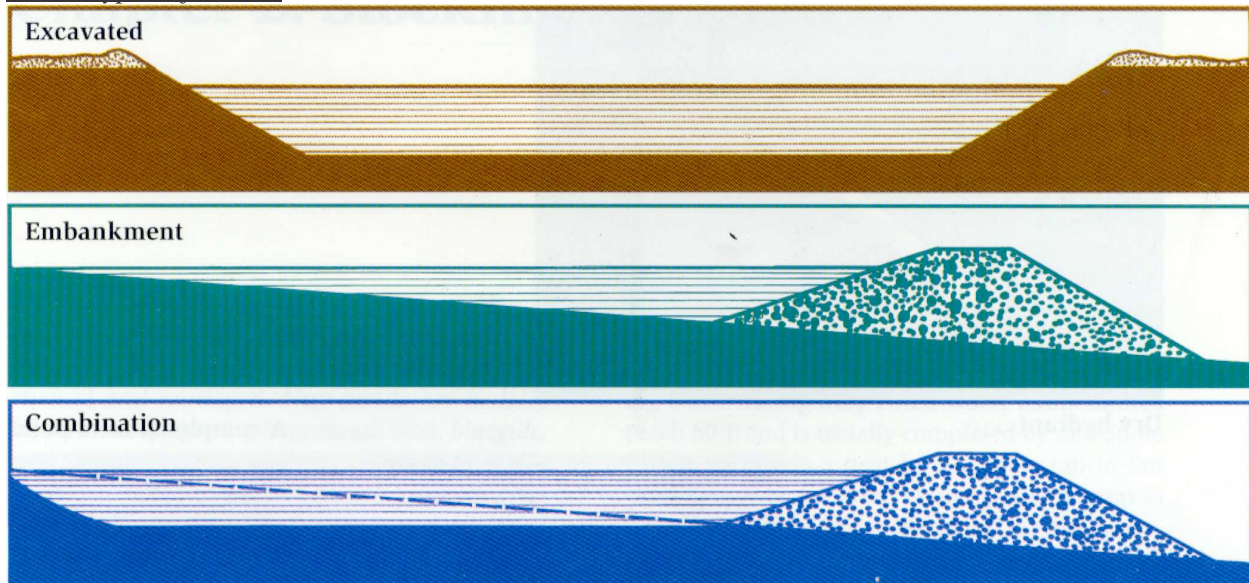
PLANNING CONSIDERATIONS

General Information

Proper construction is one of the most important parts in the development of a good pond. Many potential problems can be avoided through careful site selection and proper design. There are many things to consider before construction begins. The Natural Resources Conservation Service (NRCS) and the Delaware Soil & Water Conservation District (SWCD) staff can assist you on investigating the pond site. The following is a guide to help you plan your pond.

An embankment pond is constructed by building a levee or “fill” in order to impound water. The entire depth of an embankment pond results from the height of the levee. An excavated pond is constructed in a nearly level area where embankment type ponds are not practical. The water area and depth results from digging a pit in the ground. The excavated soil can be spread or piled and vegetated. Some ponds are built in a gently sloping area with the capacity obtained by excavating and by building a low dam. Excavated ponds may have an embankment or levee on the “lower side” up to 4 feet high.

The 3 Types of Ponds



Common Characteristics of an Excavated Pond

- Initial filling from outside sources may be necessary. Ponds normally fill from surface water runoff.
- They are usually built in soils with slow permeability and high clay content. A test hole investigation may be necessary to check the soil suitability.
- Water level should stay fairly constant from rainfall and evaporation.
- There should be no water exchange with ground water.
- When constructed within a watershed, an overflow system is necessary.
- Pond overflow must be returned to its natural watercourse before it leaves the owner's property.

All successful ponds need to fill with water after construction is completed. The water source should be considered long before construction begins.

Water Sources for Excavated Ponds

- Rain falling on pond. This only averages 36" a year. Evaporation almost offsets rainfall.
- Rainfall run-off. Watershed to pond surface area ratio should be a minimum of 6:1 and a maximum of 40:1. Effort should be made to prevent pollution sources and control erosion sources within the watershed.
- Wells-generally not recommended-need a "strong" flow. Using wells to fill ponds may affect neighboring well levels.
- Lift station from tile-slow but generally steady source of good water.
- Pumping from ditch or stream. Two possible drawbacks exist for this. Streams have high nutrient levels that may accelerate weed growth. In addition, trash fish have to be killed prior to pond stocking.
- Central Water system, if available. This can be cost-prohibitive.
- Building roof water. Although limited, this can be helpful in maintaining pond water level.
- Other possibilities may be available in certain areas (e.g. springs).

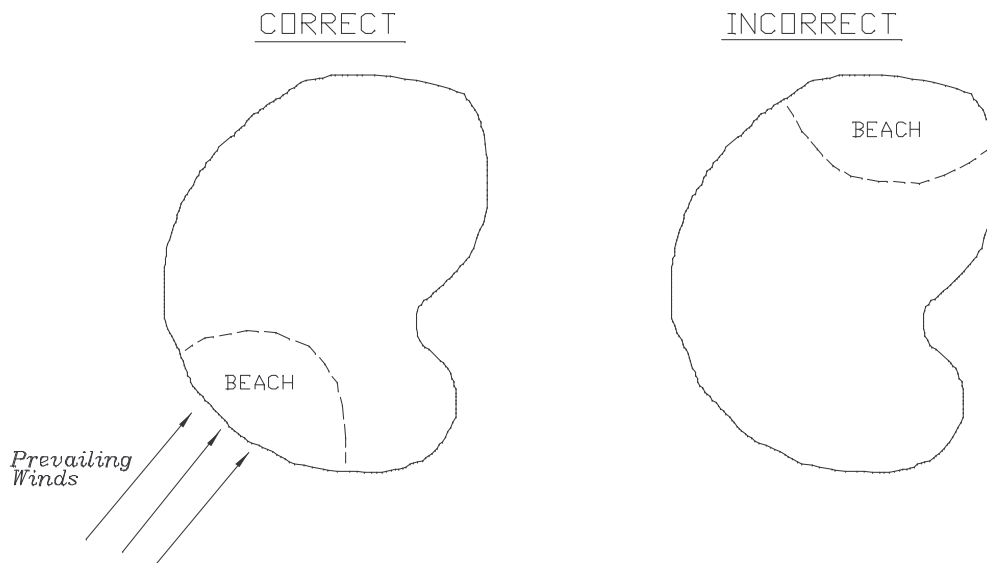
Design Recommendations

(All recommendations taken from NRCS Specification #378 Pond)

1. **Pond depth** should be a minimum of 8 feet over 25% of the pond bottom or 6 feet over 50% of the pond.
2. The pond should have a **minimum surface area** of ¼-acre for fish stocking.
3. A **core or cutoff trench** shall be excavated beneath the levee or low embankment. The **core trench** should have 1:1 side slopes and deep enough to extend into a relatively impervious layer. The cutoff trench is then back-filled in thin layers with clay material and compacted.
4. Sides should be cut to a 2:1 (horizontal to vertical) slope from the water line elevation to 4' depth. **Side slopes** of 3:1 or flatter can be used below the 4 feet of depth and above the water line.
5. Consult NRCS Specification #378 for an **overflow system**. The principal pipe spillway is dependent on watershed size and other factors. A grassed **emergency spillway** is also required.
6. The perimeter or pond edge should be shaped to a curvilinear or irregular form, and blend into the natural landscape as much as possible.
7. ***Any subsurface drains located during construction shall be routed around the pond using watertight conduit/drain material.***

Soil Placement:

- Material excavated from the pond will form a hill greater than the size and depth of the pond.
 - Shape mounds or hills to a form that blends visually with the landscape. Maintain a **12 foot minimum width** between the water edge and toe of mound fill. Side slopes on mounds should be 4:1 or flatter for mowing.
 - Soil may be spread out to a height of 3 feet with the top graded away from the pond.
 - Soil **should not** be placed so as to block surface water from entering the pond or so as to create water problems for neighbors.
 - Soil can be used for a low embankment and/or leveled.
 - Excess soil can be removed from the site.
 - Stabilize bare areas with **vegetation** and maintain grass cover. See critical area planting instructions.
8. Shoreline Erosion control may be desired on banks opposite prevailing wind direction. Use No. 1 & 2 limestone rock, 6-9 inches thick and set 1 foot above and 2 feet below normal water line.
9. If you desire a beach in your pond, it should be located in the narrowest portion of the pond. Beach areas are graded at 6:1 or 8:1 slope to a depth of 5 feet. Keep in mind that prevailing winds allow debris to collect on the pond bank. If possible, orient the beach area on the side of the prevailing winds.

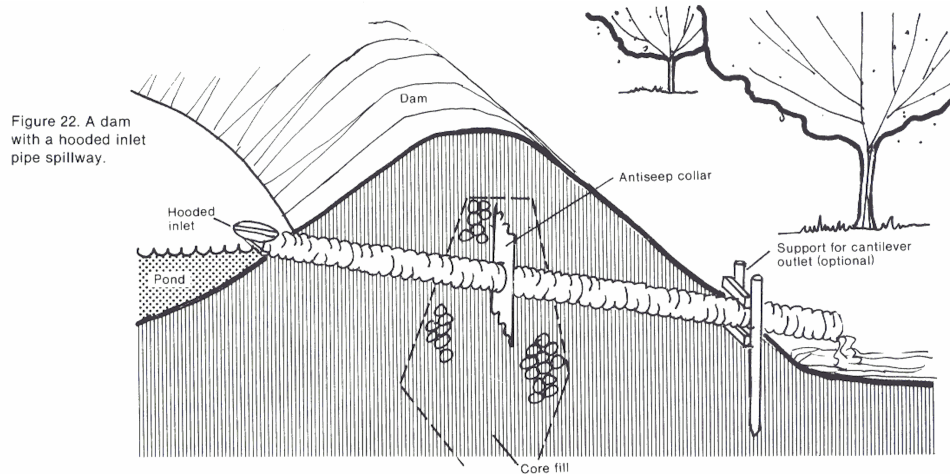


A pond can provide many hours of recreation and lend aesthetic beauty to an area if planned and constructed properly. Be sure there is adequate space available for a pond, plus the excavated soil. Check local ordinances for restrictions such as size, setbacks, etc.

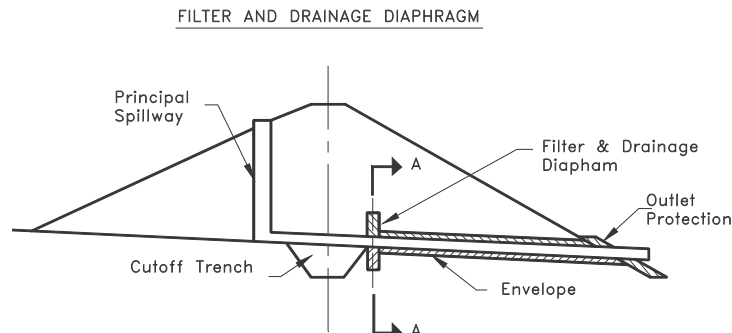
THE CORE TRENCH

The Core Trench, also called the Keyway or Cutoff Trench, is one of the most critical elements of pond construction. The purpose of the core trench is to prevent water from seeping through the fill. When fill material is placed on top of existing ground, the interface area between the fill material and existing material is a weak spot. Water is able to seep through the fill at this point, and it is difficult to maintain the water level in the pond.

The most common kind of cutoff if made of compacted clayey material. A trench is cut along the centerline of the dam deep enough to extend into some kind of impervious material. The sides of the trench should be cut at a 1:1 slope. The clay material is then compacted into the trench building it up layer by layer. This process is then continued into the dam creating a homogenous layer. Water that is trying to seep through the fill hits this trench, and is not able to seep out of the pond.



Cross-section of a dam showing the Core Trench along with a hooded inlet and antiseep collar.



Cross-section showing the location of the core trench.

PRESERVATION OF EXISTING DRAINAGE

One of the most important things to keep in mind when planning construction of any kind is the existing drainage patterns that are present on the selected site. It is your responsibility to maintain the functionality of these existing pathways. Drainageways can be both surface and subsurface.

Surface Drainage

Surface drainage can be defined as any route by which water will travel over the surface of the ground on its way to some sort of outlet. The most important thing to remember with regard to surface drainage is the route of the water. **Water must enter and leave a property at the same places that it has always done in the past.** A landowner may re-direct surface water as they wish **on their property** as long as that water is not blocked from entering the property in its original course and it returned to the original course prior to leaving the property.

Subsurface Drainage

It can be easy to dismiss subsurface drainage when constructing a pond because it is “invisible.” Tile lines are buried in the ground, and, often times, there is little information as to their size and location. It is critical to preserve and/or repair any subsurface drainage lines damaged during construction. Any subsurface tile that is cut during pond excavation must be re-routed around the pond area using watertight conduit, and reconnected to the original tile at a point downstream of the pond.

A couple of common mistakes made with regard to subsurface drains are leaving a cut tile unrepaired and outletting a cut tile into the pond. Never assume that a cut tile is confined to your property. Many old clay tiles were put in by hand, and cross property lines in an irregular course. Leaving a cut tile unrepaired can render any other connected subsurface drainage systems. This is why it is critical to re-route any damaged tile. **Outletting a tile into a pond is not a viable alternative to re-routing the tile.** As the water level in a pond rises, the efficiency of the tile is decreased. “Ponded” water in the tile will restrict upslope drainage causing wet, saturated soil conditions. This restricted drainage may result in loss in farm/home landuse and can create an adverse liability to the pond owner.

***IMPORTANT:** **Never connect the pond overflow pipe to an existing subsurface drain line.** Underground tile were never designed (ie. they are too small) to carry surface water. Entry of surface water overloads the capacity of the downslope system for proper subsurface drainage, and it can carry sediment and debris into the line that may cause blockage and otherwise damage the system.

See the “Plan View” Graphic for details on re-routing a subsurface drain.

RODENT CONTROL

Ponds provide wildlife habitat for a variety of wild animals. Rodents such as the groundhog, muskrat, and occasional beaver are attracted to these bodies of water and the dams impounding them. If not controlled, they can be quite dangerous to the structural integrity and proper performance of the dam. Holes around the waterline edge can be a nuisance and liability in some cases. Rodent control is essential in preserving a well-maintained pond.

****Check with your local Wildlife Officer or the Ohio Department of Natural Resources, Division of Wildlife before beginning any rodent control strategy.**

Groundhog (*Marmota monax*)

The heavily built, short legged groundhog is the largest member of the squirrel family. Groundhogs originally were scarce in Ohio, but gave increase with the clearing of forestland. These animals burrow along the edges of forests, brushy fencerows, creeks, and any other undisturbed area of cover, such as an unmowed or overgrown dam.

This burrowing activity is what affects the structural soundness of the dam. An active groundhog may excavate 500 pounds of material through the dam, lowering the waterline and weakening the dam. If the situation goes unchecked, the dam may collapse.

Groundhogs can be controlled by using fumigants or by shooting. Fumigation bombs may be purchased at the OSU Extension, Delaware County office. After the animal is removed, the burrow should be backfilled with a well-compacted material. Groundhogs will be discouraged from inhabiting the embankment if the vegetation is kept mowed.

Muskrat (*Ondatra zibethicus*)

The muskrat is a stocky rodent with a broad head, short legs, small eyes, and short ears that barely extend above its fur. Muskrats live in either a lodge or a bank den. The upstream slope of a dam covered with cattails is very attractive to muskrats.

Muskrat burrows start 6 to 18 inches below the water surface, and penetrate the embankment on an upward slant. At distances up to 15 feet from the entrance, a dry chamber is hollowed out above the water level. As this den approaches the crest of the embankment, they are likely to collapse causing a reduction in the freeboard. When the water level rises during a large storm, these dens allow water to seep further into the dam. Damage is compounded where groundhogs construct their burrows in dams opposite muskrat dens and then meet in the middle.

Muskrats are generally controlled by trapping and removal of cattails. Barriers to prevent burrowing can be used to protect dams. A properly constructed riprap and filter layer will discourage burrowing as well as a heavy wire fencing laid flat across the slope. Both barriers should extend several feet below and above the normal pool level.

FISH MANAGEMENT & STOCKING TIPS

- **Largemouth bass** and **Bluegills** are recommended for stocking small pond. **Channel catfish** may be stocked in ponds that are at least ½-acre in surface area. Do not stock large fish with fingerlings. Do not stock **Triploid White Amurs** in a pond unless leafy vegetation is present.
- Stocking Rates:
 - **Largemouth Bass** - 100 per acre
 - **Bluegills** - 500 per acre
 - **Channel Catfish** - 100 per acre
- Sources of fish include the Division of Wildlife (ODNR) and several commercial hatcheries throughout the state. A list is available from the SWCD office.
- Do not fish for bass until they have had a chance to spawn. Under normal conditions, they will spawn the second summer after they have been stocked. Never remove more than 25 bass per acre per year.
- Fish the bluegills hard. Take out at least a dozen bluegills for each bass. Don't throw any bluegills back, even little ones.
- Never let livestock wade in the pond or trample the edges.
- Do not plant aquatic vegetation of any kind in the pond. This may lead to an unbalanced fish population and a serious weed problem.
- Consult **OSU Extension** for detailed information on weed control and pond care.
- Adequate vegetative cover should be maintained on the watershed to prevent turbid, silty water.
- If muddy water persists for long periods following heavy rains, use gypsum or hydrated lime to clear it up. Follow recommendations in Extension Bulletin No. 374.
- Proper fertilization may be a useful management tool. It is not, however, a good general practice. Fertilize only after consulting pond management bulletins or agency representatives.
- Keep muskrats, woodchucks, and groundhogs away from pond areas. See Extension Bulletin No. 374.

SEEDING RECOMMENDATIONS

Permanent Seedings

<u>March 1 - February 28</u>	<u>Per 1000 Sq. Ft.</u>	<u>Per Acre</u>
1) Tall Fescue	1 Lb.	40 Lbs.
2) Creeping Red Fescue	½ Lb.	20 Lbs.
Perennial Ryegrass	¼ Lb.	10 Lbs.
Bluegrass	¼ Lb.	10 Lbs.
3) Creeping Red Fescue	½ Lb.	20 Lbs.
Tall Fescue	½ Lb.	20 Lbs.
4) Turf-type Fescue	2 Lb.	90 Lbs.
Kentucky Bluegrass	0.1 Lb. (2 oz.)	5 Lbs.

*Dormant Seedings: Seedings made after November 1 will be dormant seedings and vegetative mulch will be increased from 2 tons per acre to 3 tons per acre (150 Lbs. per 1000 square feet.)

Temporary Seedings

<u>March 1 - June 15</u>	<u>Per 1000 Sq. Ft.</u>	<u>Per Acre</u>
1) Oats	3 Lb.	4 Bu.
2) Perennial Ryegrass	1 Lb.	40 Lbs.
<u>June 16 - August 15</u>	<u>Per 1000 Sq. Ft.</u>	<u>Per Acre</u>
1) Oats and Sudangrass	2 Lb. Each	2 Bu. Each
2) Perennial Ryegrass	1 Lb.	40 Lbs.
<u>August 16 - November 1</u>	<u>Per 1000 Sq. Ft.</u>	<u>Per Acre</u>
1) Rye	3 Lb.	2 Bu.
2) Wheat	3 Lb.	2 Bu.
3) Perennial Ryegrass	1 Lb.	40 Lbs.

WWW POND RESOURCES

USDA NRCS POND RELATED SPECIFICATIONS

POND

http://efotg.nrcs.usda.gov/references/public/OH/Oh378_Standard_Pond.pdf

FISHPOND MANAGEMENT

http://efotg.nrcs.usda.gov/references/public/OH/Oh399_Standard_Fishpond_Management.pdf

CRITICAL AREA PLANTING

http://efotg.nrcs.usda.gov/references/public/OH/Oh342_Standard_Critical_Area_Planting_June_2002.pdf

OHIO STATE UNIVERSITY EXTENSION PUBLICATIONS

OHIO POND MANAGEMENT BULLETIN

<http://ohioline.osu.edu/b374/index.html>

*Planning Considerations, Pond Measurements, Physical and Chemical Properties of Pond Water, Stocking Info, Fish Facts, Weed Control, Muddy Water, Winter Pond Management, Pond Safety, Fishing Tips, & Sources of Assistance

MUDDY WATER IN PONDS-CAUSES, PREVENTION, & REMEDIES

<http://ohioline.osu.edu/a-fact/0006.html>

PLACING ARTIFICIAL FISH ATTRACTORS IN PONDS

<http://ohioline.osu.edu/a-fact/0001.html>

WINTER & SUMMER FISH KILLS IN PONDS

<http://ohioline.osu.edu/a-fact/0008.html>

FISH SPECIES SELECTION FOR POND STOCKING

<http://ohioline.osu.edu/a-fact/0010.html>

CONTROLLING FILAMENTOUS ALGAE IN PONDS

<http://ohioline.osu.edu/a-fact/0003.html>

OHIO DRAINAGE LAWS

<http://ohioline.ag.ohio-state.edu/b822/index.html>

NUISANCE CANADA GEESE

<http://ohioline.osu.edu/w-fact/0003.html>

NATURAL RESOURCES FACT SHEET INDEX

<http://ohioline.osu.edu/a-fact/>

ODNR DIV. OF WATER - DAM SAFETY ISSUES

CONSTRUCTION PERMITS FOR DAMS

http://www.dnr.state.oh.us/water/pubs/fs_div/fctsht34/tabid/4120/Default.aspx

DAM SAFETY PUBLICATIONS

<http://www.dnr.state.oh.us/Water/pubs/default/tabid/4079/Default.aspx#anchor12197693>

*Rodent Control, Trees & Brush, Classification of Structures, Earth Dam Failures, Seepage Through Earthen Dams, Ground Cover

ODNR DIV. OF WILDLIFE PUBLICATIONS

FISH PROPAGATORS

http://www.dnr.state.oh.us/water/pubs/fs_div/fctsht34/tabid/4120/Default.aspx

OHIO FISH IDENTIFICATION GUIDE

<http://www.ohiodnr.com/Portals/9/pdf/pub334.pdf>

OHIO POND MANAGEMENT HANDBOOK

<http://www.ohiodnr.com/Portals/9/pdf/pondmgt.pdf>

OTHER USEFUL WEBSITES

DELAWARE SOIL & WATER CONSERVATION DISTRICT

www.delawareswcd.org

OHIO DEPARTMENT OF NATURAL RESOURCES

www.ohiodnr.com

USDA NATURAL RESOURCES CONSERVATION SERVICE

www.oh.nrcs.usda.gov

SOILS CONSULTANTS IN OHIO

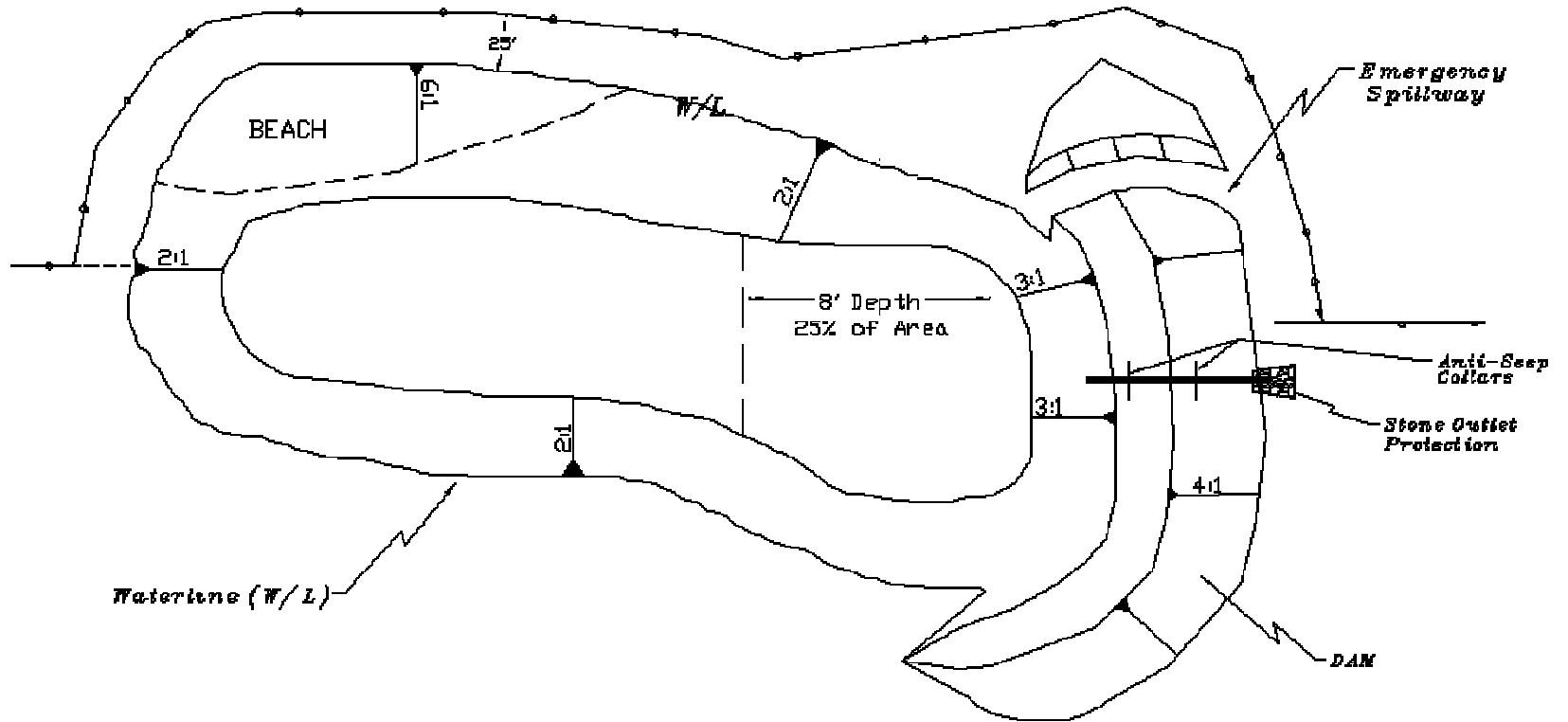
<http://ohiopedologist.com/soilConsultants.htm>

DELAWARE COUNTY TOWNSHIP ZONING OFFICERS

http://www.dcrpc.org/DOWNLOADS/zon_officers.htm

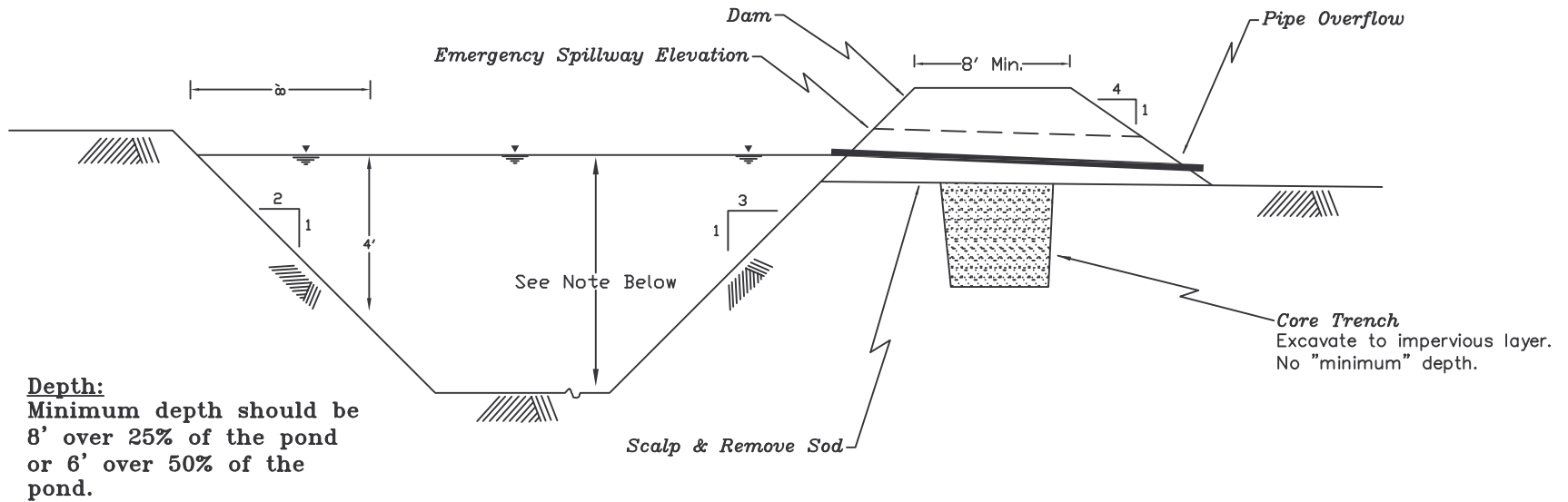
Plan View of an Excavated Pond

NOT TO SCALE



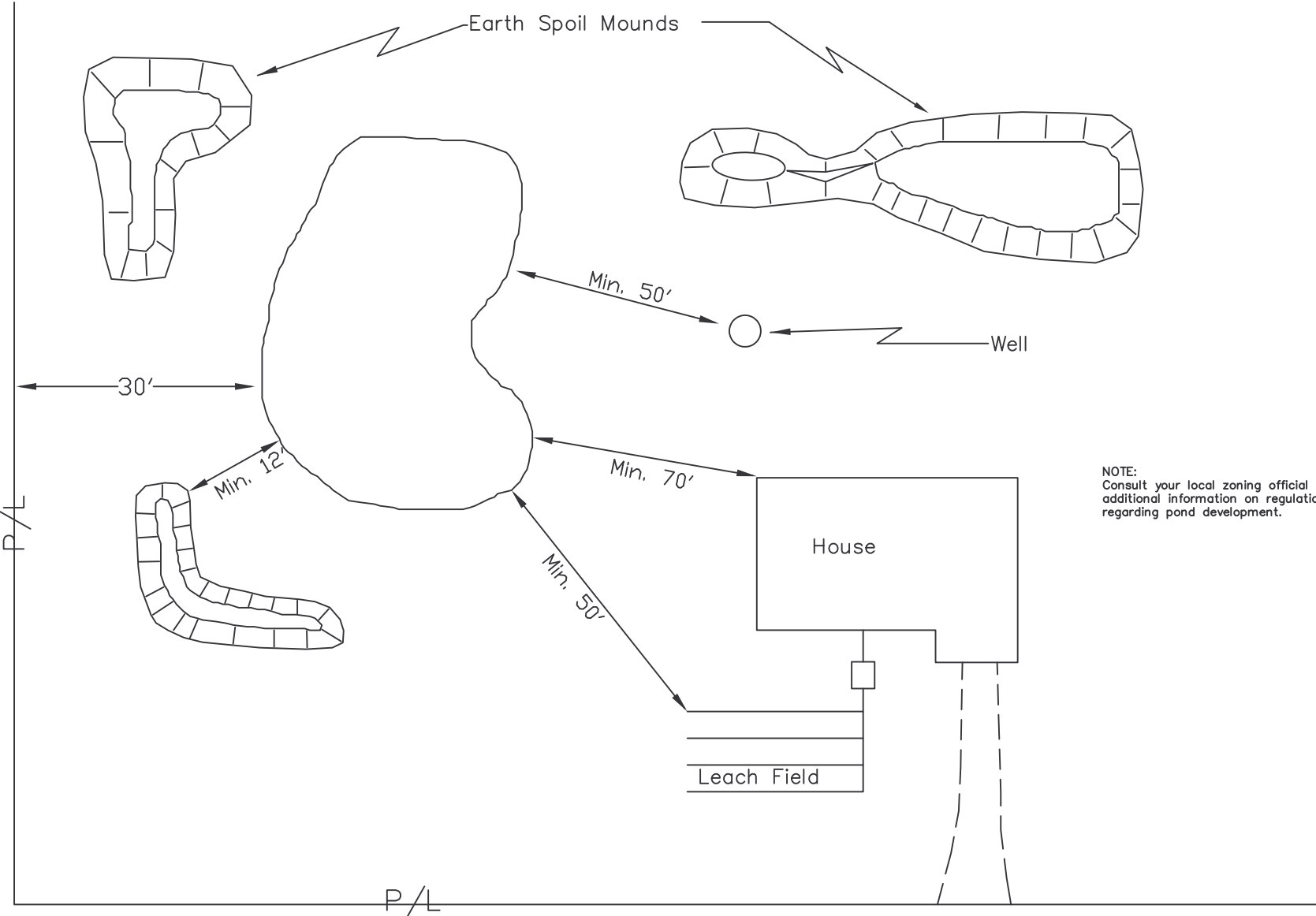
Typical Cross Section

NOT TO SCALE



TYPICAL PLAN VIEW OF A PROPERTY WITH POND

NOT TO SCALE



NOTE:
Consult your local zoning official for
additional information on regulations
regarding pond development.



FactSheet

Extension

Ohio State University Fact Sheet

Food, Agricultural and Biological Engineering

590 Woody Hayes Dr., Columbus, Ohio 43210

Fire Protection in Rural Areas: Dry Hydrants for Ponds

AEX-422-98

**Tom Lagucki
Karen Mancl**

Tragic fires can occur anywhere, anytime. Having ready access to an ample supply of water is critical in an emergency. Large cities provide pressurized hydrants for use in fighting fires. In rural areas, however, small water systems may not have enough water in reserve to fight a fire. Private wells can seldom provide the necessary flow for firefighting. Ponds, streams, and even wastewater treatment lagoons can be considered as a source of water to combat a fire.

Dry hydrants provide an easy access to fill tank trucks regardless of weather. A dry hydrant is a non-pressurized, low-cost pipe system installed along the bank of a body of water. The top of the pipe extends above the ground next to a body of water and the bottom of the pipe extends down into the water. A minimum of two feet of water must be maintained over the bottom of the pipe to assure year-round water supply.

Hydrant Materials and Construction

The materials needed for a dry hydrant include: 6-inch (or larger) schedule 40 PVC pipe, hose connection compatible with local fire equipment, two 90-degree or 45-degree elbows, and a strainer with cap. The vertical dimension is the most limiting. Water cannot be lifted by suction greater than 20 feet. The hose connection must be positioned 2 feet from the ground so it is accessible year-round, even in snow. Therefore, the vertical length of pipe should extend down to a depth below frostline but no deeper than 18 feet. Less than 10 feet is preferred. The horizontal section of the pipe extends out from the bank and into the water, secured 2 feet up off the bottom to avoid clogging with mud. The pipe should be at least 2 feet below the anticipated water surface during low water conditions to assure enough water to fight a fire. The intake must be covered with a screen to keep debris out of the pipe.

National Fire Protection Association. *Standard on Water Supplies for Suburban and Rural Fire Fighting*. NFPA Standard 1231.

Natural Resources Conservation Service. *Dry Hydrants-235*. Ohio Engineering Standard #235.

This project is supported, in part, by the Ohio Small Community Environmental Infrastructure Group.

All educational programs conducted by Ohio State University Extension are available to clientele on a nondiscriminatory basis without regard to race, color, creed, religion, sexual orientation, national origin, gender, age, disability or Vietnam-era veteran status.

Keith L. Smith, Associate Vice President for Ag. Adm. and Director, OSU Extension.

TDD No. 800-589-8292 (Ohio only) or 614-292-1868

| [Ohionline](#) | [Search](#) | [Fact Sheets](#) | [Bulletins](#) |