Fox

DAM SAFETY INSPECTION REPORT

Margaret Creek Structure No. 6
File Number: 9221-001
Class I
Athens County, Waterloo Township
Inspection Date: May 23, 2007

In accordance with Ohio Revised Code Section 1521.062, the owners of dams must monitor, maintain, and operate their dams safely. Negligence of owners in fulfilling these responsibilities can lead to the development of extremely hazardous conditions to downstream residents and properties. In the event of a dam failure, owners can be subject to liability claims.

The Chief of the Division of Water has the responsibility to ensure that human life, health, and property are protected from the failure of dams. Conducting periodic safety inspections and working with dam owners to maintain and improve the overall condition of Ohio dams are vital aspects of achieving this purpose.

Representatives of the Chief conducted this inspection to evaluate the condition of the dam and its appurtenances under authority of Ohio Revised Code Section 1521.062. In accordance with Ohio Administrative Code Rule 1501:21-21-03, the owners of dams must implement all remedial measures listed in the enclosed report.

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Section 1

Required Remedial Measures

The requirements listed below are based on observations made during inspection, calculations performed, and requirements of the Ohio Administrative Code (OAC). A checklist noting all observations made during the inspection has been enclosed in Section 3. References to right and left in this report are oriented as if you were standing on the dam crest and looking downstream.

Engineer Repairs and Investigations: The owner must retain the services of a professional engineer to address the following items. Plans, specifications, investigative reports, and other supporting documentation, as necessary, must be submitted to the Division of Water for review and approval prior to construction. These items have been noted previously and the appropriate time period for completion has already been exceeded. A record of all repairs should be included in the operation, maintenance, and inspection manual.

1. The dam's discharge/storage capacity must be sufficient to safely pass the required design flood. Perform a hydrologic and hydraulic study to determine the adequacy of the dam's discharge/storage capacity to safely pass the required design flood. Prepare plans and specifications as necessary to increase the discharge/storage capacity to pass the required design flood. In accordance with OAC Rule 1501:21-13-02, the minimum design flood for Class I dams is 100 percent of the Probable Maximum Flood or the critical flood. See the Flood Routing Summary in Section 2 of this report for additional information.

Owner Repairs: The owner must address the following items. The owner may hire a contractor or perform the work him or herself. Repair activities should be documented in the operation, maintenance, and inspection manual.

1. The lake drain must be functional. Perform routine maintenance of the lake drain. The maintenance should be performed annually and should include operation and lubrication of the sluice gate in accordance with the manufacturer's specifications. See the "Lake Drains" fact sheet included in this section for additional information. Contact the Division of Water if the lake drain becomes inoperable.

2. Remove the debris from the low-flow inlet of the principal spillway. See Discussion Item A included in this section for additional information.

3. Remove the brush from the riprap on the upstream slope, in the plunge pool, and from the right groin. Removal of the trees near the right groin is recommended. Seed all disturbed areas to establish a proper grass cover. See the "Trees and Brush" fact sheet included in this section for additional information.

4. Mow all vegetation on the embankment and in the emergency spillway at least twice per year. See the "Ground Cover" fact sheet included in this section for additional information.

Owner Dam Safety Program: In accordance with Ohio Revised Code (ORC) Section 1521.062, the owner of a dam shall maintain a safe structure and appurtenances through inspection, maintenance, and operation. A dam, like any other part of the infrastructure, will change and deteriorate over time. Appurtenances such as gates and valves must be routinely exercised to ensure their operability. Inspection

and monitoring of the dam identifies changing conditions and problems as they develop, and maintenance prevents minor problems from developing into major ones. Dams must have these procedures documented in an operation, maintenance, and inspection manual (OMI).

Despite efforts to provide sufficient structural integrity and to perform inspection and maintenance, dams can develop problems that can lead to failure. Early detection and appropriate response are crucial for maintaining the safety of the dam and downstream people and property. The ORC requires the owner to fully and promptly notify the Division of Water of any condition which threatens the safety of the structure. A rapidly changing condition may be an indication of a potentially dangerous problem. The Dam Safety Engineering Program can be contacted at 614/265-6731 during business hours or at 614/799-9538 after business hours. Dams must have emergency preparedness procedures documented in an emergency action plan (EAP).

The owner must address the following items.

1. The Emergency Action Plan must be updated to address items 2 and 3 in the Division of Water letter of April 4, 2003. A copy of the letter is included in this section. The inundation maps are sufficient for now, but will need to be updated when the hydraulics and hydrology are addressed or if more downstream development occurs (likely within 10 years). Item 4 of the letter has been addressed.

2. This dam must have an operation, maintenance, and inspection manual (OMI) in accordance with OAC Rule 1501:21-21-04. Prepare and submit an OMI manual. In general, your current procedures and checklists are acceptable. Guidelines for the preparation of an OMI manual are included with this report.

3. Monitor the condition of the spillway riser and the concrete cradle at the outlet yearly for further cracking and efflorescence. See Photograph No. 3. See the "Problems with Concrete Materials" fact sheet included in this section for guidance in monitoring the spillway system and for additional information.

4. Monitor the flow exiting the toe drains monthly for any signs of increased flow, muddy flow, or instability on or adjacent to the embankment. See the "Seepage Through Earthen Dams" fact sheet included in this section for guidance in monitoring the toe drains and for additional information.

Val A Zampedro 7/25/07

Val A. Zampedro, P.E. Date
Project Engineer
Dam Safety Engineering Program
Division of Water

July 25, 2007

Keith R. Banachowski, P.E. Date
Program Manager
On behalf of Deborah F. Hoffman, Chief
Division of Water

This inspection was performed pursuant to the authority granted to the Chief of the Division of Water in ORC Section 1521.062.

Ohio Department of Natural Resources

BOB TAFT, GOVERNOR

SAMUEL W. SPECK, DIRECTOR

James R. Morris • Chief

Division of Water

April 4, 2003

Mr. Terry Courtney,
Secretary-Treasurer
Hocking Conservancy District
560 West Union Street
Athens, OH 45701-2331

RE: Margaret Creek Structures No. 1, 4, 5 and 6
Athens County
File Numbers: 9121-008, 9220-003, 9220-002, and 9221-001

Dear Mr. Courtney:

On March 5, 2003, the Division of Water, Dam Safety Engineering Program, received emergency action plans for Margaret Creek Structures No. 1, 4, 5, and 6. We have completed our review of the submitted information and have the following comments.

1. Inundation maps showing the effect of the Design Flood and the Design Flood plus failure of the dams must be included.

2. On Page C-1 of the plans, it indicates the Margaret Creek Conservancy District maintains a list of local contractors and sources of construction repair materials. Please include this list in the emergency action plans.

3. Actions to be taken during periods of darkness, and alternate means of communication must be included.

4. On Page 8 of the plans, the area code for the ODNR, Division of Water is incorrect. It should be 614.

Please make revisions in accordance with the above comments. The emergency action plans must be resubmitted for review. If you should have any questions or would like to schedule a meeting to discuss your emergency action plans, please contact me at 614/265-6760.

Sincerely,

Val A. Zampedro

Val A. Zampedro, P.E.
Project Engineer
Dam Safety Engineering Program
Division of Water

Discussion Items

A. Spillway inlets should be kept clear of any obstructions such as leaves, twigs, logs, brush, and sediment. An obstructed inlet reduces the flow capacity of the spillway, and may also increase the normal pool elevation. Both factors can reduce the total discharge and available flood storage of the dam, thereby increasing the potential for overtopping during a severe flood event. Overtopping can cause severe erosion of earthen embankments, which can lead to failure of the dam.

Ohio Department of Natural Resources
Division of Water Fact Sheet

Fact Sheet 94-31

Dam Safety: Seepage Through Earthen Dams

Contrary to popular opinion, wet areas down stream from dams are not usually natural springs, but seepage areas. Even if natural springs exist, they should be treated with suspicion and carefully observed. Flows from ground-water springs in existence prior to the reservoir would probably increase due to the pressure caused by the pool of water behind the dam.

All dams have some seepage as the impounded water seeks paths of least resistance through the dam and its foundation. Seepage must, however, be controlled to prevent erosion of the embankment or foundation or damage to concrete structures.

Detection

Seepage can emerge anywhere on the downstream face, beyond the toe, or on the downstream abutments at elevations below normal pool. Seepage may vary in appearance from a "soft," wet area to a flowing "spring." It may show up first as an area where the vegetation is lush and darker green. Cattails, reeds, mosses, and other marsh vegetation often become established in a seepage area. Another indication of seepage is the presence of rust-colored iron bacteria. Due to their nature, the bacteria are found more often where water is discharging from the ground than in surface water. Seepage can make inspection and maintenance difficult. It can also saturate and weaken portions of the embankment and foundation, making the embankment susceptible to earth slides.

If the seepage forces are large enough, soil will be eroded from the foundation and be deposited in the shape of a cone around the outlet. If these "boils" appear, professional advice should be sought immediately. Seepage flow which is muddy and carrying sediment (soil particles) is evidence of "piping," and will cause failure of the dam. Piping can occur along a spillway and other conduits through the embankment, and these areas should be closely inspected. Sinkholes may develop on the surface of the embankment as internal erosion takes place. A whirlpool in the lake surface may follow and then likely a rapid and complete failure of the dam. Emergency procedures, including downstream evacuation, should be implemented if this condition is noted.

Seepage can also develop behind or beneath concrete structures such as chute spillways or headwalls. If the concrete structure does not have a means such as weep holes or relief drains to relieve the water pressure, the concrete structure may heave, rotate, or crack. The effects of the freezing and thawing can amplify these problems. It should be noted that the water pressure behind or beneath structures may also be due to infiltration of surface water or spillway discharge.

A continuous or sudden drop in the normal lake level is another indication that seepage is occurring. In this case, one or more locations of flowing water are usually noted downstream from the dam. This condition, in itself, may not be a serious problem, but will require frequent and close monitoring and professional assistance.

Control

The need for seepage control will depend on the quantity, content, and location of the seepage. Reducing the quantity of seepage that occurs after construction is difficult and expensive. It is not usually attempted unless the seepage has lowered the pool level or is endangering the embankment or appurtenant structures. Typical methods used to control the quantity of seepage are grouting or installation of an upstream blanket. Of these methods, grouting is probably the least effective and is most applicable to leakage zones in bedrock, abutments, and foundations. These methods must be designed and constructed under the supervision of a professional engineer experienced with dams.

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Controlling the content of the seepage or preventing seepage flow from removing soil particles is extremely important. Modern design practice incorporates this control into the embankment through the use of cut-offs, internal filters, and adequate drainage provisions. Control at points of seepage exit can be accomplished after construction by installation of toe drains, relief wells, or inverted filters.

Weep holes and relief drains can be installed to relieve water pressure or drain seepage from behind or beneath concrete structures. These systems must be designed to prevent migration of soil particles but still allow the seepage to drain freely. The owner must retain a professional engineer to design toe drains, relief wells, inverted filters, weep holes, or relief holes.

Monitoring

Regular monitoring is essential to detect seepage and prevent dam failure. Knowledge of the dam's history is important to determine whether the seepage condition is in a steady or changing state. It is important to keep written records of points of seepage exit, quantity and content of flow, size of wet area, and type of vegetation for later comparison. Photographs provide invaluable records of seepage.

All records should be kept in the operation, maintenance, and inspection manual for the dam. The inspector should always look for increases in flow and evidence of flow carrying soil particles, which would indicate that a more serious problem is developing. Instrumentation can also be used to monitor seepage. V-notch weirs can be used to measure flow rates, and piezometers may be used to determine the saturation level (phreatic surface) within the embankment.

Regular surveillance and maintenance of internal embankment and foundation drainage outlets is also required. The rate and content of flow from each pipe outlet for toe drains, relief wells, weep holes, and relief drains should be monitored and documented regularly. Normal maintenance consists of removing all obstructions from the pipe to allow for free drainage of water from the pipe. Typical obstructions include debris, gravel, sediment, and rodent nests. Water should not be permitted to submerge the pipe outlets for extended periods of time. This will inhibit inspection and maintenance of the drains and may cause them to clog.

Any other questions, comments concerns, or fact sheet requests, should be directed to the Division of Water at the following address:

Ohio Department of Natural Resources
Division of Water
Dam Safety Engineering Program
2045 Morse Road
Columbus, Ohio 43229-6605
Voice: (614) 265-6731 Fax: (614) 447-9503
Website: http://www.dnr.state.oh.us/water

Ohio Department of Natural Resources
Division of Water Fact Sheet

Fact Sheet 99–56

Dam Safety: Problems with Concrete Materials

Visual inspection of concrete will allow for the detection of distressed or deteriorated areas. Problems with concrete include construction errors, disintegration, scaling, cracking, efflorescence, erosion, spalling, and popouts.

Construction Errors

Errors made during construction such as adding improper amounts of water to the concrete mix, inadequate consolidation, and improper curing can cause distress and deterioration of the concrete. Proper mix design, placement, and curing of the concrete, as well as an experienced contractor are essential to prevent construction errors from occurring. Construction errors can lead to some of the problems discussed later in this fact sheet such as scaling and cracking. Honeycombing and bugholes can be observed after construction.

Honeycombing can be recognized by exposed coarse aggregate on the surface without any mortar covering or surrounding the aggregate particles. The honeycombing may extend deep into the concrete. Honeycombing can be caused by a poorly graded concrete mix, by too large of a coarse aggregate, or by insufficient vibration at the time of placement. Honeycombing will result in further deterioration of the concrete due to freeze-thaw because moisture can easily work its way into the honeycombed areas. Severe honeycombing should be repaired to prevent further deterioration of the concrete surface.

Bugholes is a term used to describe small holes (less than about 0.25 inch in diameter) that are noticeable on the surface of the concrete. Bugholes are generally caused by too much sand in the mix, a mix that is too lean, or excessive amplitude of vibration during placement. Bugholes may cause durability problems with the concrete and should be monitored.

Disintegration and Scaling

Disintegration can be described as the deterioration of the concrete into small fragments and individual aggregates. Scaling is a milder form of disintegration where the surface mortar flakes off. Large areas of crumbling (rotten) concrete, areas of deterioration which are more than about 3 to 4 inches deep (depending on the wall/slab thickness), and exposed rebar indicate serious concrete deterioration. If not repaired, this type of concrete deterioration may lead to structural instability of the concrete structure. A registered professional engineer must prepare plans and specifications for repair of serious concrete deterioration. For additional information, see the "Concrete Repair Techniques" fact sheet.

Disintegration can be a result of many causes such as freezing and thawing, chemical attack, and poor construction practices. All exposed concrete is subject to freeze-thaw, but the concrete's resistance to weathering is determined by the concrete mix and the age of the concrete. Concrete with the proper amounts of air, water, and cement, and a properly sized aggregate, will be much more durable. In addition, proper drainage is essential in preventing freeze-thaw damage. When critically saturated concrete (when 90% of the pore space in the concrete is filled with water) is exposed to freezing temperatures, the water in the pore spaces within the concrete freezes and expands, damaging the concrete. Repeated cycles of freezing and thawing will result in surface scaling and can lead to disintegration of the concrete. Hydraulic structures are especially susceptible to freeze-thaw damage since they are more likely to be critically saturated. Older structures are also more susceptible to freeze-thaw damage since the concrete was not air entrained. In addition, acidic substances in the surrounding soil and water can cause disintegration of the concrete surface due to a reaction between the acid and the hydrated cement.

Cracks

Cracks in the concrete may be structural or surface cracks. Surface cracks are generally less than a few millimeters wide and deep. These are often called hairline cracks and may consist of single, thin cracks, or cracks in a craze/map-like pattern. A small number of surface or shrinkage cracks is common and does not usually cause any problems. Surface cracks can be caused by freezing and thawing, poor construction practices, and alkali-aggregate reactivity. Alkali-aggregate reactivity occurs when the aggregate reacts with the cement causing crazing or map cracks. The placement of

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new concrete over old may cause surface cracks to develop. This occurs because the new concrete will shrink as it cures. Surface cracks in the spillway should be monitored and will need to be repaired if they deteriorate further.

Structural cracks in the concrete are usually larger than 0.25 inch in width. They extend deeper into the concrete and may extend all the way through a wall, slab, or other structural member. Structural cracks are often caused by settlement of the fill material supporting the concrete structure, or by loss of the fill support due to erosion. The structural cracks may worsen in severity due to the forces of weathering. A registered professional engineer knowledgeable about dam safety must investigate the cause of structural cracks and prepare plans and specifications for repair of any structural cracks. For additional information, see the "Concrete Repair Techniques" fact sheet.

Efflorescence

A white, crystallized substance, known as efflorescence, may sometimes be noted on concrete surfaces, especially spillway sidewalls. It is usually noted near hairline or thin cracks. Efflorescence is formed by water seeping through the pores or thin cracks in the concrete. When the water evaporates, it leaves behind some minerals that have been leached from the soil, fill, or concrete. Efflorescence is typically not a structural problem. Efflorescence should be monitored because it can indicate the amount of seepage finding its way through thin cracks in the concrete and can signal areas where problems (i.e. inadequate drainage behind the wall or deterioration of concrete) could develop. Also, water seeping through thin cracks in the wall will make the concrete more susceptible to deterioration due to freezing and thawing of the water.

Erosion

Erosion due to abrasion results in a worn concrete surface. It is caused by the rubbing and grinding of aggregate or other debris on the concrete surface of a spillway channel or stilling basin. Minor erosion is not a problem but severe erosion can jeopardize the structural integrity of the concrete. A registered professional engineer must prepare plans and specifications for repair of this type of erosion if it is severe.

Erosion due to cavitation results in a rough, pitted concrete surface. Cavitation is a process in which subatmospheric pressures, turbulent flow and impact energy are created and will damage the concrete. If the shape of the upper curve on the ogee spillway is not designed close to its ideal shape, cavitation may occur just below the upper curve, causing erosion. A registered professional engineer must prepare plans and specifications for repair of this type of erosion if the concrete becomes severely pitted which could lead to structural damage or failure of the structure.

Spalling and Popouts

Spalling is the loss of larger pieces or flakes of concrete. It is typically caused by sudden impact of something dropped on the concrete or stress in the concrete that exceeded the design. Spalling may occur on a smaller scale, creating popouts. Popouts are formed as the water in saturated coarse aggregate particles near the surface freezes, expands, and pushes off the top of the aggregate and surrounding mortar to create a shallow conical depression. Popouts are typically not a structural problem. However, if a spall is large and causes structural damage, a registered professional engineer must prepare plans and specifications to repair the spalling.

Inspection and Monitoring

Regular inspection and monitoring is essential to detect problems with concrete materials. Concrete structures should be inspected a minimum of once per year. The inspector should also look at the interior condition of concrete spillway conduit. Proper ventilation and confined space precautions must be considered when entering a conduit. It is important to keep written records of the dimensions and extent of scaling, disintegration, efflorescence, honeycombing, erosion, spalling, popouts, and the length and width of cracks. Structural cracks should be monitored more frequently and repaired if they are a threat to the stability of the structure or dam. Photographs provide invaluable records of changing conditions. A rapidly changing condition may indicate a very serious problem, and the Dam Safety Engineering Program should be contacted immediately. All records should be kept in the operation, maintenance, and inspection manual for the dam.

Any other questions, comments concerns, or fact sheet requests, should be directed to the Division of Water at the following address:

Ohio Department of Natural Resources
Division of Water
Dam Safety Engineering Program
1939 Fountain Square, Building E-3
Columbus, Ohio 43224-1336
(614) 265-6731 (Voice) (614) 447-9503 (Fax)
http://www.dnr.state.oh.us/odnr/water/

Ohio Department of Natural Resources
Division of Water Fact Sheet

Fact Sheet 99–54

Dam Safety: Ground Cover

The establishment and control of proper vegetation are an important part of dam maintenance. Properly maintained vegetation can help prevent erosion of embankment and earth channel surfaces, and aid in the control of groundhogs and muskrats. The uncontrolled growth of vegetation can damage embankments and concrete structures and make close inspection difficult.

Grass vegetation is an effective and inexpensive way to prevent erosion of embankment surfaces. If properly maintained, it also enhances the appearance of the dam and provides a surface that can be easily inspected. Roots and stems tend to trap fine sand and soil particles, forming an erosion-resistant layer once the plants are well established. Grass vegetation may not be effective in areas of concentrated runoff, such as at the contact of the embankment and abutments, or in areas subjected to wave action.

Common Problems

Bare Areas

Bare areas on an embankment are void of protective cover (e.g. grass, asphalt, riprap etc.). They are more susceptible to erosion which can lead to localized stability problems such as small slides and sloughs. Bare areas must be repaired by establishing a proper grass cover or by installing other protective cover. If using grass, the topsoil must be prepared with fertilizer and then scarified before sowing seed. Types of grass vegetation that have been used on dams in Ohio are bluegrass, fescue, ryegrass, alfalfa, clover, and redtop. One suggested seed mixture is 30% Kentucky Bluegrass, 60% Kentucky 31 Fescue, and 10% Perennial Ryegrass. Once the seed is sown, the area should be mulched and watered regularly.

Erosion

Embankment slopes are normally designed and constructed so that the surface drainage will be spread out in a thin layer as "sheet flow" over the grass cover. When the sod is in poor condition or flow is concentrated at one or more locations, the resulting erosion will leave rills and gullies in the embankment slope. The erosion will cause loss of material and make maintenance of the embankment difficult. Prompt repair of the erosion is required to prevent more serious damage to the embankment. If erosion gullies are extensive, a registered professional engineer may be required to design a more rigid repair such as riprap or concrete. Minor rills and gullies can be repaired by filling them with compacted cohesive material. Topsoil should be a minimum of 4 inches deep. The area should then be seeded and mulched. Not only should the eroded areas be repaired, but the cause of the erosion should be addressed to prevent a continued maintenance problem.

Footpaths

Paths from animal and pedestrian traffic are problems common to many embankments. If a path has become established, vegetation in this area will not provide adequate protection and a more durable cover will be required unless the traffic is eliminated. Gravel, asphalt, and concrete have been used effectively to cover footpaths. Embedding railroad ties or other treated wood beams into an embankment slope to form steps is one of the most successful and inexpensive methods used to provide a protected pathway.

Vehicle Ruts

Vehicle ruts can also be a problem on the embankment. Vehicular traffic on the dam should be discouraged especially during wet conditions except when necessary. Water collected in ruts may cause localized saturation, thereby weakening the embankment. Vehicles can also severely damage the vegetation on embankments. Worn areas could lead to erosion and more serious problems. Ruts that develop in the crest should be repaired by grading to direct all surface drainage into the impoundment. Bare and eroded areas should be repaired using the methods mentioned in the above sections. Constructed barriers such as fences and gates are effective ways to limit access of vehicles.

Improper Vegetation

Crown vetch, a perennial plant with small pink flowers, has been used on some dams in Ohio but is not recommended (see Figure 1). It hides the embankment surface, preventing early detection of cracks and erosion. It is not effective in preventing erosion.

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Figure 1: Crown Vetch
(Source: http://www.vg.com)

Vines and woody vegetation such as trees and brush also hide the embankment surface preventing early detection of cracks and erosion. Tall vegetation also provides a habitat for burrowing animals. All improper vegetation must be removed from the entire embankment surface. Any residual roots that are larger than 3 inches in diameter must be removed. All roots should be removed down to a depth of at least 6 inches and replaced with a compacted clay material; then 4 inches of topsoil should be placed on the disturbed areas of the slope. Finally, these areas must be seeded and mulched to establish a proper grass cover.

Maintenance

Embankments, areas adjacent to spillway structures, vegetated channels, and other areas associated with a dam require continual maintenance of the vegetal cover. Removal of improper vegetation is necessary for the proper maintenance of a dam, dike or levee. All embankment slopes and vegetated earth spillways should be mowed at least twice a year. Reasons for proper maintenance of the vegetal cover include unobstructed viewing during inspection, maintenance of a non-erodible surface, discouragement of burrowing animal habitation, and aesthetics.

Common methods for control of vegetation include the use of weed trimmers or power brush-cutters and mowers. Chemical spraying to kill small trees and brush is acceptable if precautions are taken to protect the local environment. Some chemical spraying may require proper training prior to application. Additional information can be found on the Trees and Brush Fact Sheet.

Any other questions, comments concerns, or fact sheet requests, should be directed to the Division of Water at the following address:

Ohio Department of Natural Resources
Division of Water
Dam Safety Engineering Program
2045 Morse Road
Columbus, Ohio 43229-6693
Voice: (614) 265-6731 Fax: (614) 447-9503
Website: http://www.dnr.state.oh.us/water

Ohio Department of Natural Resources
Division of Water Fact Sheet

Fact Sheet 94–28

Dam Safety: Trees and Brush

The establishment and control of proper vegetation is an important part of dam maintenance. Properly maintained vegetation can help prevent erosion of embankment and earth channel surfaces, and aid in the control of groundhogs and muskrats. The uncontrolled growth of vegetation can damage embankments and concrete structures and make close inspection difficult.

Trees and Brush

Trees and brush should not be permitted on embankment surfaces or in vegetated earth spillways. Extensive root systems can provide seepage paths for water. Trees that blow down or fall over can leave large holes in the embankment surface that will weaken the embankment and can lead to increased erosion. Brush obscures the surface limiting visual inspection, provides a haven for burrowing animals, and retards growth of grass vegetation. Tree and brush growth adjacent to concrete walls and structures may eventually cause damage to the concrete and should be removed.

Stump Removal & Sprout Prevention

Stumps of cut trees should be removed so vegetation can be established and the surface mowed. Stumps can be removed either by pulling or with machines that grind them down. All woody material should be removed to about 6 inches below the ground surface. The cavity should be filled with well-compacted soil and grass vegetation established.

Stumps of trees in riprap cannot usually be pulled or ground down, but can be chemically treated so they will not continually form new sprouts. Certain herbicides are effective for this purpose and can even be used at water supply reservoirs if applied by licensed personnel. For product information and information on how to obtain a license, contact the Ohio Department of Agriculture at the following address:

Ohio Department of Agriculture
Pesticide Regulation
8995 E. Main Street
Reynoldsburg, Ohio 43068
Telephone Number (614) 728-6987

These products should be painted, not sprayed, on the stumps. Other instructions found on the label should be strictly followed when handling and applying these materials. Only a few commercially available chemicals can be used along shorelines or near water.

Embankment Maintenance

Embankments, areas adjacent to spillway structures, vegetated channels, and other areas associated with a dam require continual maintenance of the vegetal cover. Grass mowing, brush cutting, and removal of woody vegetation (including trees) are necessary for the proper maintenance of a dam, dike, or levee. All embankment slopes and vegetated earth spillways should be mowed at least twice per year. Aesthetics, unobstructed viewing during inspections, maintenance of a non-erodible surface, and discouragement of groundhog habitation are reasons for proper maintenance of the vegetal cover.

Methods used in the past for control of vegetation, but are now considered unacceptable, include chemical spraying, and burning. More acceptable methods include the use of weed whips or power brush-cutters and mowers. Chemical spraying to first kill small trees and brush is acceptable if precautions are taken to protect the local environment.

It is important to remember not to mow when the embankment is wet. It is also important to use proper equipment for the slope and type of vegetation to be cut. Also, always follow the manufacturer's recommended safe operation procedures.

Any other questions, comments, concerns, or fact sheet requests, should be directed to the Division of Water at the following address:

Ohio Department of Natural Resources
Division of Water
Dam Safety Engineering Program
2045 Morse Road
Columbus, Ohio 43229-6693
Voice: (614) 265-6731 Fax: (614) 447-9503
Website: http://www.dnr.state.oh.us/water

Ohio Department of Natural Resources
Division of Water Fact Sheet

Fact Sheet 93-26

Dam Safety: Lake Drains

A lake drain is a device to permit draining a reservoir, lake or pond. Division of Water Administrative Rule 1501:21-13-06 requires that all Class I, Class II and Class III dams include a lake drain.

Types of Drains

Common types of drains include the following:

- A valve located in the spillway riser.
- A conduit through the dam with a valve at either the upstream or downstream end of the conduit.
- A siphon system (Often used to retrofit existing dams).
- A gate, valve or stoplogs located in a drain control tower.

Uses of Drains

The following situations make up the primary uses of lake drains:

Emergencies: Should serious problems ever occur to threaten the immediate safety of the dam, drains may be used to lower the lake level to reduce the likelihood of dam failure. Examples of such emergencies are as follows: clogging of the spillway pipe which may lead to high lake levels and eventually dam overtopping, development of slides or cracks in the dam, severe seepage through the dam which may lead to a piping failure of the dam, and partial or total collapse of the spillway system.

Maintenance: Some repair items around the lake and dam can only be completed or are much easier to perform with a lower than normal lake level. Some examples are: slope protection repair, spillway repairs, repair and/or installation of docks and other structures along the shoreline, and dredging the lake.

Winter Drawdown: Some dam owners prefer to lower the lake level during the winter months to reduce ice damage to structures along the shoreline and to provide additional flood storage for upcoming spring rains. Several repair items are often performed during this winter drawdown period. Periodic fluctuations in the lake level also discourage muskrat and beaver habitation along the shoreline. Muskrat burrows in earthen dams can lead to costly repairs.

Common Maintenance Problems

Common problems often associated with the maintenance and operation of lake drains include the following:

- Deteriorated and bent control stems and stem guides.
- Deteriorated and separated conduit joints.
- Leaky and rusted control valves and sluice gates.
- Deteriorated ladders in control towers.
- Deteriorated control towers.
- Clogging of the drain conduit inlet with sediment and debris.
- Inaccessibility of the control mechanism to operate the drain.
- Seepage along the drain conduit.
- Erosion and undermining of the conduit discharge area because the conduit outlets significantly above the elevation of the streambed.
- Vandalism.
- Development of slides along the upstream slope of the dam and the shoreline caused by lowering the lake level too quickly.

Operation and Maintenance Tips

A. All gates, valves, stems and other mechanisms should be lubricated according to the manufacturer's specifications. If you do not have a copy of the specifications and the manufacturing company can not be determined, then a local valve distributor may be able to provide assistance.

B. The lake drain should be operated at least twice a year to prevent the inlet from clogging with sediment and debris, and to keep all movable parts working easily. Most manufacturers recommend that gates and valves be operated at least four times per year. Frequent operation will help to ensure that the drain will be operable when it is needed. All valves and gates should be fully opened and closed at least twice to help flush out debris and to obtain a proper seal. If the gate gets stuck in a partially opened position, gradually work the

Continued on back!

gate in each direction until it becomes fully operational. Do not apply excessive torque as this could bend or break the control stem, or damage the valve or gate seat. With the drain fully open, inspect the outlet area for flow amounts, leaks, erosion and anything unusual.

C. All visible portions of the lake drain system should be inspected at least annually, preferably during the periodic operation of the drain. Look for and make note of any cracks, rusted and deteriorated parts, leaks, bent control stems, separated conduit joints or unusual observations.

D. A properly designed lake drain should include a headwall near the outlet of the drain conduit to prevent undermining of the conduit during periods of flow. A headwall can be easily retro-fitted to an existing conduit if undermining is a problem at an existing dam. A properly designed layer of rock riprap or other slope protection will help reduce erosion in the lake drain outlet area.

E. Drain control valves and gates should always be placed upstream of the centerline of the dam. This allows the drain conduit to remain depressurized except during use, therefore reducing the likelihood of seepage through the conduit joints and saturation of the surrounding earth fill.

F. For accessibility ease, the drain control platform should be located on shore or be provided with a bridge or other structure. This becomes very important during emergency situations if high pool levels exist.

G. Vandalism can be a problem at any dam. If a lake drain is operated by a crank, wheel or other similar mechanism, locking with a chain or other device, or off-site storage may be beneficial. Fences or other such installations may also help to ward off vandals.

H. The recommended rate of lake drawdown is one foot or less per week, except in emergencies. Fast drawdown causes a build-up of hydrostatic pressures in the upstream slope of the dam which can lead to slope failure. Lowering the water level slowly allows these pressures to dissipate.

Monitoring

Monitoring of the lake drain system is necessary to detect problems and should be performed at least twice a year or more frequently if problems develop. Proper ventilation and confined space precautions must be considered when entering a lake drain vault or outlet pipe. Items to be considered when monitoring a lake drain system include the stem, valve, outlet pipe and related appurtenances. Monitoring for surface deterioration (rust), ease of operation, and leakage is important to maintain a working lake drain system. If the stem or valve appears to be inoperable because of deterioration or if the operability of the lake drain system is in question, because the valve does not completely close (seal) and allows an excessive amount of leakage, then a registered professional engineer or manufacturer's representative should be contacted. Photographs along with written records of the monitoring items performed provide invaluable information. For further information on evaluating the condition of the lake drain system see the "Spillway Conduit System Problems", "Problems with Metal Materials", "Problems with Plastic (Polymer) Materials", and "Problems with Concrete Materials" fact sheets.

Conclusion

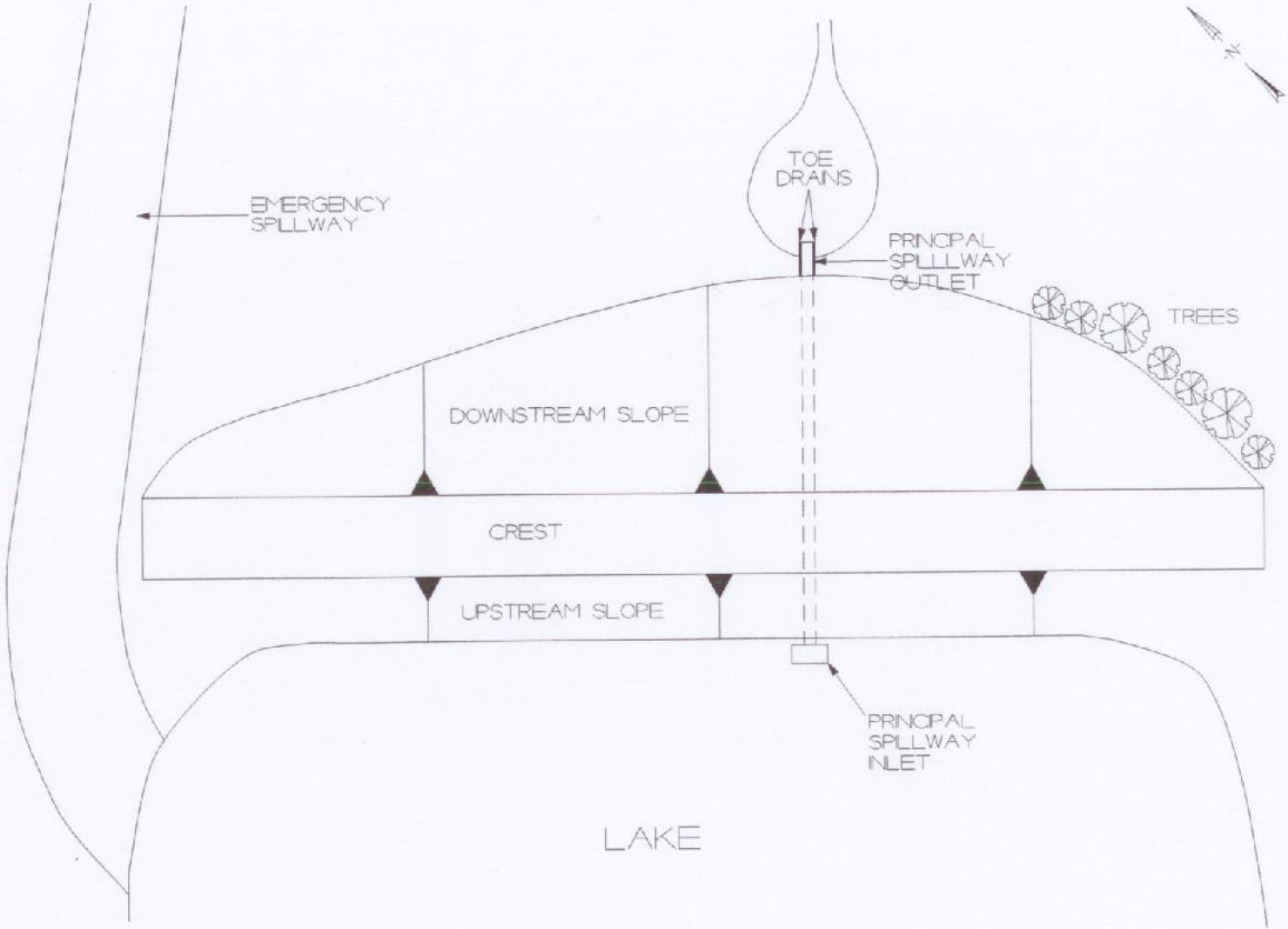
An operable lake drain accomplishes the following:

1. Makes for a safer dam by providing a method to lower the lake level in an emergency situation.
2. Allows the dam owner to have greater control of the lake level for maintenance, winter drawdown and emergency situations.
3. Meets the requirements of the Ohio Dam Safety Laws.

Any other questions, comments concerns, or fact sheet requests, should be directed to the Division of Water at the following address:

Ohio Department of Natural Resources
Division of Water
Dam Safety Engineering Program
1939 Fountain Square, Building E-3
Columbus, Ohio 43224-1336
(614) 265-6731 (Voice) (614) 447-9503 (Fax)
http://www.dnr.state.oh.us/water

Section 2

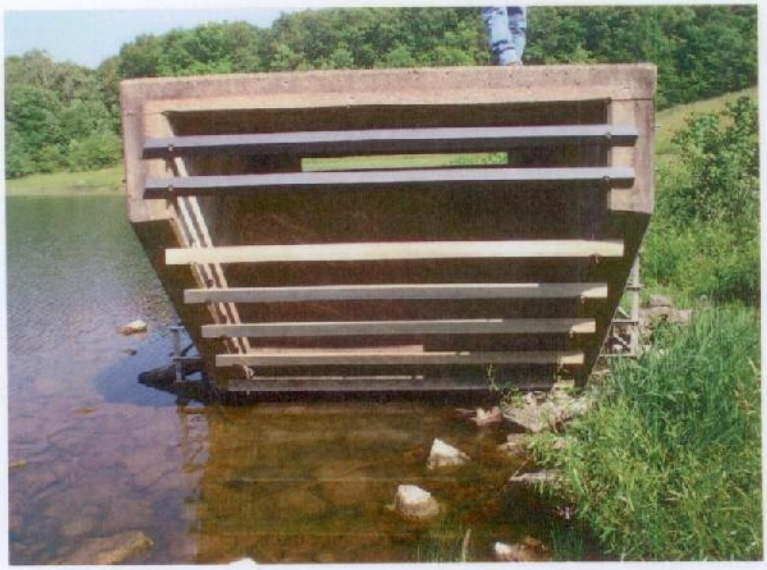


DAM SAFETY ENGINEERING PROGRAM	STATE OF OHIO DEPARTMENT OF NATURAL RESOURCES DIVISION OF WATER	MARGARET CREEK STRUCTURE NO. 6	DESIGNED BY: DRAWN BY: VAZ CHECKED BY: APPROVED BY:	FILE NO: 922H-001 SCALE: NONE DATE: 6/12/07 REVISED:	DATE OF INSPECTION: MAY 23, 2007

Photograph No. 1: The upstream slope and crest of the dam viewed from the right abutment.

Photograph No. 2: The downstream slope of the dam viewed from the left abutment.

Photograph No. 3: The principal spillway riser. Note the cracking and efflorescence.



Photograph No. 4: The principal spillway riser.

Photograph No. 5: The interior of the principal spillway riser. Note the debris at the low-flow inlet.

Photograph No. 6: The outlets of the principal spillway pipe and the toe drains. Note the cracks and efflorescence on the concrete cradle.

Photograph No. 4: The principal spillway riser.

Photograph No. 5: The interior of the principal spillway riser. Note the debris at the low-flow inlet.

Photograph No. 6: The outlets of the principal spillway pipe and the toe drains.

Photograph No. 7: The support for the principal spillway outlet pipe.

Photograph No. 8: The inlet of the emergency spillway channel.

Photograph No. 9: The emergency spillway channel looking downstream.

Dam Classification Checklist

Name of Dam:	Margaret Creek Structure No. 6			File Number:	9221-001
County:	Athens	Date:	May 23, 2007	Engineer:	VAZ

The classification of a dam is based on three factors: the dam's height, storage capacity, and potential downstream hazard. The height of the dam is the vertical distance from the crest to the downstream toe. The storage capacity is the volume of water that the dam can impound at the top of dam (crest) elevation. The downstream hazard consists of roads, buildings, homes, and other structures that would be damaged in the event of a dam failure. Potential for loss of life is also evaluated. Various dam failure scenarios must be considered, and they include failures when the dam is at normal pool level and failures during significant flood events. Each of the three factors is evaluated, and the final classification of the dam is based on the highest individual factor. Class I is the highest and Class IV is the lowest. The classification of a dam can change based on future development along the downstream channel.

This checklist is intended to establish or verify the appropriate classification in accordance with the Ohio Administrative Code – it does not necessarily show all potential hazards or the full extent of inundation. In addition, elevations are estimated.

HEIGHT CLASSIFICATION

Dam Height = 41.5 feet

	> 60' - Class I
X	> 40' - Class II
	> 25' - Class III
	≤ 25' - Class IV

STORAGE CLASSIFICATION

Stor. Capacity (top of dam)= 2068 acre-feet

	> 5000 acre-feet - Class I
X	> 500 acre-feet - Class II
	> 50 acre-feet - Class III
	≤ 50 acre-feet - Class IV

EXEMPT~NON-REGULATED

	Height ≤ 6 feet
	Storage ≤ 15 acre-feet
	6 ft. < Height < 10 ft. & Stor. ≤ 50 ac-ft

Height Class: II

Storage Class: II

Hazard Class (see next page): I

Estimated Population at Risk: (none 1-5 6-15 16+)

Final Class: I

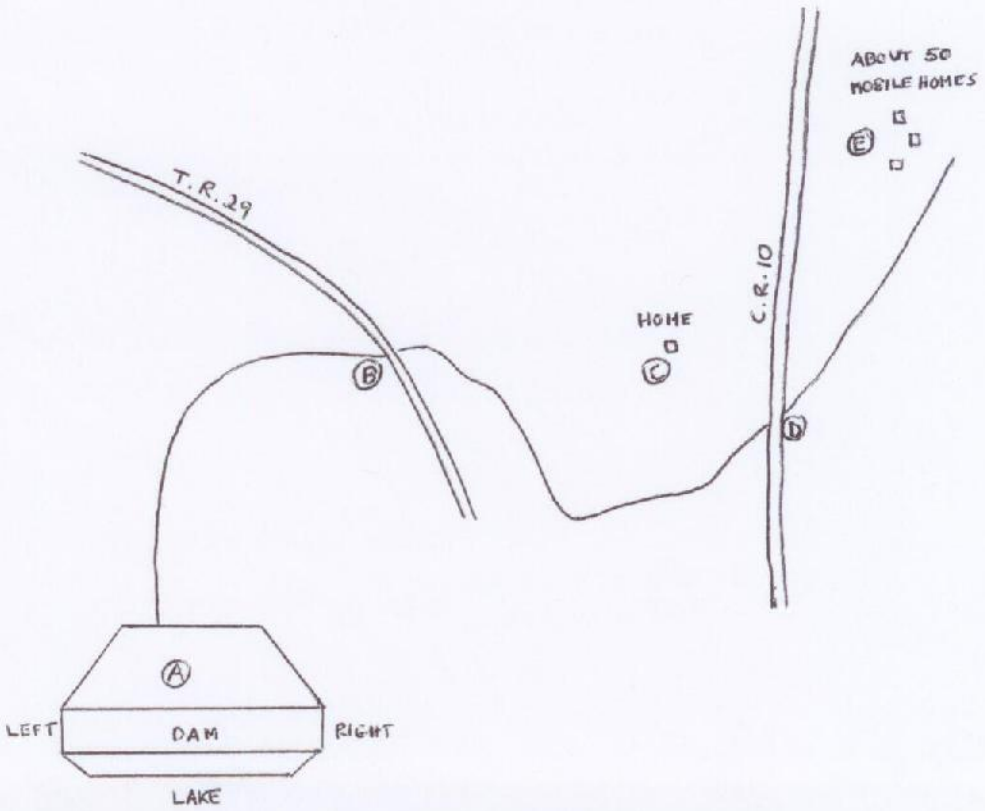
Class Changed (Yes, No)

POTENTIAL DOWNSTREAM HAZARD

I	II					III		IV	-	-			
Probable loss of human life	Loss of public water supply or wastewater treatment facility, release of health hazardous waste	Flooding of structure or high-value property	Damage to high-value or Class I, II, III dam or levee	Damage to major road (US or state route), disruption of only access to residential or critical facility area	Damage to railroad or public utility	Damage to rural building, not otherwise high-valued property, or Class IV dam or levee	Damage to local road (county and township)	Loss restricted mainly to the dam or agricultural /rural land	No hazard to structure noted	*No hazard assessment; further investigation needed*	Distance downstream of dam to affected structure (feet)	Vertical distance from streambed to base of affected structure (feet)	Horizontal distance from stream to affected structure (feet)
							A				–	–	–
							B				1000	5	0
C											5000	7	250
							D				6000	5	0
E											8400	6-10	50-500

This checklist is intended to establish or verify the appropriate classification in accordance with the OAC – it does not necessarily show all potential hazards or the full extent of inundation.

Sketch of Developments Downstream of Dam



Flood Routing Summary

A dam must be able to safely pass severe flood events. A dam uses a combination of reservoir storage capacity and spillway discharge to prevent floodwater from overtopping the embankment crest. As part of this inspection, the Division of Water did not thoroughly investigate the ability of this dam to safely pass the required design flood. In 2001 the Division of Water performed hydrologic and hydraulic calculations to estimate the size of the design flood and the total spillway discharge capacity of the dam. These calculations combined with the reservoir storage capacity were used in the flood routings to determine the maximum water surface elevation in the reservoir for various flood events (see Table I).

Margaret Creek Structure No. 6 is a Class I dam; therefore, in accordance with OAC Rule 1501:21-13-02, the required design flood is 100% of the Probable Maximum Flood (PMF) or the critical flood. This dam and its spillway system must safely pass the design flood without overtopping the embankment crest. Flood routing calculations indicate that the dam can pass 40% of the PMF; Margaret Creek Structure No. 6 does not appear to be able to safely pass the design flood.

Table I - Flood Routing Summary

Flood Event	Maximum Inflow (cubic feet per second)	Maximum WSEL* (feet)	Overtopping Depth** (feet)	Overtopping Duration (hours)
PMF	26826	720.1	8.1	5.3
75% PMF	20119	716.4	4.4	3.6
50% PMF	13413	712.7	0.7	1.9
25% PMF	6706	707.3	-4.7	0
12% PMF***	3219	704	-8	0

* WSEL – water surface elevation, in feet above the mean sea level

** A negative number indicates that the dam does not overtop and represents the elevation difference between the Maximum WSEL and the Top of Dam Elevation (freeboard)

*** 12% PMF is similar to the 100-year flood. The 100-year flood event has a 1% chance of occurring in any given year. This is only an approximation.

Top of Dam Elevation: 712.00 feet above msl
Emergency Spillway Elevation: 704.00 feet above msl
Normal Pool Elevation: 694.00 feet above msl

History of Margaret Creek Structure No. 6

Date	Event
1967	Dam constructed.
1974	Dam safety inspection by the Division of Water.
1983	Dam safety inspection by the Division of Water.
1992	Dam safety inspection by the Division of Water.
2001	Dam safety inspection by the Division of Water.
May 23, 2007	Dam safety inspection by the Division of Water.

Section 3

LOCATION MAP

MARGARET CREEK STRUCTURE NO. 6 - 9221-001

Mar 02, 2007

Dam Inventory Sheet

Name: MARGARET CREEK STRUCTURE NO. 6
File No: 9221-001
National #: OH00706
Permit No.: EXEMPT
Class: I

Reservoir: FOX LAKE

Owner Information

Owner: Hocking Conservancy District
Owner Type: Public, C.d.
Address: 560 West Union Street
Parcel No.:

City: Athens **State:** OH **Zip:** 45701-2331
Contact: Terry Courtney, Exec. Sec-Treas **Phone No.:** 740/592-1792

Location Information

County: Athens
Latitude Deg.: 39 **Min.:** 18 **Sec.:** 0
Township: Waterloo
Longitude Deg.: 82 **Min.:** 11 **Sec.:** 32
Stream West Branch Margaret Creek
Nearest Affected Community: Athens
Community's Distance from Dam (miles): 5.6
USGS Quad.: The Plains
USGS Basin No.: 05030204

Design/Construction Information

Designed By: Usda, Scs
Constructed By: Unknown
Completed: 1967 **Plan Available:** YES **At:** USDA, SCS, DIV OF WATER
Failure/Incident/Breach:

Structure Information

Purpose: Flood Control, C.d.; Recreation, Public
Type of Impound.: Dam And Spillway
Type of Structure: Earthfill
Drainage Area (sq. miles): 4 **or (acres):** 2560

Embankment Data

Length (ft): 600
Height (ft): 41.5
Top Width (ft): 16
Upstream Slope: 3H:1V
Downstream Slope: 2.5H:1V
Volume of Fill (cub. yds.): 97480

Spillway Outlet Works Data

Lake Drain: 12-INCH-DIAMETER VALVE
Principal: 30-INCH-DIAMETER CONCRETE PIPE W/30-IN X 90-IN CONCRETE RISER (SEE DISCRI
Emergency: 40-FT-WIDE OPEN CHANNEL W/2H:1V SIDE SLOPES
Maximum Spillway Discharge (cfs) 4436 **Design Flood:** 1.0 **Flood Capacity** 0.40

Dam Reservoir Data	Elevation (ft-MSL)*	Area (acres)	Storage (acre-feet)
Top of Dam:	712	128	2068
Emergency Spillway:	704	91.2	1171
Principal Spillway:	694	47.5	465
Streambed:	670.5		
Foundation:	660.5		

*Elevations are not necessarily related to a USGS benchmar

Inspection Information

Inspection History:
05/23/2007 VAZ
10/31/2001 MEM
05/14/1992
07/13/1983
02/07/1974

Phase I:
Other Visits:

Operation Information/Remarks

LAKE IS ALSO USED FOR PUBLIC RECREATION BY ODNR, DIVISION OF WILDLIFE, 1840 BELCHER DRIVE, COLUMBUS, OHIO 43224, 614/265-6300.

Emergency Action Plan: Yes **Format:** ICODS **OMI:** No
Annual Fee: $445.00 **Last Entry:** 07/20/2007

Dam Safety Inspection Checklist

Complete All Portions of This Section (Pre-inspection)

Name of Dam: Margaret Creek Structure No. 6

Athens County Required Action

Date of Inspection: May 23, 2007 — None ☐ Mon. ☐ Maint. ☐ Eng. ☒

File Number: 9221-001

Class: I Design Flood: 1.0 Flood Capacity: 0.40

Interview with Owner (at the site):

Owner/Representative present: (Yes) No) Name(s): Mark Holdcroft

Owner's Name(s): Hocking Conservancy District

Address: 560 West Union Street, ,

City: Athens State: OH Zip (+4): 45701-2331

Contact Person: Terry Courtney, Exec. Sec-Treas Telephone: 740/592-1792

Email Address:

Purpose of dam: Flood Control, C.d.; Recreation, Public

Owner Dam Safety Program

Emergency Action Plan

EAP (document): Yes ICODS Up-to-date? (yes, no) ☐ ☐ ☐ ☒

Exercised:

Downstream development: No recent changes.

Security:

Operation, Maintenance, and Inspection

OMI (document): No Up-to-date? (yes, no) ☐ ☐ ☒ ☐

Operation of drains/gates

All operable? (yes, no) Valve is stiff. Operated annually.

Normal rate of drawdown: 4 to 5 inches overnight Emerg. rate of drawdown: Same as normal

Accessibility for operation: From shore.

Maintenance

Frequency of mowing: Twice per year.

Other maintenance: Woody plants cut annually, rodent burrows filled as needed, toe drains monitored.

Inspection

Frequency and thoroughness of day-to-day & routine inspections: Monthly walk through.

Frequency and thoroughness of event-driven inspections: In response to rain events.

Problems found during inspections: Dump in downstream area.

Field Information

Pool Elevation (during inspection): Normal pool Time: 9:30 (a.m.) p.m.)

Site Conditions(temp., weather, ground moisture): 75°, sunny, dry

Inspection Party: Val Zampedro, Keith Banachowski

Maximum Height: 41.5 Feet (measured or inventory appears correct)

Normal Pool Surface Area: 47.5 Acres (measured or inventory appears correct)

Riser has two 18-inch low-flow inlets; two 7.5-foot-long weirs at 699.5; Lake drain is wrought iron, located on upstream side of riser, discharges into riser; Two 6-inch CMP toe drains located on either side of principal outlet. Based on 100-year flood estimate, PMF seems rather high (27x 100-year).	Lake Is Also Used For Public Recreation By Odnr, Division Of Wildlife, 1840 Belcher Drive, Columbus, Ohio 43224, 614/265-6300.

UPSTREAM SLOPE

Gradient: Horizontal: 3 Vertical: 1 (est.) meas.)

Action: None | Monitor | Maintenance | Engineer

☑ ***VEGETATION*** [no problem]

☐ Trees: Quantity: (<5, sparse, dense) ☐ ☐ ☐ ☐

Diameter: (<6", 6-12", >12")

Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)

Notes:

☒ Brush: Quantity: (sparse) dense) ☐ ☐ ☒ ☐

Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg) IN RIPRAP

Notes:

☒ Ground Cover: Type: (grass) crown vetch) Other: ☐ ☐ ☒ ☐

Quantity: (bare, sparse, adequate, (dense)

Appearance: (too tall) too short, good)

Notes:

☒ ***SLOPE PROTECTION*** (no problem) could not inspect thoroughly] ☐ ☐ ☐ ☐

☐ None

☒ Riprap: Average Diameter: 8 INCHES ☒ ☐ ☐ ☐

(adequate) sparse, displaced, weathered, vegetation) (bedding/fabric noted - yes, no)

Notes:

☐ Wave Berm: ☐ ☐ ☐ ☐

Vegetation: (adequate, bare, sparse, improper vegetation)

Notes:

☐ Concrete Slabs: (cracked, settlement, undermined, voids, deteriorated, vegetation) ☐ ☐ ☐ ☐

Notes:

☐ Other: ☐ ☐ ☐ ☐

Notes:

☒ ***EROSION*** (no problem) could not inspect thoroughly]

☐ Wave Erosion (Beaching): Scarp: Length: Height: ☐ ☐ ☐ ☐

Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)

Notes:

☐ Runoff Erosion (Gullies): Quantity: ☐ ☐ ☐ ☐

Depth: Width: Length:

Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)

Notes/Causes:

☒ ***INSTABILITIES*** (no problem) could not inspect thoroughly]

☐ Slides: Transverse Length: Longitudinal Length: ☐ ☐ ☐ ☐

Scarp: Width: Length:

Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)

Crack: Width: Depth:

Notes/Causes

☐ Cracks: ☐ Transverse ☐ Longitudinal ☐ Other ☐ ☐ ☐ ☐

Quantity: Length: Width: Depth:

Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)

Notes/Causes:

None | Monitor | Maintenance | Engineer

Required Action

Required Action

None | Monitor | Maintenance | Engineer

☐ Cracks: ☐ Transverse ☐ Longitudinal ☐ Other ☐ ☐ ☐ ☐
Quantity: Length: Width: Depth:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes/Causes:

☐ Bulges ☐ Depressions ☐ Hummocky ☐ ☐ ☐ ☐
Size: Height: Depth:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes/Causes:

☐ Bulges ☐ Depressions ☐ Hummocky ☐ ☐ ☐ ☐
Size: Height: Depth:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes/Causes:

☒ ***OTHER*** (no problem) could not inspect thoroughly] ☐ ☐ ☐ ☐
☐ Rodent Burrows: (few, numerous)
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes:

☐ Ruts: ☐ ☐ ☐ ☐
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Depth: Width Length:
Notes/Causes: (truck/auto, motorcycle, ATV, animals, pedestrian)

☐ Other: ☐ ☐ ☐ ☐
Notes:

CREST Length: 600 FEET Width: 16 FEET (est, meas.)

☒ ***VEGETATION*** (no problem) ☐ ☐ ☐ ☐
☐ Trees: Quantity: (<5, sparse, dense)
Diameter: (<6", 6-12", >12")
Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)
Notes:

☐ Brush: Quantity: (sparse, dense) ☐ ☐ ☐ ☐
Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)
Notes:

☒ Ground Cover: Type: (grass) crown vetch) Other: ☒ ☐ ☐ ☐
Quantity: (bare, sparse, adequate, (dense))
Appearance: (too tall, too short, (good))
Notes:

☒ ***EROSION*** (no problem) could not inspect thoroughly] ☐ ☐ ☐ ☐
☐ Runoff Erosion (Gullies): Quantity: Depth: Width: Length:
Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)
Notes/Causes:

None | Monitor | Maintenance | Engineer

Required Action

Action

None | Monitor | Maintenance | Engineer

☒ ***ALIGNMENT*** [no problem, could not inspect thoroughly] — ☒ ☐ ☐ ☐

☒ Vertical: ☐ Low Area:

Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)

Elevation Difference: Length:

Notes/Causes: CREST A LITTLE BUMPY. — ☐ ☐ ☐ ☐

☐ Horizontal:

Notes/Causes:

☒ ***WIDTH*** (no problem) — ☐ ☐ ☐ ☐

☐ Too Narrow

Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)

Notes/Causes:

☒ ***INSTABILITIES*** (no problem) could not inspect thoroughly] — ☐ ☐ ☐ ☐

☐ Cracks: ☐ Transverse ☐ Longitudinal ☐ Other

Quantity: Length: Width: Depth:

Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)

Notes/Causes:

☐ Cracks: ☐ Transverse ☐ Longitudinal ☐ Other — ☐ ☐ ☐ ☐

Quantity: Length: Width: Depth:

Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)

Notes/Causes:

☐ Bulges ☐ Depressions ☐ Hummocky — ☐ ☐ ☐ ☐

Size: Height: Depth:

Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)

Notes/Causes:

☐ Bulges ☐ Depressions ☐ Hummocky — ☐ ☐ ☐ ☐

Size: Height: Depth:

Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)

Notes/Causes:

☒ ***OTHER*** (no problem) could not inspect thoroughly] — ☐ ☐ ☐ ☐

☐ Rodent Burrows: (few, numerous)

Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)

Notes:

☐ Ruts: — ☐ ☐ ☐ ☐

Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)

Depth: Width: Length:

Notes/Causes: (truck/auto, motorcycle, ATV, animals, pedestrian) — ☐ ☐ ☐ ☐

☐ Other:

Notes:

None | Monitor | Maintenance | Engineer

Required Action

Required Action

DOWNSTREAM SLOPE Gradient: Horizontal: 2.5 Vertical: 1 (est, meas.)

None | Monitor | Maintenance | Engineer

☒ ***VEGETATION*** [no problem]

☒ Trees: Quantity: (<5, sparse, (dense) ☐ ☐ ☒ ☐
Diameter: (<6", 6-12", (>12"))
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg) IN RIGHT ABUTMENT NEAR GROIN.
Notes: REMOVAL OF TREES IS RECOMMENDED.

☒ Brush: Quantity: (sparse) dense) ☐ ☐ ☒ ☐
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg) RIGHT GROIN
Notes:

☒ Ground Cover: Type: (grass, crown vetch) Other: ☐ ☐ ☐ ☐
Quantity: (bare, sparse, adequate, dense)
Appearance: (too tall, too short, good)
Notes:

☒ ***EROSION*** (no problem) could not inspect thoroughly]

☐ Runoff Erosion (Gullies): Quantity: Depth: Width: Length: ☐ ☐ ☐ ☐
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes/Causes:

☒ ***INSTABILITIES*** (no problem) could not inspect thoroughly]

☐ Slides: Transverse Length: Longitudinal Length: ☐ ☐ ☐ ☐
Scarp: Width: Length:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Crack: Width: Depth:
Notes/Causes:

☐ Cracks: ☐ Transverse ☐ Longitudinal ☐ Other ☐ ☐ ☐ ☐
Quantity: Length: Width: Depth:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes/Causes:

☐ Cracks: ☐ Transverse ☐ Longitudinal ☐ Other ☐ ☐ ☐ ☐
Quantity: Length: Width: Depth:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes/Causes:

☐ Bulges ☐ Depressions ☐ Hummocky ☐ ☐ ☐ ☐
Size: Height: Depth:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes/Causes:

☐ Bulges ☐ Depressions ☐ Hummocky ☐ ☐ ☐ ☐
Size: Height: Depth:
Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
Notes/Causes:

None | Monitor | Maintenance | Engineer

Required Action

Required Action

☒ ***OTHER*** (no problem) could not inspect thoroughly] — None ☐ Monitor ☐ Maintenance ☐ Engineer ☐

☐ Rodent Burrows: (few, numerous) ☐ ☐ ☐ ☐

Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)

Notes:

☐ Ruts: ☐ ☐ ☐ ☐

Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)

Depth: Width: Length:

Notes/Causes: (truck/auto, motorcycle, ATV, animals, pedestrian)

☐ Other: ☐ ☐ ☐ ☐

Notes:

☒ ***SEEPAGE*** (no problem) could not inspect thoroughly]

☐ Wet Area ☐ Flow ☐ Boil ☐ Sinkhole ☐ ☐ ☐ ☐

Flow Rate Size:

Location:

☐ Aquatic Vegetation ☐ None

☐ Rust Colored Deposits ☐ None

☐ Sediment in Flow ☐ None

☐ Other:

Notes/Causes: LEFT TOE AREA WAS INVESTIGATED BUT NO EVIDENCE OF WETNESS WAS FOUND.

☐ Wet Area ☐ Flow ☐ Boil ☐ Sinkhole ☐ ☐ ☐ ☐

Flow Rate Size:

Location:

☐ Aquatic Vegetation ☐ None

☐ Rust Colored Deposits ☐ None

☐ Sediment in Flow ☐ None

☐ Other:

Notes/Causes:

☒ ***EMBANKMENT DRAINS*** [none, none found, no problem, could not inspect thoroughly]

Type: ☒ Toe Drain ☐ Relief Wells ☐ Other: ☐ ☒ ☐ ☐

Flow Rate: TRICKLE OF FLOW FROM BOTH Size: 6" Number: 2

Location: ON BOTH SIDES OF PRINCIPAL SPILLWAY OUTLET PIPE.

Notes: PIPES LOSING BITUMINOUS COATING, BUT STILL APPEAR TO BE FUNCTIONING

☒ ***MONITORING INSTRUMENTATION*** (none) none found, no problem, could not inspect thoroughly]

☐ None Found ☐ Piezometers ☐ Weirs/Flumes ☐ Other ☐ ☐ ☐ ☐

☐ Periodic Inspections by:

Notes:

None Monitor Maintenance Engineer

Required Action

Required Action

PRINCIPAL SPILLWAY

☒ *GENERAL INLET* (no problem) could not inspect thoroughly] ☐ ☐ ☐ ☐

☐ Anti-Vortex Plate [None] Dimensions: (adequate, too small,)
Type: (steel, concrete, aluminum, stainless steel, corrugated metal, wood, other):
Deterioration: (missing sections, rusted, collapsed)
Notes:

☐ Flash Boards [None] ☐ ☐ ☐ ☐
Type: (metal, wood):
Deterioration:
Notes:

☒ Trashrack [None] Opening Size: 1 FT. (adequate, too small, too large) ☒ ☐ ☐ ☐
Type: (metal bars, fence, screen, concrete, baffle, other):
Deterioration: (broken bars, missing sections, rusted, collapsed)
Notes:

☒ *INLET OBSTRUCTION* [no problem, could not inspect thoroughly] ☐ ☐ ☒ ☐
☒ Debris: (leaves, trash, logs, branches, ice) A FEW LOGS AT LOW-FLOW ENTRANCE ☐ ☐ ☐ ☐
☐ Trees: Quantity: (<5, sparse, dense)
Diameter: (<6", 6-12", >12")
Location: (entire inlet, lt side, rt side, middle, see dwg)
Notes:

☐ Brush: Quantity: (sparse, dense) ☐ ☐ ☐ ☐
Location: (entire inlet, lt side, rt side, middle, see dwg)
Notes:

☐ Other:(beaver activity, trashrack opening too small, partially/completely blocked, i.e.) ☐ ☐ ☐ ☐

Notes:

☒ *INLET MATERIALS* [no problem, could not inspect thoroughly]
☐ Metal
(loss of coating/paint, surface rust, corrosion (pitting, scaling), rusted out, pipe deformation) ☐ ☐ ☐ ☐

Dimensions:
Location:
Notes/Causes:

☒ Concrete
(bug holes, hairline crack, efflorescence) ☐ ☒ ☐ ☐
(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ ☐ ☐ ☐
(isolated crack, exposed rebar, disintegration, other) ☐ ☐ ☐ ☐
Dimensions/Location:
Notes/Causes: GENERALLY GOOD CONDITION

(bug holes, hairline crack, efflorescence) ☐ ☐ ☐ ☐
(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ ☐ ☐ ☐
(isolated crack, exposed rebar, disintegration, other) ☐ ☐ ☐ ☐
Dimensions/Location:
Notes/Causes:

☐ Plastic ☐ ☐ ☐ ☐
(deterioration, cracking, deformation)
Dimensions:
Location:
Notes/Causes:

None Monitor Maintenanc Engineer

☒ *OTHER INLET PROBLEMS* (no problem) could not inspect thoroughly]
☐ Mis-Alignment:(pipe, chute, sidewall, headwall) ☐ Pipe Deformation ☐ ☐ ☐ ☐
Location/Description:
Notes/Causes:
Required Action

☐ Separated Joint ☐ Loss of Joint Material ☐ ☐ ☐ ☐
Location/Description:
Notes/Causes:

☐ Undermining: ☐ ☐ ☐ ☐
Location/Description:
Notes/Causes:

☐ Other: ☐ ☐ ☐ ☐

☒ *OUTLET OBSTRUCTION* (no problem) could not inspect thoroughly]
☐ Debris: (leaves, trash, logs, branches, ice) ☐ ☐ ☐ ☐
☐ Trees: Quantity: (<5, sparse, dense) Diameter: (<6", 6-12", >12") ☐ ☐ ☐ ☐
Location: (entire outlet, lt side, rt side, middle, see dwg)
Notes:

☐ Brush: Quantity: (sparse, dense) ☐ ☐ ☐ ☐
Location:(entire outlet, lt side, rt side, middle, see dwg)
Notes:

☐ Other:(beaver activity, trashrack opening too small, partially/completely blocked, i.e.) ☐ ☐ ☐ ☐
Notes:

☒ *OUTLET MATERIALS* [no problem, could not inspect thoroughly]
☐ Metal (loss of coating/paint, surface rust, corrosion (pitting, scaling), rusted out, pipe deformation) ☐ ☐ ☐ ☐
Dimensions:
Location:
Notes/Causes:

☒ Concrete (bug holes, hairline crack, efflorescence) ☐ ☒ ☐ ☐
(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ ☐ ☐ ☐
(isolated crack, exposed rebar, disintegration, other) ☐ ☐ ☐ ☐
Dimensions/Location:
Notes/Causes: GENERALLY GOOD CONDITION

(bug holes, hairline crack, efflorescence) ☐ ☐ ☐ ☐
(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ ☐ ☐ ☐
(isolated crack, exposed rebar, disintegration, other) ☐ ☐ ☐ ☐
Dimensions/Location:
Notes/Causes:

☐ Plastic (deterioration, cracking, deformation) ☐ ☐ ☐ ☐
Dimensions:
Location:
Notes/Causes:

☐ Other: ☐ ☐ ☐ ☐

☒ *OTHER OUTLET PROBLEMS* (no problem) could not inspect thoroughly) ☐ ☐ ☐ ☐
☐ Mis-Alignment:(pipe, chute, sidewall, headwall) ☐ Pipe Deformation
Location/Description:
Notes/Causes:

None Monitor Maintenance Engineer
Required Action

None Monitor Maintenance Engineer

☐ Separated Joint ☐ Loss of Joint Material ☐ ☐ ☐ ☐
Location/Description:
Notes/Causes: Required Action

☐ Undermining: ☐ ☐ ☐ ☐
Location/Description:
Notes/Causes:

☒ Other: SUPPORT IN GOOD CONDITION. NO WETNESS UNDER PIPE. ☒ ☐ ☐ ☐

OUTLET EROSION CONTROL STRUCTURE (Stilling Basins) ☐ ☐ ☐ ☐

☐ None
☒ (endwall/headwall, (plunge pool) impact basin, flip bucket, USBR, baffled chute, rock lined channel) ☒ ☐ ☐ ☐
Notes: PLUNGE POOL APPEARED TO BE WORKING WELL.

Components (baffle blocks, chute blocks, endsill)

☒ *MATERIAL* [no problem, could not inspect thoroughly] ☒ ☐ ☐ ☐
☒ Riprap: Average Diameter: 12"
(adequate) sparse, displaced, weathered, vegetation) (bedding/fabric noted - yes, (no))
Notes: SOME RIPRAP WAS ADDED A FEW YEARS AGO.

☐ Concrete
(bug holes, hairline crack, efflorescence) ☐ ☐ ☐ ☐
(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ ☐ ☐ ☐
(isolated crack, exposed rebar, disintegration, other) ☐ ☐ ☐ ☐
Dimensions/Location:
Notes/Causes:

(bug holes, hairline crack, efflorescence) ☐ ☐ ☐ ☐
(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ ☐ ☐ ☐
(isolated crack, exposed rebar, disintegration, other) ☐ ☐ ☐ ☐
Dimensions/Location:
Notes/Causes:

☒ *OTHER* [no problem, could not inspect thoroughly] ☐ ☐ ☐ ☐
☐ Mis-Alignment: (sidewall, headwall, entire struct.)
Location:
Description:
Notes/Causes:

☐ Separated Joint ☐ Loss of Joint Material ☐ ☐ ☐ ☐
Location:
Description:
Notes/Causes:

☐ Undermining: ☐ ☐ ☐ ☐
Location:
Description:
Notes/Causes:

☒ Other: A LITTLE OVERGROWN WITH BRUSH ☐ ☐ ☒ ☐

Required Action

☒ *DRAINS* (none) none found, no problem, could not inspect thoroughly) (See *SEEPAGE* Section for Toe Drains & Relief Wells)
Type: ☐ Weep Holes ☐ Relief Drains ☐ Other: ☐ ☐ ☐ ☐
Flow Rate: Size: Number:
Location:
Notes:

None Monitor Maintenance Engineer

EMERGENCY SPILLWAY

☐ None Found

Action: ☐ None ☐ Monitor ☐ Maintenance ☐ Engineer

☒ ***INLET OBSTRUCTION*** (no problem) could not inspect thoroughly] ☐ ☐ ☐ ☐

☐ Debris: (leaves, trash, logs, branches, ice) ☐ ☐ ☐ ☐

☐ ☐ ☐ ☐

☐ Trees: Quantity: (<5, sparse, dense)

Diameter: (<6", 6-12", >12")

Location: (entire inlet, lt side, rt side, middle, see dwg)

Notes:

☐ Brush: Quantity: (sparse, dense) ☐ ☐ ☐ ☐

Location: (entire inlet, lt side, rt side, middle, see dwg)

Notes:

☐ Other:(i.e. beaver activity) ☐ ☐ ☐ ☐

Notes:

☒ ***INLET MATERIALS*** [no problem, could not inspect thoroughly]

☒ Earthen

☒ Ground Cover: Type: (grass) crown vetch) Other: ☐ ☐ ☒ ☐

Quantity: (bare, sparse, adequate, (dense))

Appearance: (too tall) too short, good)

Notes:

☐ Erosion: (wave, surface runoff) ☐ ☐ ☐ ☐

Description (height/depth/length/etc):

Notes:

☐ Ruts: ☐ ☐ ☐ ☐

Location: (entire inlet, lt side, rt side, middle, see dwg)

Depth: Width: Length:

Notes/Causes: (truck/auto, motorcycle, ATV, animals, pedestrian)

☐ Riprap: Average Diameter: ☐ ☐ ☐ ☐

(adequate, sparse, displaced, weathered, vegetation) (bedding/fabric noted - yes, no)

Notes:

☒ ***OTHER INLET PROBLEMS*** (no problem) could not inspect thoroughly]

☐ Channel Mis-Alignment: ☐ ☐ ☐ ☐

Location/Description:

Notes/Causes:

☐ Other: ☐ ☐ ☐ ☐

☒ ***OPEN CHANNEL CONTROL SECTION*** (no problem) could not inspect thoroughly]

Width 40 FEET (estim., meas.) **Breadth** 15 FEET (estim., meas.) ☒ ☐ ☐ ☐

Notes:

Required Action

None Monitor Maintenance Engineer

☒ ***OUTLET OBSTRUCTION*** (no problem, could not inspect thoroughly)

☐ Debris: (leaves, trash, logs, branches, ice) ☐ ☐ ☐ ☐

☐ Trees: Quantity: (<5, sparse, dense) ☐ ☐ ☐ ☐

Diameter: (<6", 6-12", >12")

Location: (entire outlet, lt side, rt side, middle, see dwg)

Notes:

☐ Brush: Quantity: (sparse, dense)

Location: (entire outlet, lt side, rt side, middle, see dwg) ☐ ☐ ☐ ☐

Notes:

☐ Other: (i.e. beaver activity) ☐ ☐ ☐ ☐

Notes:

☒ ***OUTLET MATERIALS*** [no problem, could not inspect thoroughly]

☒ Earthen

☒ Ground Cover: Type: (grass, crown vetch) Other: ☐ ☐ ☒ ☐

Quantity: (bare, sparse, adequate, dense)

Appearance: (too tall, too short, good)

Notes:

☐ Erosion: (other, surface runoff)

Description (width/depth/length/etc): ☐ ☐ ☐ ☐

Notes:

☐ Ruts:

Location: (entire inlet, lt side, rt side, middle, see dwg) ☐ ☐ ☐ ☐

Depth: Width Length:

Notes/Causes: (truck/auto, motorcycle, ATV, animals, pedestrian)

☐ Riprap: Average Diameter:

(adequate, sparse, displaced, weathered, vegetation) (bedding/fabric noted - yes, no) ☐ ☐ ☐ ☐

Notes:

☐ ***OTHER OUTLET PROBLEMS*** (no problem, could not inspect thoroughly)

☐ Channel Mis-Alignment: ☐ ☐ ☐ ☐

Location/Description:

Notes/Causes:

☐ Other: ☐ ☐ ☐ ☐

None Monitor Maintenance Engineer

Required Action

LAKE DRAIN

Required Action: None | Monitor | Maint. | Engineer

☒ ***GENERAL***

☐ None Found ☐ Does not have one

☒ Type of Lake Drain (isolated control/intake tower, valve vault w/ outlet conduit, (valve in riser/drop inlet), siphon) ☒ ☐ ☐ ☐

Notes:

☒ Operated During Inspection (yes (no)) ☐ ☐ ☒ ☐

Notes: STIFF VALVE, BUT OPERABLE.

☒ ***ACCESS TO VALVE/SLUICE GATE*** (no problem) could not inspect thoroughly] ☒ ☐ ☐ ☐

☒ Type (not accessible, (from shore) boat, walkway, other)

Notes:

☐ Walkway/Platform:

☐ Concrete Deterioration ☐ Cracks (platform, piers, end supports, railing) ☐ ☐ ☐ ☐

Location:

Notes:

☐ Wood Deterioration ☐ ☐ ☐ ☐

Notes:

☐ Metal Deterioration ☐ ☐ ☐ ☐

(minor, moderate, extensive, other)

Notes:

☒ ***LAKE DRAIN COMPONENTS*** [no problem, (could not inspect thoroughly)]

☐ Concrete Structure ☐ ☐ ☐ ☐

Location:

Description: (deterioration, misalignment, cracks):

Notes/Causes:

☒ Valve Control (Operating Device)

☐ No Operating Device ☐ No Stem ☐ Bent/Broken Stem ☐ Other ☒ ☐ ☐ ☐

Notes/Operability: AGED, SURFACE RUST, BUT IN GENERALLY GOOD CONDITION

☐ Valve / Sluice Gate

☐ Metal Deterioration: (surface rust, minor, moderate, extensive, other) ☐ ☐ ☐ ☐

Location:

Flow Rate:

Notes/Causes:

☐ Misalignment ☐ ☐ ☐ ☐

Notes/Causes:

☐ Leakage - Flow Rate: ☐ ☐ ☐ ☐

Notes/Causes:

☐ Valve / Sluice Gate

☐ Metal Deterioration: (surface rust, minor, moderate, extensive, other) ☐ ☐ ☐ ☐

Location:

Flow Rate:

Notes/Causes:

☐ Misalignment - Notes/Causes: ☐ ☐ ☐ ☐

☐ Leakage - Flow Rate:

Notes/Causes:

Required Action: None | Monitor | Maintenance | Engineer

Required Action

☒ Outlet Conduit

☐ Metal: (loss of coating/paint, surface rust, corrosion (pitting, scaling), rusted out) — None ☐ Monitor ☐ Maintenance ☐ Engineer ☐
Location:
Notes/Causes:

☒ Concrete (bug holes, hairline crack, efflorescence) ☐ ☐ ☐ ☐
(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ ☐ ☐ ☐
(isolated crack, exposed rebar, disintegration, other) ☐ ☐ ☐ ☐
Dimensions/Location:
Notes/Causes: SEE PRINCIPAL SPILLWAY OUTLET SECTION FOR DETAILS

☐ Plastic: (deterioration, cracking) ☐ ☐ ☐ ☐
Location:
Notes/Causes:

☐ Conduit Deformation ☐ Mis-Alignment: ☐ ☐ ☐ ☐
Location:
Notes/Causes:

☐ Separated Joint ☐ Loss of Joint Material ☐ ☐ ☐ ☐
Location/Description:
Notes/Causes:

☐ Undermining: ☐ ☐ ☐ ☐
Location/Description:
Notes/Causes:

☐ Vegetation (trees, brush) ☐ ☐ ☐ ☐
Notes:

☐ Other: ☐ ☐ ☐ ☐
Notes:

☒ Energy Dissipator

☒ Type (endwall, plunge pool, impact basin, stilling basin, rock-lined channel, none) ☐ ☐ ☐ ☐
Notes: SEE PRINCIPAL SPILLWAY OUTLET EROSION CONTROL STRUCTURE FOR DETAILS.

☐ Riprap: Average Diameter: ☐ ☐ ☐ ☐
(adequate, sparse, displaced, weathered, vegetation) (bedding/fabric noted - yes, no))
Notes:

☐ Concrete (bug holes, hairline crack, efflorescence) ☐ ☐ ☐ ☐
(spalling, popouts, honeycombing, scaling, craze/map cracks) ☐ ☐ ☐ ☐
(isolated crack, exposed rebar, disintegration, other) ☐ ☐ ☐ ☐
Dimensions/Location:
Notes/Causes:

☐ Mis-Alignment: ☐ ☐ ☐ ☐
Location/Description:
Notes/Causes:

☐ Separated Joint ☐ Loss of Joint Material ☐ ☐ ☐ ☐
Location/Description:
Notes/Causes:

☐ Undermining: ☐ ☐ ☐ ☐
Location/Description:
Notes/Causes:

Required Action

☐ Other: ☐ ☐ ☐ ☐
Notes:

None Monitor Maintenance Engineer