DAM SAFETY INSPECTION REPORT

Sippo Creek Reservoir Dam
Class I
Stark County, Perry Township
File Number: 0614-012
Inspection Date: April 26, 2001

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 Division of Water, Dam Safety Engineering Program, 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.

This inspection was conducted to evaluate the condition of the dam and its appurtenances under authority of Section 1521.062 of the Ohio Revised Code. 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 this inspection, calculations performed following the inspection, 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.

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. The owner must complete these items and implement all engineered plans for improvement within 5 years unless otherwise stated. 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% of the Probable Maximum Flood or the critical flood. See the Flood Routing Summary Section of this report.

2. The erosion on the upstream slope and crest of the embankment must be repaired and the upstream slope and crest must be protected from pedestrian foot traffic. Prepare plans and specifications for repairing the erosion and installing erosion protection. See the "Ground Cover" fact sheet included in this section for additional information.

3. The vertical alignment of the embankment crest must be uniform. Prepare plans and specifications for the correction of the variable vertical alignment of the crest. See Discussion Item 1 included in this section for additional information.

4. This dam must have an operation, maintenance, and inspection manual (OM&I) and an emergency action plan (EAP) in accordance with OAC Rule 1501:21-21-04. Prepare an OM&I and an EAP. Guidelines for the preparation of these documents are included with this report.

5. The lake drain valve must operate properly. Investigate the integrity of the valve. See the "Lake Drains" fact sheet included in this section for additional information.

Maintenance and Operation: The owner must address the following items. Maintenance and operational procedures already performed should be continued and other items attended to as noted. Typical maintenance and operational procedures include regular mowing of the grass cover; operation, and maintenance of the lake drain; and monitoring for slope instabilities, structural deterioration, and seepage. All current maintenance and operation procedures and those listed below should be included in the operation, maintenance and inspection manual.

1. Remove the trees and brush from the embankment. Re-seed all disturbed areas to establish a proper grass cover. See the "Trees and Brush" fact sheet included in this section for additional information.

2. Replace the missing stones and the deteriorated mortar between many of the stones of the entire principal spillway. See the "Open Channel Spillways (Earth and Rock)" fact sheet included in this section for additional information.

3. Repair the erosion gullies along the sides of the spillway on the downstream slope. See the "Ground Cover" fact sheet included in this section for additional information.

4. Replace the lake drain valve operator. See the "Lake Drains" fact sheet included in this section for additional information.

5. After its operability has been inspected by a registered professional engineer, perform routine maintenance of the lake drain. The maintenance should be performed annually and should include operation and lubrication of the valve in accordance with the manufacturer's specifications. See the "Lake Drains" fact sheet included in this section for additional information.

6. Remove the exercise equipment from the crest and flower boxes from the downstream slope. Re-seed all disturbed areas to establish a proper grass cover. See Discussion Item 2 and the "Ground Cover" fact sheet included in this section for additional information.

Monitoring: The owner/operator must monitor the following items and record all observations. A rapidly changing condition may be an indication of a potentially dangerous problem, and the Dam Safety Engineering Program should be contacted immediately at 614/265-6731 during business hours or at 614/799-9538 after business hours.

1. Monitor the condition of the lake drain conduit and valve for further deterioration. See the "Problems with Metal Materials" and "Lake Drain" fact sheets included in this section for additional information. Please note that repairs may be needed if this problem worsens.

5-16-01

Doug Evans, E.I. Date
Project Engineer
Dam Safety Engineering Program
Division of Water

MAY 18, 2001

Keith Banachowski, P.E. Date
Program Manager
Dam Safety Engineering Program
Division of Water

Discussion Items

1. Low areas on the crest create a reduction of freeboard and a greater likelihood that the dam will be overtopped during severe floods. Earthen embankments are not designed to be overtopped and are particularly susceptible to erosion. Should the dam overtop, floodwaters will concentrate in the low area, increasing the likelihood of erosion on the crest and downstream face. Overtopping can lead to failure of the embankment. Low areas may be repaired by leveling the crest to a uniform elevation using suitable, properly compacted fill material. Any unsuitable material (sand, gravel, topsoil, etc.) should be removed from the embankment surface before placing fill. The repaired areas should also be properly re-seeded, using at least 6 inches of topsoil, and a healthy grass cover should be reestablished.

2. Earthen embankments are not designed to be overtopped and are particularly susceptible to erosion. Should the dam overtop, the exercise equipment on the crest and the flower boxes on the downstream slope will cause turbulence in the flow of water. Any turbulence in the flow will increase the water's ability to erode the embankment. Turbulence and erosion build off of each other in a destructive cycle, each increasing the other, and erosion of the embankment during overtopping can quickly lead to failure of the dam.

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
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 94–28

Dam Safety: Trees and Brush

The establishment and control of proper vegetation is an important part of dam maintenance. Properly main tained 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 once a 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.

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OHIO Department of Natural Resources

Bob Taft *Governor* • Samuel W. Speck *Director* • James R. Morris, P.E. *Chief*

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Ohio Department of Natural Resources
Division of Water Fact Sheet

Fact Sheet 98–49

Dam Safety: Open Channel Spillways
(Earth and Rock)

Open channels are often used as the emergency spillway and sometimes as the principal spillway for dams. A principal spillway is used to pass normal inflows, and an emergency spillway is designed to operate only during large flood events, usually after the capacity of the principal spillway has been exceeded. For dams with pipe conduit principal spillways, an open channel emergency spillway is almost always required as a backup in case the pipe becomes clogged. Open channels are usually located in natural ground adjacent to the dam and can be vegetated, rock-lined, or cut in rock.

Design

Flow through an emergency spillway does not necessarily indicate a problem with the dam, but high velocity flows can cause severe erosion and result in a permanently lowered lake level if not repaired. Proper design of an open channel spillway will include provisions for minimizing any potential erosion. One way to minimize erosion is to design a flatter channel slope to reduce the velocity of the flow. Earthen channels can be protected by a good grass cover, an appropriately designed rock cover, concrete or various types of erosion control matting. Rock-lined channels must have adequately sized riprap to resist displacement and contain an appropriate geotextile fabric or granular filter beneath the rock. Guide berms are often required to divert flow through open channels away from the dam to prevent erosion of the embankment fill. If an open channel is used for a principal spillway, it must be rock-lined or cut in rock due to more frequent or constant flows.

Ohio Administrative Code Rule 1501:21-13-04 requires that the frequency of use for an earth (grass-lined) or a rock-lined emergency spillway be less than:

- Once in 50 years for Class I dams;
- Once in 25 years for Class II dams; and
- Once in 10 years for Class III dams.

Maintenance

Maintenance should include, but not be limited to, the following items:

•**Grass-covered channels should be mowed at least twice per year to maintain a good grass cover and to prevent trees, brush and weeds from becoming established.** Poor vegetal cover can result in extensive and rapid erosion when the spillway flows. Repairs can be costly. Reseeding and fertilization may be necessary to maintain a vigorous growth of grass. One suggested seed mixture is 30% Kentucky Bluegrass, 60% Kentucky 31 Fescue, and 10% Perennial Ryegrass.

•**Trees and brush must be removed from the channel.** Tree and brush growth reduces the discharge capacity of the spillway channel. This increases the lake level during large storm events which can lead to overtopping and failure of the dam.

•**Erosion in the channel must be repaired quickly after it occurs.** Erosion can be expected in the spillway channel during high flows, and can also occur as a result of rainfall and runoff, especially in areas of poor grass cover. Terraces or drainage channels may be necessary in large spillway channels where large amounts of rainfall and runoff may concentrate and have high velocities. Erosion of the side slopes may deposit material in the spillway channel, especially where the side slopes meet the channel bottom. In small spillways, this can significantly reduce the discharge capacity. This condition often occurs immediately after construction before vegetation becomes established. In these cases, it may be necessary to reshape the channel to provide the necessary capacity.

•**All obstructions should be kept out of the channel.** Open channel spillways often are used for purposes other than passage of flood flows.

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Among these uses are reservoir access, parking lots, boat ramps, boat storage, pasture and cropland. Permanent structures (buildings, fences, etc.) should not be constructed in these spillways. If fences, bridges or other such structures are absolutely necessary, they should cross the spillway far enough upstream or downstream from the control section so that they do not interfere with the flow. Construction of any structures in or across the channel requires prior approval from the Division of Water.

•**Weathering of rock channels can be a serious problem and is primarily due to freeze/thaw action**. Deterioration due to the effects of sun, wind, rain, chemical action and tree root growth also occurs. Weathered rock is susceptible to erosion and displacement during high flows; therefore, rock channels are often designed with 1 to 3 feet of earth with a grass cover over the rock surface to help insulate the rock from the effects of freeze/thaw action.

Monitoring

Open channel spillways should be monitored for erosion, poor vegetal cover, growth of trees and brush, obstructions, and weathering and displacement of rock. Monitoring should take place on a regular basis and after large flood events. It is important to keep written records of observations. Photographs provide invaluable records of changing conditions. 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:

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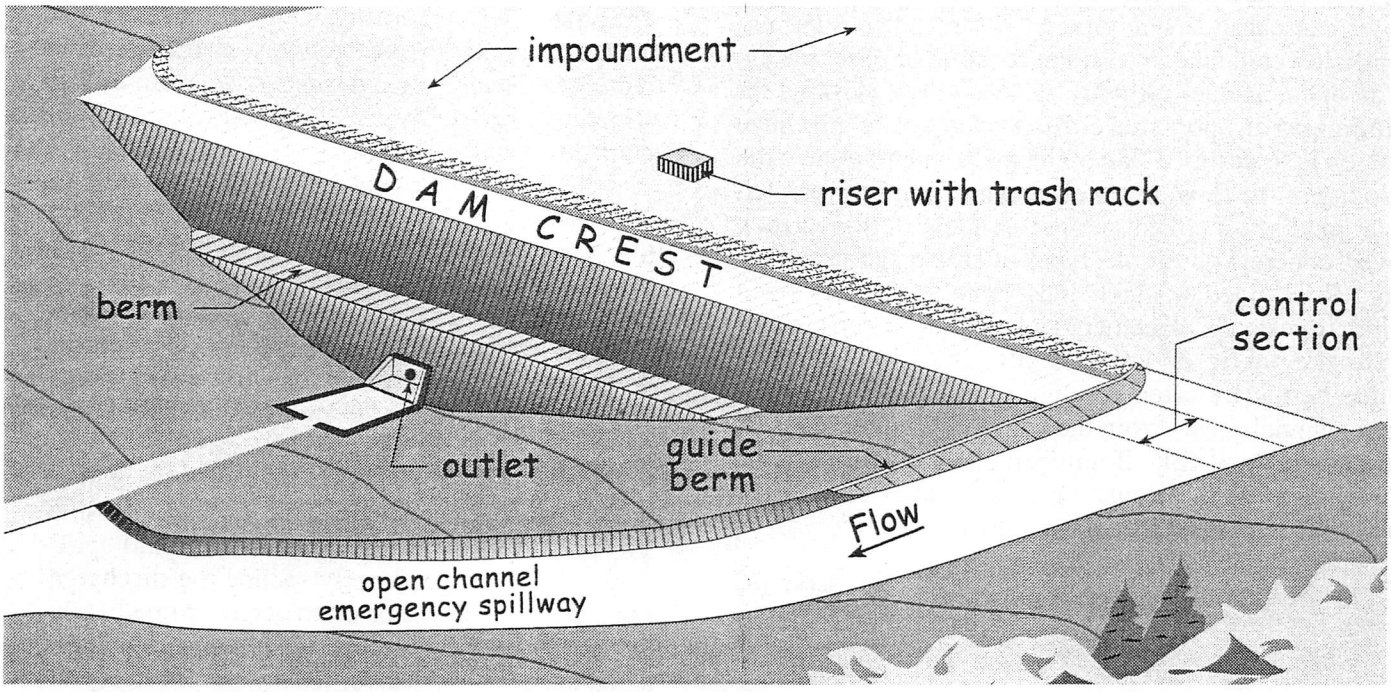
Downstream View of Open Channel Spillway



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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

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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:

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Ohio Department of Natural Resources
Division of Water Fact Sheet

Fact Sheet 99–57

Dam Safety: Problems with Metal Materials

Corrosion is a common problem for spillway conduits and other metal appurtenances. Corrosion is the deterioration or breakdown of metal because of a reaction with its environment. Exposure to moisture, acidic conditions, or salt will accelerate the corrosion process. Acid runoff from strip-mined areas will cause rapid corrosion of metal conduits. In these areas, conduits made of less corrodible materials such as concrete or plastic should be used. Soil types also factor into the amount of corrosion. Clayey soils can be more corrosive than sandy soils since they are poorly drained and poorly aerated. Silts are somewhere in between clays and sands. Some examples of metal conduits include ductile iron, smooth steel, and corrugated metal. Corrugated metal pipe is not recommended for use in dams since the service life for corrugated metal is only 25 to 30 years, whereas the life expectancy for dams is much longer. In areas of acidic water, the service life can be much less. Therefore, corrugated metal spillway conduits typically need to be repaired or replaced early in the dam's design life, which can be very expensive.

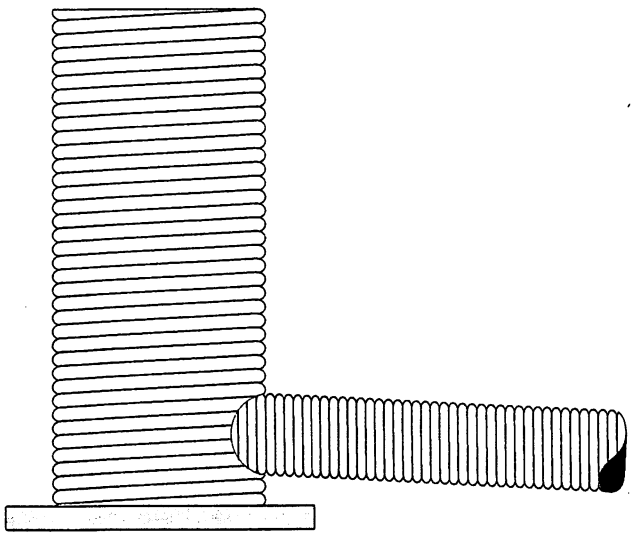

Figure 1 – Example of a corrugated metal pipe and riser spillway.

Conduit coating is an effective way of controlling corrosion of metal conduits if used properly. It is relatively inexpensive and extends the life of the conduit. Some examples of coatings include cement-mortar, epoxy, aluminum, or polyethylene film. Asphalt (bituminous) coatings are not recommended since their service life is usually only one or two years. Coatings must be applied to the conduit prior to installation and protected to ensure that the coating is not scratched off. Coatings applied to conduits in service are generally not very effective because of the difficulty in establishing an adequate bond.

Corrosion can also be controlled or arrested by installing cathodic protection. A metallic anode such as magnesium (or zinc) is buried in the soil and is connected to the metal conduit by wire. Natural voltage current flowing from the magnesium (anode) to the conduit (cathode) will cause the magnesium to corrode and not the conduit. However, sufficient maintenance funds should be allocated for the regular inspection of this active system.

If corrosion is allowed to continue, metal conduits will rust out. The spillway must be repaired before water flows through the rusted out portion of the conduit and erodes the fill material of the embankment. Continued erosion can lead to failure of the dam. Sliplining can be an economical and effective method of permanently restoring deteriorated spillways. During sliplining, a smaller diameter pipe is inserted into the old spillway conduit and then grout is used to fill in the void between the two pipes. If sliplining the spillway is not feasible, the lake may need to be drained and a new spillway must be installed. A registered professional engineer must be retained to develop and submit plans and specifications for any major modifications such as spillway sliplining or replacement.

Corrosion of the metal parts of the operating mechanisms such as lake drain valves and sluice gates can be effectively treated by keeping these parts lubricated and /or painted. If the device has not been operated in several years, a qualified person (i.e. manufacturer's representative or registered professional engineer) should inspect it to determine its

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operability. Caution must be used to prevent the mechanism from breaking. A registered professional engineer may be needed to prepare plans and specifications for repair if the device is determined to be inoperable.

Regular inspection and monitoring is essential to detect any problems with metal materials. Coatings on metal pipes should be inspected for scratched and worn areas. The inspector should also look for corrosion inside the spillway conduit. Proper ventilation and confined space precautions must be considered when entering the spillway conduit system. If using cathodic protection, regular inspections are required to verify that the system is working properly. It is important to keep written records of the amount of surface rust, pitting, and corrosion on any metal surface. Areas of thin metal should be monitored more frequently and repaired or replaced if they rust out. 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.

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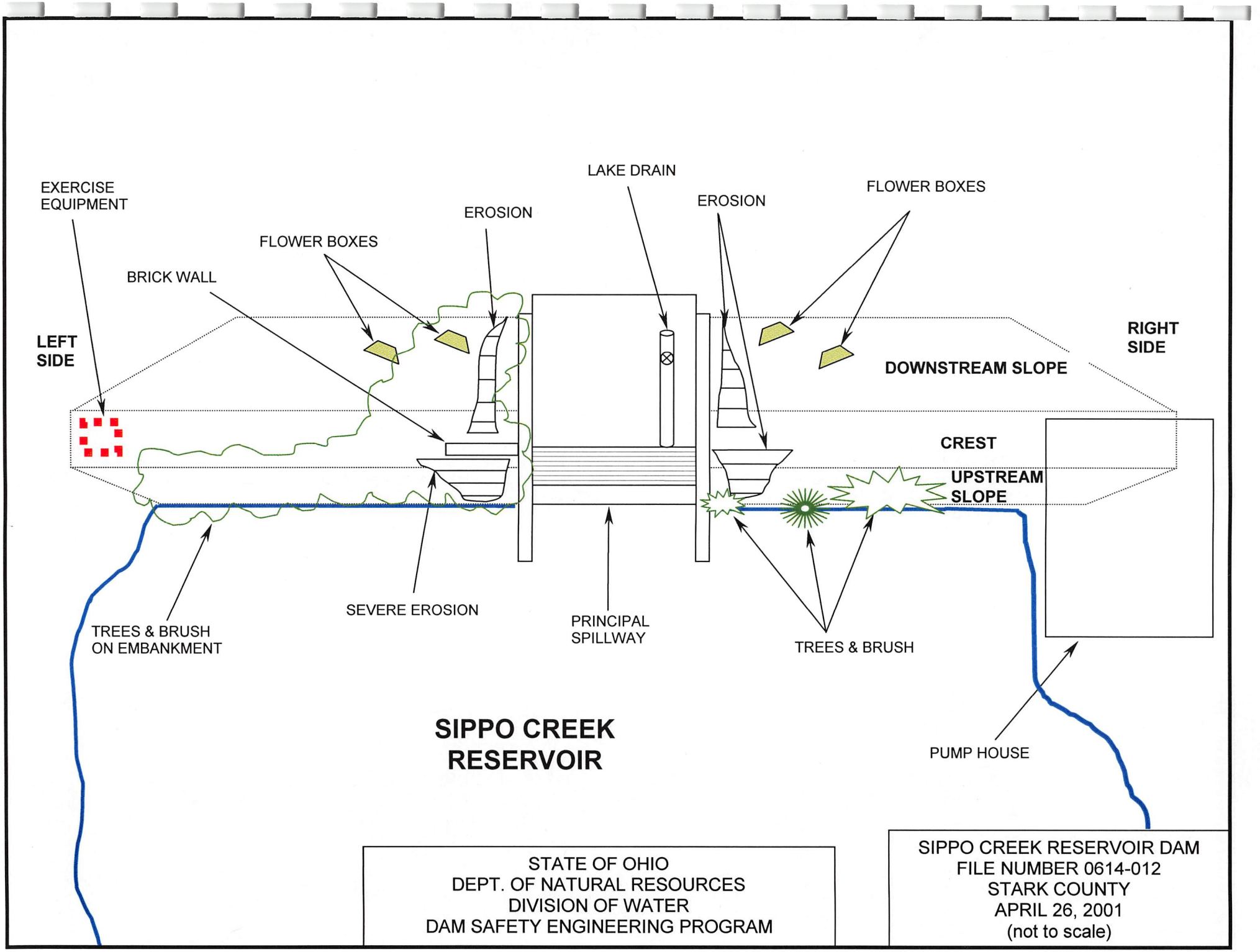
http://www.dnr.state.oh.us/odnr/water/

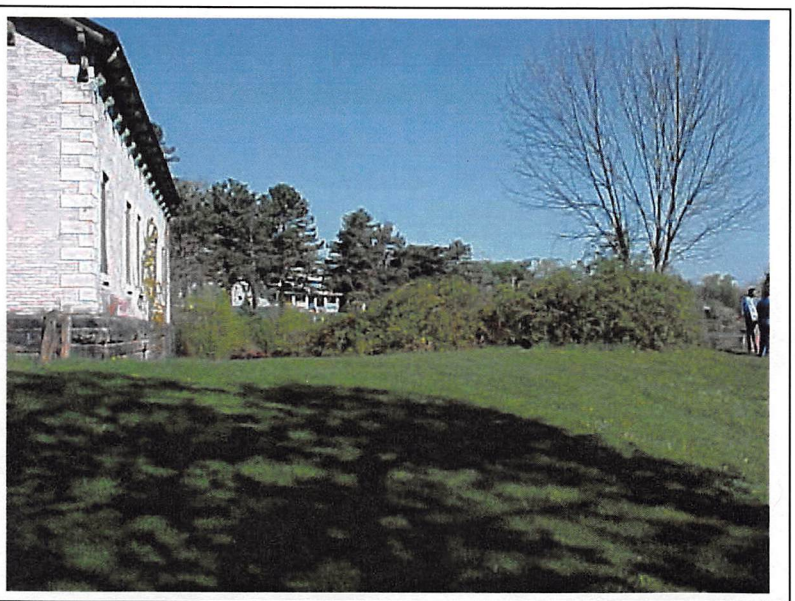
SECTION 2



STATE OF OHIO
DEPT. OF NATURAL RESOURCES
DIVISION OF WATER
DAM SAFETY ENGINEERING PROGRAM

SIPPO CREEK RESERVOIR DAM
FILE NUMBER 0614-012
STARK COUNTY
APRIL 26, 2001
(not to scale)

Sippo Creek Reservoir Dam
April 26, 2001



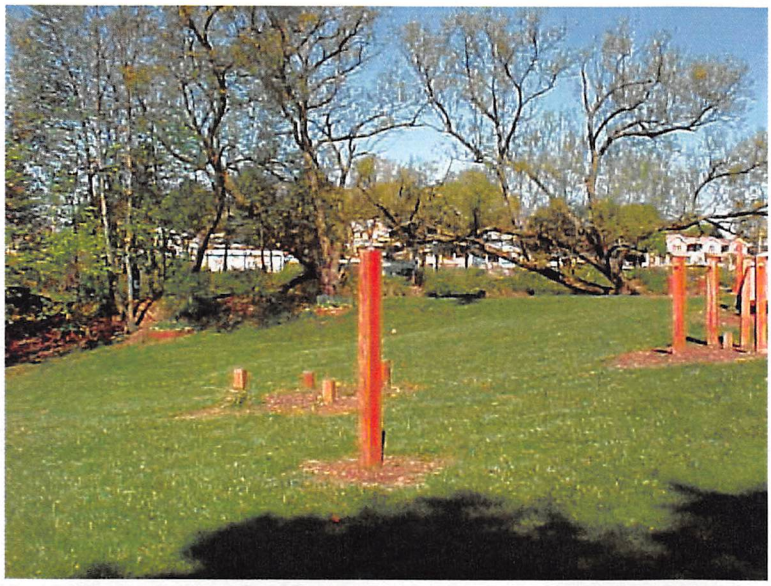
Photograph 1:
Defunct pump house and trees & brush on right end of dam.

Photograph 2:
Trees & brush noted on upstream and downstream slopes.

Photograph 3:
Severe erosion noted on left upstream and downstream slope adjacent to spillway.

WDE, File Number: 0614-012

Sippo Creek Reservoir Dam
April 26, 2001



Photograph 4:
Trees & brush on left side of dam. Exercise equipment in foreground appears to be downstream of groin, however, some equipment was noted on crest of dam..

Photograph 5:
Uneven crest and erosion adjacent to the right side of the spillway.

Photograph 6:
Missing blocks and mortar in the spillway sidewalls.

Sippo Creek Reservoir Dam
April 26, 2001

Photograph 7:
Lake drain is located in spillway.

Photograph 8:
Downstream end of culvert for State Route 241, is located approximately 1500 feet from dam.

Photograph 9:
Residential area approximately 1 mile downstream of dam. This home is located at 1114 Tremont Ave. SE.

WDE, File Number: 0614-012

DAM CLASSIFICATION CHECKLIST

Name of Dam: Sippo Creek Res. Dam **File Number:** 0614-012 **Permit Number:**
County: Stark **Date:** April 26, 2001 **Engineer:** WDE

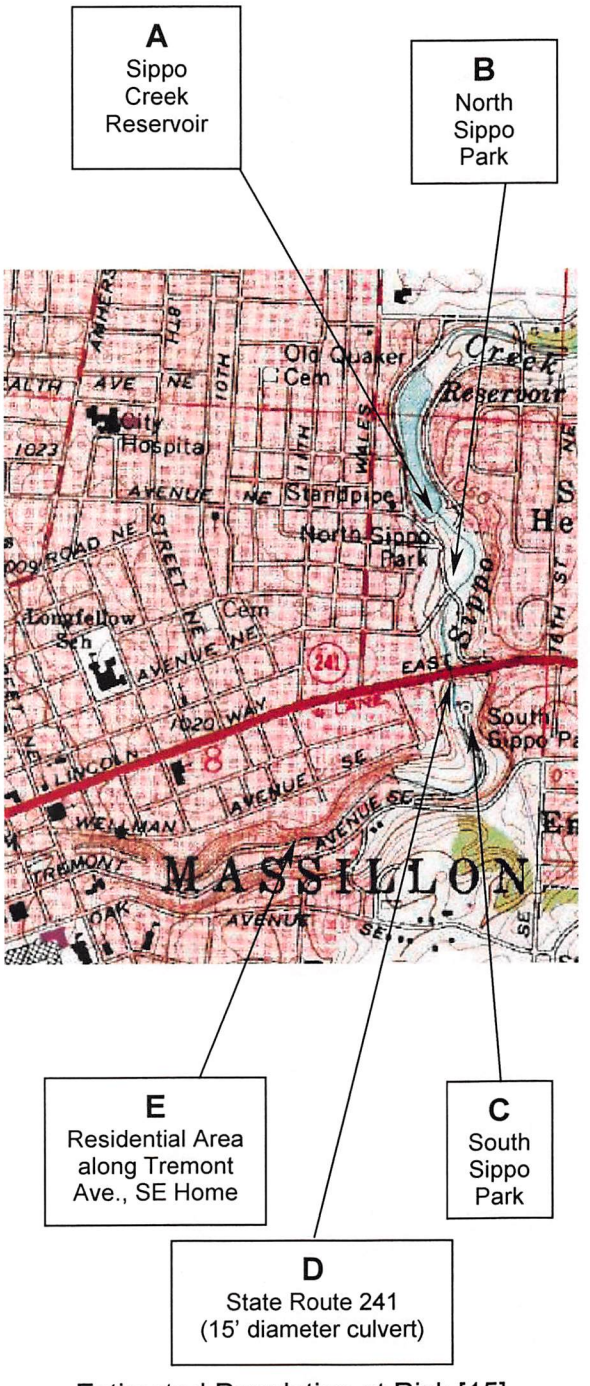
HEIGHT
Height of dam as measured = 18.9 feet
☐ > 60' – Class I
☐ > 40' – Class II
☐ > 25' – Class III
☒ ⩽ 25' – Class IV

STORAGE
Storage volume at top of dam = 82.5 acre-feet
☐ > 5000 acre-feet – Class I
☐ > 500 acre-feet – Class II
☒ > 50 acre-feet – Class III
☐ ⩽ 50 acre-feet – Class IV

EXEMPT
☐ Height ⩽ 6 feet
☐ Storage ⩽ 15 acre-feet
☐ 6 feet < Height < 10 feet, and Volume < 50 acre-feet

POTENTIAL DOWNSTREAM HAZARD

I	II				III		IV	X			
Loss of Human life (plausible circumstances envisioned to cause loss of life)	A possible health hazard (loss of public water/waste water facilities)	Loss of High-value property (flooding of homes & businesses, damage to Class I, II & III dams)	Damage to interstate highways & state routes and only access to homes/critical facilities	Damage to railroads or public utilities	Damage to rural buildings & not otherwise high-valued property, Class IV dams, levees	Damage to local roads (county & township)	Losses restricted mainly to dam and agricultural/rural	No hazard to structure noted	Distance downstream from dam to affected structure (feet)	Vertical distance from streambed to base of affected structure (feet)	Horizontal distance from stream to base of affected structure (feet)
							A		0	0	0
					B				200	3	0
					C				2000	3	0
			D						1500	30	0
E									5300	4	30



Estimated Population at Risk [15]

Height Class (IV) Storage Class (III) Hazard Class (I)
Final Class: (I)

Change in Classification: (NO)

Flood Routing Summary

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. However, the Division of Water did perform hydrologic and hydraulic calculations utilizing information provided by the city's consultant on this issue, MS Consultants, Inc., and from our records to estimate the inflow hydrographs and the total spillway discharge capacity of the dam. These calculations combined with the lake storage capacity were used in the flood routings to determine the maximum water surface elevation in the lake for various flood events (see Table I).

Sippo Creek Reservoir Dam is a Class I dam; therefore, in accordance with OAC Rule 1501:21-13-02, the required design flood 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. Based on the flood routing calculations, Sippo Creek Reservoir Dam does not appear to be able to safely pass the design flood.

Table I (Flood Routing Summary Table)

Flood Event	Maximum Water Surface Elevation (feet above msl)	Depth of Overtopping (feet)	Duration of Overtopping (hours)
PMF	1013.9	13.3	14.7
50% PMF	1008.2	7.6	14.7
25% PMF	1004.6	3.4	15.0
100-Year*	1001.5	0.9	8.0
50-year**	1001.4	0.8	7.0

*The 100-year flood event has a 1% chance of occurring in any given year. This is only an approximation.
**This is only an approximation. The 50-year flood has a 2% chance of occurring in any given year

Normal Pool Elevation: 997.0 feet above msl
Top of Dam Elevation: 1000.6 feet above msl

History of Sippo Creek Reservoir Dam

Date	Event
Unknown	Dam construction completed
1991	First ODNR, DOW dam safety inspection
2001	Second ODNR, DOW inspection

SECTION 3

Location Map

DAM INVENTORY SHEET

NAME: SIPPO CREEK RESERVOIR DAM
RESERVOIR:

FILE NO: 0614-012
NATIONAL #: OH02825
PERMIT NO: EXEMPT
CLASSIFICATION:I

OWNER INFORMATION

OWNER: City of Massillon
ADDRESS1: Parks & Recreation
ADDRESS2: 195 Oak Avenue, SE
ADDRESS3:
CITY: Massillon STATE: OH ZIP+4:44646
CONTACT PERSON: Jay Boodheshwar, Director TELEPHONE: 330/832-1621

OWNER TYPE: PUBLIC, LOCAL
PARCEL NO:

LOCATION INFORMATION

COUNTY: STARK
TOWNSHIP: PERRY
STREAM: SIPPO CREEK
NEAREST AFFECTED COMMUNITY: MASSILON
COMMUNITY'S DISTANCE FROM DAM (miles): 0.00
USGS QUAD: MASSILLON

LATITUDE Deg: 40 Min: 48 Sec: 18
LONGITUDE Deg: 81 Min: 30 Sec: 30
USGS BASIN NO: 05040001

DESIGN/CONSTRUCTION INFORMATION

DESIGNED BY: UNKNOWN
CONSTRUCTED BY: UNKNOWN
COMPLETED: PLANS AVAILABLE: NO AT:
FAILURE/INCIDENT/BREACH:

STRUCTURE INFORMATION

PURPOSE OF DAM: RECREATION, PUBLIC
TYPE OF IMPOUNDMENT: DAM AND SPILLWAY
TYPE OF STRUCTURE: EARTHFILL
DRAINAGE AREA (sq.miles): 14.90 or (acres): 9566

EMBANKMENT DATA
LENGTH (ft) : 265
MAX. HEIGHT (ft): 18.9
TOP WIDTH (ft) : 6
UPSTREAM SLOPE : 2H:1V
DOWNSTREAM SLOPE : 2H:1V
VOLUME OF FILL (cu.yds.):

SPILLWAY & OUTLET WORKS DATA
LAKE DRAIN:24-INCH-DIAMETER GATE VALVE
PRINCIPAL: 36-FT-WIDE WEIR

EMERGENCY: NONE
MAXIMUM TOTAL SPILLWAY DISCHARGE (cfs): 753
DESIGN FLOOD: 1.0 FLOOD CAPACITY: 0.03

DAM & RESERVOIR DATA

	ELEVATION(ft-MSL)	AREA(acres)	STORAGE(acre-feet)
FOUNDATION (CUTOFF):			
STREAMBED	981.7		
PRINCIPAL SPILLWAY	997.0	4.4	21.7
EMERGENCY SPILLWAY			
TOP OF DAM	1000.6	34.0	82.5

INSPECTION INFORMATION

LAST INSPECTION (mon/day/yr): 4/26/01 INSPECTOR: WDE
PHASE I:
PRIOR INSPECTIONS: 12/19/91
OTHER SITE VISITS:

OPERATION INFORMATION/REMARKS:

EMERGENCY ACTION PLAN: NO FORMAT: NPDP INCIDENT ID:
ANNUAL FEE: $ EXEMPT LAST DATA ENTRY: 5/07/01

Dam Safety Inspection Checklist

Complete All Portions of This Section (Pre-inspection)
Name of Dam: SIPPO CREEK RESERVOIR DAM
Date of Inspection: APRIL 26, 2001 File Number: 0614-012
EAP: (yes, no) OM&I: (yes, no)

Review Inventory - Highlight missing information (Pre -inspection)
Owner's Name(s):
Address:
City: State: Zip (+4):
Telephone (Home): Telephone (Work):
Contact Person: JAY BOODHESHWAR Telephone:
Designed By: UNKNOWN
Constructed By: UNKNOWN
Year Completed: UNKNOWN Plans Available (Yes, No) (location):
Purpose of dam:

Interview with Owner (at the site):
Owner/Representative present: (Yes, No) Name(s): JAY BOODHESHWAR
DIRECTOR OF PARKS & RECREATON
Double check address, telephone #, purpose (check ->) ☑
How long have you owned dam - previous name/owner? SINCE CONSTRUCTED

EAP/OM&I: up-dated-(yes, no) & location:
Operate lake drain (times per year, accessibility): No

Mowing (times per year): REGULARLY (WEEKLY) DURING SEASON
Prior problems (wet areas, erosion, slides):

Repair or modification (what & when): NONE

Failure/Incident/Breach (max. pool): NONE

Downstream hazard status (recent changes): NONE

Do you know the in-depth details of the construction of your dam? (If yes - ask next three questions, if no - go to Field Information Section)
Core trench material and location:
Volume of fill (earth or rock) in dam:
Foundation (earth or rock) of dam:

Field Information (while at site)
Pool Elevation (during inspection): 997.3 ft-msl Time: 10:30 (a.m.) p.m.)
Site Conditions(temp., weather, ground moisture): 70°F / SUNNY / MOIST

Inspection Party: WDE & KRB
Maximum Height: 18.9 Feet (measured or inventory appears correct)
Normal Pool Surface Area: 4.4 Acres(measured or inventory appears correct)

Required Action

UPSTREAM SLOPE

Gradient: Horizontal: 2 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)

Notes:

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

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

Notes:

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

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

Appearance: (too tall, too short, good)

Notes:

☒ ***SLOPE PROTECTION*** [no problem, could not inspect thoroughly]

☒ None ☒ ☐ ☐ ☐

☐ Riprap: Average Diameter: ☐ ☐ ☐ ☐

(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: 2 ☐ ☐ ☐ ☒

Depth: 3' Width: 6' Length: 10'

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

Notes/Causes: SIDES

☒ ***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: DEFUNCT PUMPHOUSE LOCATED ON RIGHT END ☒☐☐☐
Notes: NOW USED BY PARK FOR STORAGE

CREST

Length: 265' Width: 6' (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: 2 Depth: 2' Width: 6' Length: 6' ☐☐☐☒
Location: (adj. to structure, entire crest, lt end, rt end, middle, see dwg)
Notes/Causes: ADJACENT TO SPILLWAY SIDES

None Monitor Maintenance Engineer

Required Action

Required 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: APPROXIMATELY 3' Length: 265'

Notes/Causes: VERTICAL ALIGNMENT OF THE CREST IS VARIABLE OVER THE ENTIRE LENGTH OF THE DAM. WORST AREAS ARE NEAR THE SPILLWAY. ☐ ☐ ☐ ☐

☐ 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: EXERCISE EQUIPMENT ☐ ☐ ☒ ☐

Notes: LOCATED ON LEFT END OF CREST

None Monitor Maintenance Engineer

Required Action

Required Action

DOWNSTREAM SLOPE Gradient: Horizontal: 2 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)
  Notes:
- ☒ Brush: Quantity: (sparse, dense) — ☐ ☐ ☒ ☐
  Location: (adj. to structure, entire slope, 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: 2 Depth: 2' Width: 4' Length: 25' — ☐ ☐ ☒ ☐
  Location: (adj. to structure, entire slope, lt end, rt end, middle, see dwg)
  Notes/Causes: ADJACENT TO SIDES OF SPILLWAY

☒ ***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

None Monitor Maintenance Engineer

☒ ***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: FLOWER BOXES LOCATED ON RIGHT & LEFT ☐ ☐ ☒ ☐

~~Notes:~~ DOWNSTREAM SLOPES

☒ ***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: .....

☐ ☐ ☐ ☐

☐ 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: ..... Size: ..... Number: .....

Location: .....

Notes: .....

☒ ***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

None | Monitor | Maintenance | Engineer

☒ ***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: NONE NEEDED - OPEN CHANNEL

☒ Flash Boards [None] ☒ ☐ ☐ ☐

Type: (metal, wood): _____

Deterioration: _____

Notes: _____

☒ Trashrack [None] Opening Size: _____ (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) ☐ ☐ ☐ ☐

☐ 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:

(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 | Maintenance | Engineer

Required Action

None Monitor Maintenance Engineer

☐ 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:

☐ Rock-Cut (weathered, erosion) ☐ ☐ ☐ ☐

Description:

Notes:

☒ Other: STONE: SEVERAL OF THE HANDLAID STONES ARE MISSING AND THE MORTAR BETWEEN SOME OF THE STONES HAS FALLEN OUT. ☐ ☐ ☒ ☐

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

☐ Mis-Alignment:(pipe, chute, sidewall, headwall) ☐ Pipe Deformation ☐ ☐ ☐ ☐

Location/Description:

Notes/Causes:

☐ Separated Joint ☐ Loss of Joint Material ☐ ☐ ☐ ☐

Location/Description:

Notes/Causes:

☐ Undermining: ☐ ☐ ☐ ☐

Location/Description:

Notes/Causes:

☐ Other: ☐ ☐ ☐ ☐

☒ ***OPEN CHANNEL CONTROL SECTION*** [no problem, could not inspect] **Width** 36' (est. ms.) **Brdth** 3' (est. ms.) ☒ ☐ ☐ ☐

Notes:

☒ ***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:

Required Action

None Monitor Maintenance Engineer

☐ Other:(beaver activity, partially/completely blocked, i.e.) ☐ ☐ ☐ ☐

Notes:

Required Action

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

None Monitor Maintenance Engineer

☐ 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:

(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:

☐ 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:

☐ Rock-Cut (weathered, erosion)

Description/Notes: ☐ ☐ ☐ ☐

☒ Other: STONE: SEVERAL STONES ARE MISSING AND THE MORTAR BETWEEN SOME STONES HAS FALLEN OUT ☐ ☐ ☒ ☐

☒ **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

☐ Separated Joint ☐ Loss of Joint Material ☐ ☐ ☐ ☐

Location/Description:

Notes/Causes:

☐ Undermining: ☐ ☐ ☐ ☐

Location/Description:

Notes/Causes:

☐ Other: ☐ ☐ ☐ ☐

{Upstream Slope, Crest, Downstream Slope, Seepage, **Principal Spillway-Outlet**, Emergency Spillway, Lake Drain}

Required Action

Required Action

None | Monitor | Maintenance | Engineer

OUTLET EROSION CONTROL STRUCTURE (Stilling Basins)

☐ None

☒ (endwall/headwall, plunge pool, impact basin, flip bucket, USBR, baffled chute, rock lined channel)

Notes: STEPPED SPILLWAY WITH ROCK LINED CHANNEL

Components (baffle blocks, chute blocks, endsill) STONE & MORTAR

☒ ***MATERIAL*** [no problem, could not inspect thoroughly] BUT NO APPARENT PROBLEMS NOTED

☐ 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:

(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] BUT NO APPARENT PROBLEMS NOTED

☐ 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:

☒ ***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:

Type: ☐ Weep Holes ☐ Relief Drains ☐ Other:

Flow Rate: Size: Number:

Location:

Notes:

None | Monitor | Maintenance | Engineer

Required Action

Required Action

None | Monitor | Maintenance | Engineer

EMERGENCY SPILLWAY

☒ None Found

Notes: NONE NEEDED) OPEN CHANNEL SPILLWAY

☒ ☐ ☐ ☐

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: DOES NOT APPEAR TO HAVE BEEN MAINTENANCED IN SEVERAL YEARS

ACCESS TO VALVE/SLUICE GATE [no problem, could not inspect thoroughly]

☒ Type (not accessible, from shore, boat, walkway, other)
Notes: ACCESS VAVLE BY WALKING INTO STREAM CHANNEL

☐ 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:

☒ 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

None | Monitor | Maintenance | Engineer

☐ Outlet Conduit

☒ Metal: (loss of coating/paint, surface rust, corrosion (pitting, scaling), rusted out) ☐ ☒ ☐ ☐

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:

☐ 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: 8" PIPE COMES OFF OF LAKE DRAIN BEFORE ☒ ☐ ☐ ☐

~~Notes:~~ VALVE (APPEARS TO BE UNDER PRESSURE) AND GOES UNDERGROUND.

☒ Energy Dissipator

☒ Type (endwall, plunge pool, impact basin, stilling basin, rock-lined channel, none) ☒ ☐ ☐ ☐

Notes: NONE NEEDED

☐ 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:

☐ Other: ☐ ☐ ☐ ☐

Notes:

Required Action

None | Monitor | Maintenance | Engineer