Dam Inventory Sheet

Name: SIPPO CREEK RESERVOIR DAM
Reservoir:
File No: 0614-012
National #: OH02825
Permit No.: EXEMPT
Class (Ht-Vol): I (IV - III)

Owner Information

Owner: City of Massillon
Address: Parks & Recreation
505 Erie St. North
City: Massillon **State:** OH **Zip:** 44646
Contact: Kim O'Farrell, CPRP Director **Phone No.:** 330/832-1621
Owner Type: Public, Local
Multi-Dams: -
Parcel No.:

Location Information

County: Stark
Township: Perry
Stream: Sippo Creek
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: **Plan Available:** NO **At:**
Failure/Incident/Breach:

Structure Information

Purpose: Recreation, Public
Type of Impound.: Dam And Spillway
Type of Structure: Earthfill
Drainage Area (sq. miles): 14.9 **or (acres):** 9566

Embankment Data

Length (ft): 265
Height (ft): 18.9
Top Width (ft): 6
Upstream Slope: 2H:1V
Downstream Slope: 2H:1V
Volume of Fill (cub. yds.):

Spillway Outlet Works Data

Lake Drain: 24-INCH-DIAMETER GATE VALVE
Principal: 50-FT-WIDE WEIR
Emergency: NONE
Maximum Spillway Discharge (cfs): 753 **Design Flood:** 1.0 **Flood Capacity:** 0.03

Dam Reservoir Data	Elevation (ft-MSL)*	Area (acres)	Storage (acre-feet)
Top of Dam:	1000.6	34	82.5
Emergency Spillway:			
Principal Spillway:	997	4.4	21.7
Streambed:	981.7		
Foundation:			

*Elevations are not necessarily related to a USGS benchmark

Inspection Information

Inspection History:
6/16/2015 TMG
5/25/2010 TMG
2/21/2006 TML
4/26/2001 WDE
12/19/1991

Phase I:
Other Visits:
Inspection Year: C

Operation Information/Remarks

Emergency Action Plan: Not Approved **Format:** No Plan **OMI:** No
Last Entry: 6/25/2015

Kathy Catazaro-Perry, Mayor

Massillon
City of Champions

March 10, 2017

Mr. Andrew D. Ware, Chief
ODNR – Division of Water Resources
2045 Morse Road, Building B-3
Columbus, OH 43229

RE: Sippo Creek Reservoir Dam
File Number: 0614-012

Mr. Ware,

First of all, thank you for making the time to meet with us on Monday, March 6, 2017 in your Columbus office. We are in receipt of your letter dated March 7, 2017, and are focused on complying with the letter and the prior Orders of February 21, 2017. The purpose of this letter is to provide your office with an update as to our efforts since the meeting.

We intend to provide weekly status updates during the early weeks of the project, followed by a more appropriate update schedule as the project progresses. The Weekly Status Update will be provided in a format similar to the attached document. Information contained therein shall be as follows:

- Page 1: This is intended to be a snapshot of the big picture items completed during the current week, in a format that can be used by the Mayor / Administration when speaking with the Media and local community groups. It will also provide a good executive summary for your staff.
- Page 2: This is intended to be the Executive Summary of items required to be completed with **Step #1 of the Project – Lowering the Water Level by Four (4) Feet**. This form will begin to contain additional information such as % Complete and Target Completion Dates. Each one of the bullet points will have additional background information in the file containing additional detail – for example, Agency Coordination will have a list of all agencies, contact info., permit status, and other pertinent information.
- Page 3: This is intended to be the Executive Summary of items required to be completed with **Step #2 of the Project – Repair or Breach (Remove) the Dam**. This form will begin to contain additional information such as % Complete and Target Completion Dates. Each one of the bullet points will have additional background information in the file containing additional detail as well.

At this time, I would like to request a conference call with your staff on Monday, March 13, 2017 to discuss: Our Progress to-date; Our Concerns about Schedule – especially given the high water conditions due to recent rains; and other updates that may occur between today and Monday.

Please contact via: {david.krock@ohm-advisiors.com; or 330-913-1045 (o); or 330-350-0521 (c) }

Sincerely,

David G. Krock, PE
Massillon City Engineer

cc: Mayor; File

Municipal Government | Administration Building | 151 Lincoln Way East, Massillon, OH 44646
330.830.1700 | Fax 330.830.1764 | www.massillonohio.com

Sippo Creek Reservoir Dam **Weekly Status Report**

In Accordance with the February 21, 2017 ODNR letter, the City shall lower the water level in the reservoir by four (4) feet. Listed below is our Plan Outline to complete the work

Step #1: Lower Reservoir Water Level by Four (4) Feet

- **PRE Water Lowering Activities**
  - Photo / Video Documentation – Dam & Downstream Area
  - County, State, and Federal Agency Notifications / Permits
  - City and Local Community Notifications (Council, Park Board, etc.)
  - Local Area Resident Notifications (Adjacent Properties)
  - News Media Communication (via Mayor's Office)
  - Coordination with Engineers and Dam Experts
  - Review Prior Hydraulic Study for Downstream Impacts
  - Evaluation of Options to Lower Water Level
  - Evaluation of Liabilities, Risks, etc.
  - Analysis of Required Public Safety Measures within the Park
  - Analysis of Sediment Controls, Work Area, & Other Impacts
  - Contractor(s) Cost Estimates to Complete the Recommended Option
  - Pre-Construction Meeting to review plans, schedule, emergency contact information, contingency plans for high water & unexpected circumstances, risk & liability mitigation, and Notice to Proceed
- **ACTIVE Water Lowering Activities**
  - Photo / Video Documentation – Dam & Downstream Area
  - County, State, and Federal Agency Notifications / Permits
  - City and Local Community Notifications
  - Local Area Resident Notifications (Individuals & Community Groups)
  - Implement Public Safety Measures (Fence, Closures, etc.)
  - Implement Sediment Control & Water Quality Measures
  - On-Site Monitoring of Contractor by Engineers and Dam Experts
  - Trouble-Shooting of Unforeseen Conditions
  - Contractor Performing Work to Lower Water Level
- **POST Water Lowering Activities**
  - Photo / Video Documentation – Dam & Downstream Area
  - County, State, and Federal Agency Notifications / Permits
  - City and Local Community Notifications
  - Local Area Resident Notifications
  - Coordination with Engineers and Dam Experts
  - Evaluation of Options to Lower Water Level
  - Contractor Estimates to Complete the Recommended Option

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Sippo Creek Reservoir Dam **Weekly Status Report**

In Accordance with the February 21, 2017 ODNR letter, the City shall Repair or Breach the Dam. Listed below is our Plan Outline to complete the work.

Step #2: Repair or Breach (Remove) the Dam

- **To Repair or to Remove the Dam?**
  - Public Involvement Process
  - Funding Sources, Opportunities, and likelihood of Winning
  - Selection of Preferred Option
  - Council Legislation to Proceed
- **Planning & Design**
  - Environmental Permits
  - Construction / Demolition Plans
  - Repair / Restoration Plans
  - Prepare EPA & OM&I (if Repair)
  - ODNR Plan Approval Process
- **Public Bidding and Construction**
  - Public Bidding Process
  - Selection, Award, and Contracts
  - Pre-Construction Meeting
  - Construction
  - Post-Construction / Closeout Items
  - As-Built Plans & Engineer's Certification (if repair)
  - Final EAP & OM&I submitted to ODNR (if repair)
  - Final Inspection & Approval by ODNR (if repair)

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330.830.1700 | Fax 330.830.1764 | www.massillonohio.com

Griffin, Tina

From: David Krock <David.Krock@ohm-advisors.com>
Sent: Friday, March 10, 2017 10:59 AM
To: Griffin, Tina
Cc: jsmith@massillonohio.gov; mayorkathy@massillonohio.gov; Jason Popiel; Greg McCue; Kim O'Farrell
Subject: RE: Sippo Creek Reservoir Dam
Attachments: Sippo Creek Reservoir Dam_letter to ODNR_2017_03_10.pdf; Sippo Creek Reservoir Dam_Status Report_2017_03_10.pdf

Tina,

I have attached 2 documents for your review and distribution to others in your office.

Please contact me at your convenience to schedule Monday's conference call.

Thanks,
Dave

DAVID G. Krock, PE, ENV SP
OHM Advisors | ARCHITECTS. ENGINEERS. PLANNERS.
D 330.913.1045
C 330.350.0521

From: Tina.Griffin@dnr.state.oh.us [mailto:Tina.Griffin@dnr.state.oh.us]
Sent: Tuesday, March 7, 2017 3:55 PM
To: Tina.Griffin@dnr.state.oh.us
Cc: David Krock <David.Krock@ohm-advisors.com>; jsmith@massillonohio.gov; mayorkathy@massillonohio.gov
Subject: Sippo Creek Reservoir Dam

Tina Griffin, P.E.
Project Manager
Dam Safety Program

614-265-6634
tina.griffin@dnr.state.oh.us

Kathy Catazaro-Perry, Mayor

Massillon
City of Champions

Sippo Creek Reservoir Dam **Weekly Status Report**

City Engineer MEMO March 10, 2017

Overview of Current Project Status

The City is working diligently to meet the requirements of the ODNR Orders dated February 21, 2017. There is a great deal of work to complete in the 30 day deadline required by the order. The City has been in contact with multiple County, State, and Federal Agencies with jurisdiction over work within streams. The purpose of these calls is to officially notify each agency of our pending work, discuss permitting requirements, and review any special requests they may have.

Step #1 is to reduce the water level in the reservoir by 4'. Recent rains have increased the volume of water flowing over the dam. If the water level remains elevated, it could hamper or delay the City's efforts to fully evaluate options and/or complete the work necessary to lower the water level. The City will need to coordinate with ODNR on the matter of a time extension, if high water levels persist.

The City has been working with contractors and engineers to evaluate options and costs. It is important that the City select a method that maintains public safety, downstream water quality, and one that can be completed efficiently and expeditiously.

This week, the City met with ODNR in Columbus, as well as City Council and the Park Board in Massillon, to continue efforts to fully inform all parties.

The City is also working on the following specific items:

- Preparation of the Operation, Maintenance, and Inspection Manual specific to the Sippo Creek Dam and begin regular inspections of the dam.
- Preparation of a Project Task List, Plan, and Schedule for submittal to ODNR.

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Massillon failed to correct Sippo Creek Reservoir Dam issues for more than 26 years

BY: Megan Hickey
POSTED: 6:49 PM, Mar 8, 2017
UPDATED: 7:43 PM, Mar 8, 2017

Share Article

MASSILLON, Ohio - The Ohio Department of Natural Resources told News 5 that the City of Massillon had more than 26 years of notice to fix issues with the Sippo Creek Reservoir Dam before the state set its March 27 deadline.

In a letter dated Feb. 21, ODNR told the city's Parks and Recreation Department that the more than 100-year-old structure "poses a high risk to downstream human life and property."

The state is now requiring public safety officials to begin lowering the lake level immediately or take other actions to bring the dam into compliance.

Inspection reports obtained by News 5 show that there have been five inspections at the dam since 1991. In that first inspection, several repairs, maintenance and monitoring items were listed.

"Overall, the condition of this dam is questionable," the 1991 report said, citing erosion and "a severely inadequate spillway."

But the most recent inspection in 2015 revealed that no progress had been made in 26 years, according to ODNR.

Issues included the repair of erosion gullies on the downstream slope. Multiple tests were also ordered for the spillway and lake drain valve.

"These items have been noted previously and the appropriate time period for completion has already been exceeded," the June 16, 2015 inspection report read.

While all dams are required by the ODNR to complete an emergency action plan in accordance with OAC Rule 1501:21-21-04, a spokesperson told News 5 that Sippo Creek Reservoir Dam does not have an emergency action plan.

The City's Director of Public Safety and Service did not respond to News 5 requests about the plan.

"We are meeting with contractors this week to discuss options to lower the water level by 4 feet per the order," Director Joel Smith said in an email.

Information will be presented to the City Council on Monday.

OH STARK STORIES

Massillon warned about dam for 26 years

The Ohio Department of Natural Resources told News 5 that the City of Massillon had more than 26 years of notice to fix issues with the Sippo Creek Reservoir Dam before the state set its March 27 deadline.

Parents indicted in 5-year-old's murder case

The parents accused in the beating death of their 5-year-old daughter Ashley Zhao were indicted on murder charges Tuesday.

Police use GPS device to catch serial burglar

Canal Fulton police placed a GPS device on the car of a suspected serial burglar, enabling officers to track the man down and bring him into custody.

VIDEO: Massillon woman arrested for 4th OVI

IndeOnline.com
Massillon, OH

Dam debate: What should be done about Sippo Creek Reservoir?

Wednesday
Posted Mar 8, 2017 at 7:33 PM

Massillon's failure to heed ODNR warnings years ago may be why now it must drain Sippo Creek Reservoir, and either fix the dam or remove it.

By **Steven M. Grazier**
IndeOnline.com staff writer
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MASSILLON To some, it's a fishing hole where carp are plentiful.

Others see Sippo Creek Reservoir and the dam that created it as a meaningful historical structure. **Many are attached to the site** by fond memories from childhood.

None of that makes a difference now. The city will drain the waterway by 4 feet, reducing it to a trickle or puddle-sized pond, in compliance with a state order, until officials can figure out whether it should be repaired or torn down.

Last week, the Ohio Department of Natural Resources placed a **March 27 deadline** on the city to either lower the depth of water in the reservoir or remove the dam altogether. Officials explored both options and agreed to adhere to the order to reduce water amounts.

"It's come to a head with ODNR, and they're pretty adamant on us lowering the water level," Safety-Service Director Joel Smith said Wednesday afternoon. "So we're moving forward with that as soon as we can."

Public safety and limiting the risk of the "Rezzy" dam overflowing during a major rainstorm are main reasons for the department's requirement, according to City Engineer David Krock, who, along with Mayor Kathy Catazaro-Perry and Smith, met with state officials Monday in Columbus to discuss the matter.

Since then, Smith said, the city has talked with local contractors about reducing the water level. One meeting was held Tuesday, and another session was Wednesday with a different agency. Both groups were to examine the dam, which is located off of Sippo Boulevard NE, and offer potential project costs.

Buying time

One remedy under consideration is to repair a drainage pipe near the bottom of the dam, which has been nonfunctional for years due to buildup of silt and debris, Smith said. The city received an estimate of about $24,000 last year for that repair and — with an approaching deadline — could be forced to go that route.

Another option Krock mentioned is to begin removing parts of the dam, block by block, to allow the water to drain more efficiently. That fix seems more permanent, which is what the state ODNR is looking for, he added.

Water in the reservoir is between 4- and 6-feet deep, due to a high buildup of silt near the dam, Smith said. Reducing the water level by 4 feet will essentially make it a pass-through stream.

Draining the water gives the city more time to decide on a long-term solution, which is either tear down the dam or repair it, Smith said. Cost to repair the approximately 130-year-old structure could total about $800,000, based on a 2016 estimate.

Money used to drain, and eventually repair or demolish the dam, could come from the city's carryover fund, which is about $2.3 million, said Smith, adding that lowering the water level could only be temporary if the city decides to fix the structure.

Some residents are sour on the idea of lowering the water level and doing away with the dam.

"It's a historic landmark, so why tear it down?" said Dan Fouts, a resident of Ledgewood Boulevard NE, who was fishing Wednesday at the reservoir near the dam.

Fouts, 30, said he often catches crappie, bass and carp in the water.

"I fish here all the time. I'd really hate to see it go," he said.

City Councilwoman Sarita Cunningham, R-Ward 1, said she'd also like to see the dam remain and be fixed.

"It's been here my whole life," she said. "It's a mainstay."

'Rezzy' history

It's been a while since the reservoir was last dredged, according to Smith, who said the process occurred in 2000 or 2002 at a cost of $400,000.

During the dredging, equipment was used to "suck silt out of the bottom of the lake," local historian Rudy Turkal said. The silt was later dumped in a field on Valerie Avenue NE, in an area where new houses were eventually built.

The dumping of the silt drew complaints from many northeast Massillon residents, Turkal said.

"It was quite a stench and stunk the area up pretty good," he recalled.

In the mid-1900s, people used the reservoir as an ice-skating and swimming locale.

"There used to be a floating raft in the middle, where people used to swim out to dive off of," Turkal said.

Lack of action

As recently as last week, Krock said his office was looking at only two options for the dam — repair the structure or tear it down. At the time, he said, the city believed it had months to review both ideas, but the state's recent order derailed

that line of thought.

Krock said the city has known since 1991 about problems the state raised concerning the dam, but little was done to repair or remove the structure.

The city's **failure to take action over the years** may be to blame for the state's insistence that something be done in short order, he said.

A phone message left Wednesday with an ODNR representative was not immediately returned.

Multiple inspections and studies on the structure have taken place since the early-2000s, Smith said. He pointed to the city's lack of funds through the years as the main reason the dam had not been fortified.

The dam is structurally intact, Smith said, and is of no danger to the public.

"There's no immediate threat to structural integrity or the spillway breaking through," he said. "It clearly needs fixed, so we're moving ahead (first) with lowering the water."

Cunningham noted her frustration with the state Department of Natural Resources for imposing a three-week deadline, which she called "curious" at best.

"I wish someone from (the state) would come and talk to us and give us the 'why and where for'," she said.

Reach Steven at 330-775-1134, or at ***steven.grazier@indeonline.com.***

On Twitter: @sgrazierINDE

PHONE MEMO

Date: Wednesday, March 8, 2017

Caller: Joel P. Smith, City of Massillon, Director of Public Safety and Service

To: Tina Griffin

Subj: Sippo Creek Reservoir Dam

The Division of Water Resources sent the City of Massillon Chief's Order Number 2017-101 on February 21, 2017. The order required the city to bring Sippo Creek Reservoir Dam into compliance with Ohio's dam safety laws.

Joel phoned Tina and stated that they are working on getting the reservoir lowered by 4 feet. They are currently meeting with contractors.

In the Chief's Order, 26 Findings were listed. Joel phoned Tina and stated that they did not have some of the documents listed in the Findings and asked if we could locate them in our files and send forward them to him. The documents in question were listed in Findings No. 17 and No. 19; a comment letter dated April 4, 2012, on a hydrologic and hydraulic study, and an approval letter dated December 31, 2012, for the hydrologic and hydraulic study.

In addition, Joel also asked if ODNR had any grant monies available for the remediation of the area once the dam has been breached. Tina explained that she was not aware of any additional funding than what was discussed at the meeting held between the parties on March 6, 2017.

Historic "Rezzy Dam" in Massillon could be torn down
03/07/2017
WOIO-TV Online

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VIDEO INCLUDED IN LINK

MASSILLON, OH (WOIO) - Massillon City officials have been given notice -- repair Sippo Creek Reservoir Dam or tear it down.

The order came down from the Ohio Department of Natural Resources. The dam is in danger of overflowing during a major storm.

The historic dam, also known as "Rezzy Dam," is more than 100 years old.

Some say they come to Reservoir Park just to see and hear it.

"We started to walk that way and I said, let's go this way, we call it the falls," said one woman.

ODNR wants city officials to lower the damn by 4 feet.

"The water always flows over and when we get heavy rains that water flow becomes heavier and heavier and I think that's where the ODNR concern is," said Joel Smith, Director of Public Safety & Service.

Smith says repairs could be costly---upwards of $800,000. Money the city doesn't have because it's still in a fiscal emergency.

Tearing it down costs too and the damn would go back to it's natural state, a small stream.

Those who enjoy the park say, it won't be the same.

"I think there would be a difference. I think there would be a difference," said Jerry Gross.

"We are seeking an extension on our timeliness...we have to come up with a solution here," said Smith.

Officials have been meeting with construction crews and contractors about the repairs.

They will present that info to the city council next Monday.

The state has given public safety officials until March 27.

Massillon alerted of order on Sippo Creek Reservoir Dam
03/07/2017
Independent Online, The

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City officials were given notice late last week by the state that swift action is necessary regarding what's next for the Sippo Creek Reservoir Dam.

Engineer David Krock told City Council Monday night that the Ohio Department of Natural Resources has placed a March 27 deadline on the city to either lower the depth of water in the reservoir by 4 feet or remove the dam altogether. The city is exploring its options and is hoping to extend the deadline, he said.

The structure, also known as "Rezzy Dam," is approximately 130 years old. Safety and reducing the risk of

the dam overflowing during a major rainstorm are main reasons for the department's requirement, Krock said.

On Feb. 27, Krock said his office was looking at two future options for the dam — repair the structure or tear it down. At the time, he said the city had months to review both ideas, but the state's decision a few days ago derailed that plan.

Safety-Service Director Joel Smith said Monday the depth of water in the reservoir is only between 4 and 6 feet, due to a high buildup of silt near the dam. So reducing the water level by 4 feet will essentially make it a pass-through stream.

More discussion on the dam is planned for council's next work session, which is slated at 6:30 p.m. Monday.

Prior to next week, Smith said he plans to explore cost estimates of potential contractors for lowering the water depth and removing the dam. That information will be presented to council Monday.

"We're kind of under the gun here because of the ODNR order," he said.

Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR | JAMES ZEHRINGER, DIRECTOR

Division of Water Resources
Andrew D. Ware, Chief
2045 Morse Road/Building B-3
Columbus, Ohio 43229
614-265-6620
dswc@dnr.state.oh.us

March 7, 2017

The Honorable Kathy Catazaro-Perry
City of Massillon
Municipal Government Annex
151 Lincoln Way East
Massillon, OH 44646

RE: Sippo Creek Reservoir Dam
File Number: 0614-012
Stark County

Dear Mayor Catazaro-Perry:

I would like to thank you and your staff members for meeting with us on Monday, March 6, 2017, in Columbus to discuss the requirements of Chief's Order Number 2017-101 sent to you on February 21, 2017, concerning Sippo Creek Reservoir Dam. There are several serious deficiencies at this dam that need to be brought into compliance with Ohio dam safety laws.

During the meeting, we discussed different types of funding and you were provided contact names and phone numbers to inquire about these funds. We also discussed the different remediation options including repairing, modifying, or breaching the dam. It is our understanding that you may choose to breach the dam. Until the dam is breached or repaired, we discussed the need for immediately lowering the reservoir by at least four feet and performing regular inspections of the dam. I ask that you notify the Division of Water Resources when the lowering of the water level begins and when four feet of draw down has been obtained. My staff sent your engineer, David Krock, P.E., information on regularly inspecting the dam and a checklist specific to Sippo Creek Reservoir Dam.

In addition, we discussed the need to develop a schedule to bring this dam into compliance. In order to assist you in developing the repair schedule, I have enclosed Guidelines for Repairing Dams and a Proposed Schedule for Repairs. Please develop and submit this schedule by March 21, 2017.

It is our intention that this dam will meet the requirements of the law and we look forward to your cooperation in meeting this goal.

With regards,

Andrew D. Ware, Chief
Division of Water Resources

ADW:tmg

cc: David G. Krock, P.E., OHM Advisors
Joel Smith, City of Massillon
Tina Griffin, P.E., Division of Water Resources

Enclosures

Guidelines for Repairing Dam

The following list describes the activities that may be required to repair a dam. Please note that not all items may be necessary or there may be additional activities needed.

1. **Investigate Funding.** Depending on the situation, it may be necessary to obtain funding from various sources. Low interest loans may be available from the Ohio Water Development Authority. For ***publicly owned dams***, you may qualify for a loan to make required repairs from the Ohio Dam Safety Loan Program administered by the Ohio Water Development Authority (OWDA). To find out more about the program, please contact OWDA's Loan Officer at 614/466-5822. For ***privately owned dams***, you may qualify for a reduced-interest loan to make required repairs through the Dam Safety Linked Deposit Program administered by the Ohio Water Development Authority (OWDA). To find out about this program, please contact OWDA's Chief Operating Officer at 614/466-5822.

2. **Create a list of engineers.** A registered professional engineer who is qualified in the design, construction, and inspection of dams is required. A list of engineering firms who have worked with ODNR on dam design or repair projects or who are interested in working on dam projects can be downloaded from the Division of Water web page at http://ohiodnr.com/Water/DamSafety/Dam_Safety_Home/tabid/3329/Default.aspx. See Ohio Administrative Code (OAC) Rule 1501:21-3-02 for additional information.

3. **Select an engineer.** Please refer to the ASDSO pamphlet titled "Dam Ownership, Procuring the Services of a Professional Engineer" for information on how to choose an engineer. The pamphlet can be obtained from the *resource center* portion of the ASDSO website at www.damsafety.org or by telephone at 606-257-5140.

4. **Secure other permits.** Other permits may be required from other governmental agencies such as the U.S. Army Corps of Engineers or the Ohio Environmental Protection Agency (OEPA). The Corps of Engineers, through Section 404 of the Clean Water Act, requires permits for activities that involve a discharge of dredged or fill material into a water of the United States including wetlands. Activities that will drain or flood a wetland or significantly disturb the soils of a wetland also require a permit. Examples of regulated activities include but are not limited to: dredging, filling, excavating, land clearing using mechanized equipment, ditching, stream channelization and relocation. Information regarding the Corps of Engineers regulatory program can be obtained from their website at www.usace.army.mil/inet/functions/cw/cecwo/reg/. You may also be required to obtain a Section 401 Water Quality Certification from the OEPA. The OEPA website can be found at www.epa.state.oh.us/dsw/401/401WetlandSection.html. ODNR, Division of Water has developed a stream management guide that covers many of the types of permits that may be needed for work in or near streams. The guideline is titled "Permit Checklist for Stream Modification Projects (guide no. 6)" and can be downloaded at http://www.dnr.state.oh.us/water/pubs/fs_st/stfs06.htm or requested by phone at (614) 265-6740. Please work with your engineer to determine which, if any, other permits are required.

5. **Engineer investigates site and prepares design report, plans, and specifications.** Information regarding foundation, on-site materials, surveys, and hydrologic and hydraulics investigations can be found in OAC Chapter 1501:21-11. Information regarding design flood, spillway design, pipe conduit spillways, drains and other pipes, freeboard, and additional design requirements can be found in OAC Rule 1501:21-13-02 through 1501:21-13-08. If the repair is motivated by an inspection report issued as part of a periodic inspection performed by ODNR, plans and specifications must be prepared for the items listed in the "Engineer Repairs and Investigations" portion of the "Required Remedial Measures" section of the report. Routine items listed in other sections of the inspection report are not required to have plans and specifications developed.

6. **Prepare OM&I/EAP.** An Operation, Maintenance, and Inspection Manual (OM&I) and an Emergency Action Plan (EAP) may be required. The OM&I/EAP can be completed at any time once the scope of the project is known. The OM&I/EAP must be submitted before or at the same time as the engineer's certification and as-built plans. A description of the OM&I/EAP can be found in OAC Rules 1501:21-15-06

Proposed Schedule for Repairs

This schedule sets forth proposed timelines for repairs to _____ Dam.

This schedule should reflect any unique circumstances of this project. Please refer to the Guidelines for Submitting a Schedule for Repairs for additional information about each activity. Only include the activities that are applicable to your project. You may need to alter some activities or add additional activities depending on your project. Each activity must have a proposed date that it will be completed.

ACTIVITY	DATE TO BE COMPLETED
1. Investigate funding	
2. Create a list of engineers	
3. Select an engineer	
4. Secure other permits	
5. Engineer investigates site and prepares design report, plans and specifications	
6. Prepare OM&I and EAP	
7. Submit design report, plans, and specifications	
8. Secure funding	
9. Obtain bids from contractors	
10. Choose a contractor	
11. Develop a construction schedule	
12. Hold pre-construction meeting	
13. Start construction	
14. Complete construction	
15. Submit as-built plans and engineer's certification to ODNR, and finalized EAP & OM&I	
16. Final inspection and approval by ODNR	

Built 1886

City mulling two options for Sippo Creek Reservoir Dam

Monday

Posted Feb 27, 2017 at 9:29 PM

Massillon Engineer David Krock told City Council Monday night that his office is looking into repairing or removing the structure.

By Steven M. Grazier
IndeOnline.com staff writer

MASSILLON The fate of an approximately century-old city structure should be decided within a few months.

City Engineer David Krock told City Council Monday night that his office is looking at two future options for the Sippo Creek Reservoir Dam — repair the structure or tear it down.

The dam does not need immediate repairs, and is not in any danger of falling apart, Krock said to council during Monday's work session. However, the age of the structure and wear-and-tear over the years has taken a toll.

"It's in need of some TLC," Krock said.

In 2015, the Ohio Department of Natural Resources conducted a safety and structural study on the dam and outlined potential repairs, said Krock, who did not have a list of specifics handy on Monday.

Cost to repair the dam is estimated at $831,000, according to Krock, who said that figure is about two years old.

Work to remove the dam should cost about $500,000 and would be of little or no cost to the city, Krock said. Grant money is available through the Environmental Protection Agency to help cover the rate.

The process of removing the dam and allow water from Sippo Creek to flow freely would be time consuming, Krock said.

"It would be a slow process, probably four-to-five months," said Krock, adding that controlling sediment and ensuring clean water flows downstream are some factors.

Any decision on what to do with the dam is months away, so council can have more time to discuss and study both options. Councilman Paul Manson, D-at large, said he'd like know what to do by June 1.

"We know the dam has some problems, and there's a need to improve it," he said.

Kannik, Mia

From: David Krock <David.Krock@ohm-advisors.com>
Sent: Monday, February 27, 2017 12:07 PM
To: Kannik, Mia
Cc: Kathy Catazaro-Perry; Joel Smith; Greg McCue; Jason Popiel; Dave Maley
Subject: Sippo Creek Reservoir Dam - Massillon, OH
Attachments: Sippo Summary.pdf; Sippo Summary-Layout1.pdf

Ms. Kannik,

As a follow-up to our phone conversation this morning:

The City of Massillon has been working through our options on what to do with the Sippo Dam.

- Up through the fall of 2016, the City was heading in the direction of repairing the Dam. However, after reviewing cost estimates that exceeded $800k to repair the dam, the City decided to review the option of complete dam removal.
- The City has since twice met with Bill Zawiski, Ohio EPA – NE District Office, to review funding opportunities associated with removal of the Dam and restoration of the original streambed.
    - Attached you will find the following:
        - A written explanation and project timeline to meet the required submittal dates for funding via Ohio EPA
        - A Concept Plan that we are sharing with City Council this evening at 6:30pm to gain their public input on the Dam

The City Administration fully anticipates that the City Council and the Park Board will move forward with the necessary steps to fully remove the Sippo Dam, in accordance with our project timeline.

Regarding the Findings & Orders letter dated February 21, 2017 provided by ODNR, we have some concerns regarding our ability to meet the schedule outlined:

- Order #1:
    - By 2/27/2017: Please accept the attached documents as the Owner's Plan & Schedule
    - By 3/27/2017: Lowering the Water Level by 4'
        - The current lake drain is not operational
        - We have considered: Pumping down the water level; Using a Siphon; and boring a new outlet drain through the earthen section of the dam
            - None of these provide a good long-term scenario – especially during rain events, etc.
        - The other option is to remove a section of the existing dam – so a permanent lower spillway can be achieved
            - We are unable to complete this work at this time, since the dam is considered historical, and we need to have a plan in place with SHPO, before modifying the dam spillway
            - As part of our proposed schedule attached, we will have the historical review completed this year, as well as the environmental testing of soil sediment in the lake, so we can be sure that our proposed full removal of the dam and upstream restoration can proceed.
- Order #2:
    - The City intends to pursue Option 2(b) – breach of the dam (full removal and restoration)
    - The City needs time to:
        - Complete the Public Involvement process through the Park Board and City Council
        - Complete the Historical and Environmental processes via SHPO and EPA
        - Complete the application process to obtain funding via Ohio EPA for full dam removal

We do appreciate ODNR's responsibility to public safety, as well as the prior efforts by ODNR to see to it that the dam meets all regulatory requirements. The City of Massillon agrees with the need to move forward with a schedule that is expeditious and responsible.

The Mayor has expressed her willingness to work towards a solution – and is available to meet via conference call or in-person at ODNR in Columbus, upon your request.

Thank you for your consideration – and we look forward to hearing back from you very soon on next steps.

Thanks,
David G. Krock, PE
Massillon City Engineer

DAVID G. Krock, PE, ENV SP
DIRECTOR

OHM Advisors | ARCHITECTS. ENGINEERS. PLANNERS.

T 330.657.2145
D 330.913.1045
C 330.350.0521

Advancing Communities®

Kathy Catazaro-Perry, Mayor

Massillon
City of Champions

February 21, 2017

STATUS REPORT

MEMO from the Engineering Department, City of Massillon

TO: Mayor Kathy Catazaro-Perry

RE: Sippo Creek Dam Removal Project Summary

Historical Survey (OEPA)
This is required by OEPA, and Bill Zawiski (OEPA) will provide a recommended contact to complete the survey. The cost will be paid by the City of Massillon and has been estimated at $5,000.

Rendering of Park After Removal (OHM)
The rendering will show what the area will look like after removal of the dam, and upon integration of the landscaping and natural vegetation. During the process, coordination meetings may be required with the Park department prior to a final rendering.

Cost Estimate per Rendering (OHM)
A construction cost estimate is necessary to determine the amount of funding that will be requested by the. The OEPA will fully cover the cost of the dam removal, in addition to all necessary restoration and landscaping work necessary to establish green space within the newly created exposed land area.

EPA Environmental Survey (OEPA)
The Ohio EPA will conduct an environmental survey of current pond at the head of the dam. It consists of environmental samples and studies necessary to determine the existing water and underlying soils

DEFA Coordination Meeting (OEPA)
A meeting with the OEPA Department of Financial Assistance will be held to discuss the project status. The City of Massillon, OHM, and OEPA will meet at City Hall to discuss and verify the project is meeting requirements, and address any remaining issues or concerns.

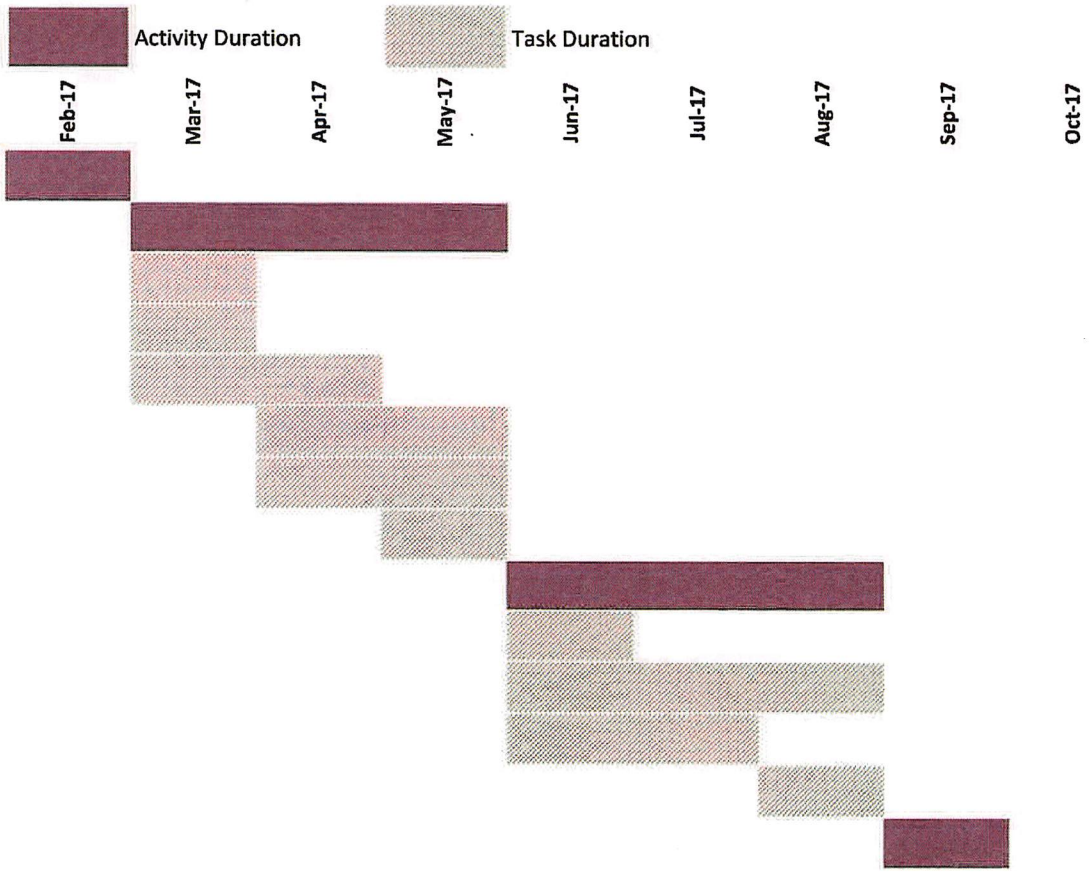
Park Board Recommendation to Council
The City's park and recreation board shall provide a recommendation to City council regarding the removal of the dam in comparison with the restoration of the dam, including associated costs. Mr. Zawiski (OEPA) can attend as needed to address questions and concerns, along with the final rendering presentation by OHM Advisors.

Application Process for Funding (OHM)
OHM Advisors, in close coordination with the Ohio EPA, will work to complete the application. The application is to be submitted in September of 2017.

Schematic Design & Cost Estimate (OHM)
A schematic design set of plans and cost estimate (approximately 30% complete set) will be completed for the proper design/bid process.

Municipal Government | Administration Building | 151 Lincoln Way East, Massillon, OH 44646
330.830.1700 | Fax 330.830.1764 | www.massillonohio.com

Sippo Creek Dam Removal



SIPPO CREEK RESERVOIR DAM - CONCEPT PLAN

WALKING TRAIL

LANDSCAPING AND GREEN SPACE

NATURALLY RELOCATED SIPPO CREEK

PUBLIC EDUCATION

OUTDOOR THEATRE FROM RECYCLED STONE

SIPPO CREEK DAM
REPAIR COST: $831,000

REMOVAL COST: $0
($500,000 EPA GRANT)

Griffin, Tina

From: McDaniel, Kathleen
Sent: Thursday, February 23, 2017 3:57 PM
To: Griffin, Tina
Subject: FW: UPS Delivery Notification, Tracking Number 1Z4760010395631542

Kathleen McDaniel

Records Management Officer
Dam Safety Program
Division of Water Resources
614-265-6731
http://water.ohiodnr.gov/safety/dam-safety

From: UPS Quantum View [mailto:pkginfo@ups.com]
Sent: Thursday, February 23, 2017 1:13 PM
To: McDaniel, Kathleen
Subject: UPS Delivery Notification, Tracking Number 1Z4760010395631542

Your package has been delivered.

Delivery Date: Thursday, 02/23/2017
Delivery Time: 01:08 PM

At the request of ODNR GENERAL SERVICES, this notice alerts you that the status of the shipment listed below has changed.

Shipment Detail

Tracking Number:	1Z4760010395631542
Ship To:	Parks & Recreation - Kim O'Farrell City of Massillon 505 ERIE ST N MASSILLON, OH 44646 US
UPS Service:	UPS GROUND
Number of Packages:	1
Weight:	1.0 LBS
Delivery Location:	FRONT DESK
Signed by:	CATRON
Reference Number 1:	737

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Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR | JAMES ZEHRINGER, DIRECTOR

Division of Water Resources
Andrew D. Ware, Chief
2045 Morse Road/Building B-3
Columbus, Ohio 43229
614-265-6620
dswc@dnr.state.oh.us

February 21, 2017

City of Massillon
Parks & Recreation Department
Kim O'Farrell, Director
505 Erie Street North
Massillon, OH 44646

RE: Sippo Creek Reservoir Dam
File Number: 0614-012
Stark County

Dear Ms. O'Farrell:

The Ohio Department of Natural Resources, Division of Water Resources has regulatory authority over dam safety in Ohio. As part of this authority, division staff began making periodic inspections of Sippo Creek Reservoir Dam in 1991. In total, the dam has been inspected five times and several site visits have been made. A Dam Safety Inspection Report was sent to the City of Massillon, Parks & Recreation Department for each periodic dam safety inspection. The 1991 Dam Safety Inspection Report stated, *"Overall, the condition of this dam is questionable. It appeared that very little regular maintenance has been performed on the embankment and the principal spillway, causing their condition to deteriorate."* Listed in the report were several repair, maintenance, and monitoring items that as a dam owner you were required by law to perform. The most recent inspection was performed on June 16, 2015. A copy of this report was sent to you on March 11, 2016. It was found that the required items listed in the 2015 report are the same required items listed in the 1991 report, indicating that no progress has been made to bring this dam into compliance over the past 26 years. On December 20, 2016, division staff made another site visit to the dam. It was found that the dam and spillway has continued to deteriorate. This dam is a Class I structure and poses a high risk to downstream human life and property. Because of this risk and the very poor condition of the dam, you must begin lowering the lake level immediately and take other actions to bring the dam into compliance.

Ohio Revised Code Section 1521.062 requires the owner of a dam to monitor, maintain, and operate the structure and its appurtenances safely in accordance with state rules and other requirements. It also allows the Chief of the Division of Water Resources to order the owner of any dam that is not safely maintained to perform such modifications, operational measures, or other actions necessary to safeguard life, health, or property. Accordingly, you are hereby ordered to perform all required measures outlined in the enclosed Chief's Order Number 2017-101. Full compliance may also be achieved through one of the options listed in the enclosed "Remediation Alternatives" fact sheet. Whether you intend to breach, modify, or repair the dam, you must submit plans and specifications prepared by a registered professional engineer to this office for review and approval prior to commencement of the work.

It is our intention that this dam will meet the requirements of the law and we look forward to your cooperation in meeting this goal. If you have any questions regarding this Chief's Order, please contact Mia Kannik of the Division of Water Resources at 614-265-6404.

With regards,

Andrew D. Ware, Chief
Division of Water Resources

ADW:tmg

cc: The Honorable Kathy Catazaro-Perry, Mayor, City of Massillion
Tina Griffin, P.E., Division of Water Resources

Enclosures

ORDER

BY THE CHIEF

OHIO DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WATER RESOURCES

Order Number 2017-101

TO: City of Massillon
Parks & Recreation Department
Kim O'Farrell, Director
505 Erie Street North
Massillon, OH 44646

RE: Sippo Creek Reservoir Dam
File Number: 0614-012
Stark County

Date: February 21, 2017

SUBJECT

Failure to monitor, maintain, and operate the dam and its appurtenances safely in accordance with state regulations; inability to pass the required design flood; severe deterioration of the principal spillway; no operable device to permit draining of the lake; lack of an Operation, Maintenance, and Inspection Manual; and lack of an Emergency Action Plan in violation of Ohio Revised Code (O.R.C.) Section 1521.062 and Ohio Administrative Code (O.A.C.) Rules 1501:21-13-02(A); 1501:21-13-03; 1501:21-13-04; 1501:21-13-06; 1501:21-15-06; and 1501:21-15-07.

Pursuant to O.R.C. Section 1521.062, the Chief of the Division of Water Resources ("the Division") makes the following findings and issues the following Order to the City of Massillon.

FINDINGS

1. The City of Massillon ("the Owner") is the owner of an earthen dam known as Sippo Creek Reservoir Dam ("the Dam") on Sippo Creek in Stark County, Perry Township, Ohio.

2. The Dam is a Class I structure pursuant to O.A.C. Rule 1501:21-13-01 and poses a high risk to downstream human life and property.

3. The date of construction for the dam is unknown, but it is believed to be approximately 100 years old.

4. On December 19, 1991, the Dam was first inventoried and inspected by the Division. The issued report on the inspection listed the overall condition of the Dam as questionable. The required remedial measures listed in the report were operability of the lake drain device, development of an Operation, Maintenance, and Inspection Manual, development of an Emergency Action Plan, inspection for structural integrity of the principal spillway, perform a hydrologic and hydraulic study, and prepare plans and specifications for the Dam to meet the required design storm.

5. On September 24, 1996, the Division was contacted by the Owner to discuss the 1991 Dam Safety Inspection Report. The Owner explained that no repairs had taken place to the Dam because of lack of funding, but that they would be allocating funding in the near future. The Division requested the Owner submit documentation explaining how and when the Owner intended on accomplishing the repairs in the future. No documentation was received.

6. On October 7, 1996, the Division was contacted by the Owner. The Owner requested an extension to the February 1997 deadline for repairs. The Division told the Owner that they would work with them, and again requested documentation explaining how and when the Owner intended on accomplishing the repairs in the future. No documentation was received.

7. On April 28, 1999, MS Consultants submitted a hydrologic and hydraulic (H&H) study on behalf of the Owner.

8. On May 27, 1999, the Division approved the H&H study.

9. On August 1, 2000, MS Consultants submitted plans and specifications for the Dam repair on behalf of the Owner.

10. On August 30, 2000, the Division sent the Owner and its consultant a comment letter pertaining to the August 1, 2000 plan submittal.

11. On November 20, 2000, MS Consultants submitted a revised H&H study to the Division on behalf of the owner.

12. On April 26, 2001 the Division performed a periodic dam safety inspection. The inspection found that no repairs had been performed on the Dam.

13. On November 14, 2006, the Owner sent a memo to the Division stating they had design plans and specifications for the dam completed in 2004 but had never submitted them to the Division. The plans and specifications were submitted with this memo.

14. On December 1, 2006, the Division contacted the Owner and informed them that the submittal was incomplete. The submittal did not include the revised H&H study or design calculations.

15. On May 25, 2010, the Division performed a periodic dam safety inspection. The inspection found that no repairs had been performed on the Dam.

16. On November 27, 2011, an H&H study was submitted by URS Corp. to the Division on behalf of the owner.

17. On April 4, 2012, the Division sent a comment letter addressing the H&H study to the Owner and their consultant.

18. On June 21, 2012, a revised H&H study was submitted by URS Corp. to the Division on behalf of the Owner.

19. On December 31, 2012, the Division approved the June 21, 2012 H&H study.

20. On January 17, 2013, URS Corp. submitted to the Division for cursory review a Feasibility Study to evaluate different overtopping protection materials.

21. On May 21, 2015, the Division spoke with the Owner to schedule a periodic dam safety inspection for the Dam and requested that the Owner attend. The Owner indicated they would attend.

22. On June 16, 2015, the Division performed a periodic dam safety inspection. The inspection found that no repairs had been performed on the Dam. The Owner did not attend.

23. On March 1, 2016, the Division received an email from AECOM (formerly URS Corp.) stating the Owner was planning on lowering the lake to perform a structural integrity inspection of the principal spillway below the water.

24. On October 7, 2016, the Division was contacted by the Owner, to discuss the deficiencies at the Dam. The Division explained to the Owner that this Dam is in very poor condition and that its failure could cause loss of life and property damage downstream. The Owner stated that they would like to have a meeting with the Division in Columbus and that they would be sending us suggested dates soon. No suggested dates were received.

25. On December 20, 2016, the Division conducted a site visit to check on the condition of the dam. It was found that the dam and its principal spillway continue to deteriorate.

26. On January 6, 2017, the Division emailed AECOM to request a copy of the report for the structural integrity inspection of the principal spillway. AECOM stated that the lake drain could not be operated to lower the water level; therefore, the inspection was not performed.

ORDER

The Owner shall perform the following remedial measures judged by the Chief as necessary to safeguard life, health, and property:

1. Beginning immediately and completed by March 20, 2017, Sippo Creek Reservoir shall be lowered four (4) feet below the principal spillway elevation. By February 27, 2017, the Owner must submit an acceptable plan or method to maintain the lowered lake level until the dam has been brought into compliance with Ohio's dam safety laws. This plan must be implemented by March 27, 2017. It is recommended that the reservoir be lowered at a rate of approximately one (1) foot per week, except as necessary during an emergency.

2. The Owner shall repair, breach, or alter the Dam such that it no longer falls under the Division's jurisdiction by performing the following measures:

   a. If the Owner chooses to repair the Dam or alter the Dam such that it no longer falls under the Division's jurisdiction:

      i. By March 20, 2017, the Owner must submit an acceptable schedule for full remediation or appropriate alteration of the Dam;

      ii. By March 22, 2018, the Owner shall submit final engineered plans for full remediation or appropriate alteration of the Dam; and

      iii. By December 31, 2018, the Owner shall complete construction to fully remediate or appropriately alter the Dam.

   b. If the Owner chooses to breach the Dam:

      i. By March 20, 2017, the Owner must submit an acceptable schedule for the permanent breach of the Dam;

      ii. By July 21, 2017, the Owner shall submit engineered plans for the permanent breach of the Dam; and

      iii. By December 31, 2017, the Owner shall complete construction to permanently breach the Dam.

It is so Ordered.

This Order is issued under the authority granted to me by O.R.C. 1521.062.

2-21-17
Issue Date

Andrew D. Ware, Chief
Division of Water Resources

NOTICE OF APPEAL RIGHTS

Pursuant to Chapter 119 of the Ohio Revised Code, you are hereby notified that you may request an administrative hearing regarding this Order. Any such request must be submitted in writing within thirty (30) days of the mailing date of this Order. Please note that this Order is being mailed to you on February 21, 2017. Requests for a hearing must be addressed to:

Chief, Division of Water Resources
Ohio Department of Natural Resources
2045 Morse Road, Building B-3
Columbus, Ohio 43229-6693

In the event that a request is made, at the hearing you may appear in person, be represented by your attorney, or be represented by such other representatives as are permitted to practice before the agency, or you may present your position, arguments or contentions in writing. At the hearing, you may present evidence and examine witnesses appearing for and against you.

Ohio Department of Natural Resources
Division of Soil and Water Resources
Fact Sheet

Fact Sheet 02–63

Remediation Alternatives

The Division of Soil and Water Resources, Dam Safety Program, has the statutory responsibility to ensure that human life, health, and property are protected from dam failures. The program regulates dams meeting certain height and storage criteria based on the provisions of the Ohio Revised Code (ORC) and Ohio Administrative Code (OAC). These criteria are listed in the ORC and OAC and in the Division of Soil and Water Resources's Construction Permit and Dam Classification fact sheets. For all dams meeting these criteria, the program regulates their construction, operation, and repair to ensure that dams meet the required safety standards set forth in the ORC and OAC.

When the program finds that a dam has been constructed without a permit or that an existing dam does not meet the required safety standards, the Division of Soil and Water Resources directs the owner to bring the dam into compliance. For a dam built without a construction permit, the owner would receive a letter that directs the owner to obtain a construction permit by following the construction permit requirements listed in the OAC and ORC. For an existing dam, the owner would receive a dam safety inspection report that lists required remedial measures. The owner must accomplish all of these required remedial measures. As alternatives to obtaining a construction permit or to accomplishing the required remedial measures listed in the inspection report, the owner may (a) remove the dam, (b) breach the dam, (c) modify the height of the dam to make it exempt from all or a portion of the construction permit and periodic inspection requirements, or (d) modify the purpose of the structure so that it does not meet the definition of a dam. Additional information about each of these alternatives is listed below.

Remove the Dam

Description: Dam removal consists of complete removal of the dam embankment to restore the original relief of the site. Removing the dam alleviates the need to obtain a construction permit or to accomplish the required remedial measures listed in the inspection report.

Requirements: The following items must be prepared by a registered professional engineer and submitted to the Division of Soil and Water Resources for review and approval: a plan for lowering the lake level, construction plans and specifications for removing the embankment, plans and specifications for controlling sediment in the impoundment, a description of erosion protection in the breach and dam embankment foundation areas, and a construction schedule. Other items may be required in certain circumstances. It is the responsibility of the owner to hire a qualified registered professional engineer.

Breach the Dam

Description: A breach is defined as an opening in a dam that prevents the dam from impounding a significant amount of water (see photograph). A breach extends from the upstream side of the embankment to the downstream side and typically has mild side slopes. A dam breach could be considered partial removal of a dam. Breaching the dam alleviates the need to obtain a construction permit or to address the required remedial measures listed in the inspection report.

Photograph of dam breach from downstream. White line shows former dam crest.

Requirements: The following items must be prepared by a registered professional engineer and submitted to the Division of Soil and Water Resources for review and approval: a plan for lowering the lake level, construction plans and specifications for constructing the breach, plans and specifications for controlling sediment in the impoundment, calculations or justification for sizing the breach, a description of erosion protection in the breach area, and a schedule for construction. Other items may be required in certain circumstances. It is the responsibility of the owner to hire a qualified registered professional engineer.

Modify the Height of the Dam

Description: Reducing the height of a dam reduces the

Continued on back!

dam's storage volume. This can make the dam exempt from the construction permit and periodic inspection requirements of the ORC or change the classification of the structure. Refer to the ORC for a complete description of the height and storage volume criteria. In summary, a dam is exempt from the construction permit and periodic inspection requirements when (a) it is not more than 6 feet high, or (b) it has not more than 15 acre-feet of storage volume at the top of dam elevation, or (c) it is not more than 10 feet high and has not more than 50 acre-feet of storage volume at the top of dam elevation. For reference, a dam that is 15 feet high and impounds a 2.5-acre lake has a storage volume of about 15 acre-feet. Modifying the dam to meet the above criteria alleviates the need to obtain a construction permit or to accomplish the required remedial measures listed in the inspection report.

The classification of a dam is based on three factors: the dam's height, storage capacity, and potential downstream hazard. Each factor is evaluated, and the final classification of the dam is based on the highest individual factor (Class I being the highest and Class IV being the lowest). When the classification based on downstream hazard is lower than the classification based on height and storage capacity, it is possible for the final classification of the dam to be changed if the height of the dam is reduced. In addition, reducing the height of a dam could change the potential impact of a dam failure on the downstream area, and thereby change the hazard classification. Changing the classification could alleviate the need to accomplish some or all of the required remedial measures listed in the inspection report. It should also be noted that Class IV dams do not require a construction permit; however, they do require submittal of the preliminary design report to the Division of Soil and Water Resources for approval.

Requirements: The following items must be prepared by a registered professional engineer and submitted to the Division of Soil and Water Resources for review and approval: a plan for lowering the lake level, detailed storage volume calculations, construction plans and specifications for lowering the dam crest, and supporting justification and calculations showing that the modified dam will operate safely. Other items such as a dam failure analysis may be required in certain circumstances. It is the responsibility of the owner to hire a qualified registered professional engineer.

Modify the Purpose of the Structure

Description: In accordance with OAC Rule 1501:21-3-01, the definition of a dam is "any artificial barrier together with any appurtenant works, which either does or may impound water or other liquefied material…A fill or structure intended solely for highway or railroad use that does not permanently impound water or other liquefied material as determined by the Chief is not considered a dam." It is possible to modify the dam so that it no longer meets the definition above. For example, draining the lake and installing a culvert at the streambed elevation or modifying the existing spillway to be a culvert may be acceptable. This alleviates the need to obtain a construction permit or to address the required remedial measures listed in the inspection report.

Requirements: The following items must be prepared by a registered professional engineer and submitted to the Division of Soil and Water Resources for review and approval: a plan for lowering the lake level, construction plans and specifications for the modification, plans and specifications for controlling sediment in the impoundment, calculations or justification for design, and a schedule for construction. Other items may be required in certain circumstances. It is the responsibility of the owner to hire a qualified registered professional engineer.

As a temporary measure, the lake level of a dam may be lowered and maintained at a lower level. A lower lake level makes the dam safer by reducing water pressure on the dam and its foundation, reducing the volume of water that would be released during a failure, and providing more flood storage capacity. Maintaining the lake at a lower lake level could allow for a less stringent time schedule for obtaining a construction permit, accomplishing required remedial measures, or modifying the size of the dam.

Other local, state, and federal approval may be required for the construction activities listed above. It is recommended that the owner contact the Ohio Environmental Protection Agency, Division of Surface Water - 401 Certification at (614) 644-2135, the local floodplain administrator, and the U.S. Army Corps of Engineers district office. You may also refer to the Division of Soil and Water Resources web site to review "Stream Management Guide, Permit Checklist for Stream Modification Projects, Guide No. 6" for more information regarding other agency approval or to review all of the Division of Soil and Water Resources fact sheets.

For additional information please contact:

Ohio Department of Natural Resources
Division of Soil and Water Resources
Dam Safety Program
2045 Morse Road
Columbus, Ohio 43229-6693
Voice: (614) 265-6731 Fax: (614) 447-9503
E-mail: water@dnr.state.oh.us
Website: http://soilandwater.ohiodnr.gov/
Emergency 24hr hotline: 614-799-9538

HISTORY

SIPPO CREEK RESERVOIR DAM

Unknown	Dam constructed.
12/19/1991	Dam inventoried and inspected. The first inspection listed the overall condition of the dam as "questionable". The engineering requirements listed operation of the lake drain, development of an EAP, perform a structural integrity inspection of the principal spillway, perform an H&H study, and prepare plans and specifications for dam to meet design storm.
09/24/1996	Newly appointed Director of Parks, Jim Siekel phoned DOWR to discuss the 1991 inspection report. He stated that no repairs had taken place because of lack of funding. He stated that he would be allocating for the funding in the near future. DOWR requested he send us documentation of when and how the city intended on accomplishing the repairs in the future. He stated that he would send the information and requested a list of engineers. The list was sent to the Director, but no documentation was received from the Director.
10/07/1996	The City Engineer phoned DOWR and requested an extension to their five year deadline. (Deadline 02/1997) DOWR stated that they would work with the owner and asked the owner to send us information to keep us abreast of the process. No information was ever submitted.
04/28/1999	Hydrologic and hydraulic (H&H) study submitted by MS Consultants.
05/27/1999	DOWR approved the H&H report.
08/01/2000	Plans and specifications for raising the dam so that it would meet the design storm were submitted to DOWR by MS Consultants.
08/30/2000	DOWR sent comment letter addressing the plans and specifications.
11/20/2000	MS Consultants submitted a new H&H study.
04/26/2001	Periodic inspection by the DOWR. Inspection found no repairs had been completed.
02/21/2006	Periodic inspection by the DOWR. Inspection found no repairs had been completed.
11/14/2006	Director of Parks, Kenn Kaminski, sent DOWR a memo stating that they City had a design repair plan and specifications completed in 2004 and never submitted it to DOWR. The plan was submitted with this memo.
12/01/2006	DOWR phoned Director and informed him that the submittal was incomplete. (Submittal did not include revised H&H study or calculations.)
05/25/2010	Periodic inspection by the DOWR. Inspection found no repairs had been completed.
11/27/2011	A new H&H study submitted to DOWR by URS Corporation (City changed engineers).

04/04/2012	DOWR sent comment letter addressing H&H study.
06/21/2012	DOWR received a response letter addressing the above comment letter from URS Corporation.
12/31/2012	DOWR approved the June 21, 2012 H&H study.
01/17/2013	URS Corporation submitted, via email, a feasibility study to the DOWR for cursory review.
05/21/2015	DOWR scheduled a periodic inspection with the new Director of Parks, Kimberly O'Farrell, and asked that she attend the inspection. She stated that she would attend the inspection.
06/16/2015	Periodic inspection by the DOWR. The Director of Parks did not attend. Inspection found no repairs had been completed but condition of dam is worsening.
03/1/2016	DOWR received an email from AECOM (formerly URS Corporation) stating that the City was planning on lowering the lake to do a structural integrity inspection of the principal spillway below the water level.
10/07/2016	DOWR was contacted by Steve Petro to discuss the dam because he was newly tasked with managing the dam. DOWR explained that the dam is in very poor condition. Mr. Petro stated that he would like to have a meeting in Columbus with himself, the Director of Parks, the Massillon City Engineer, and ODNR. He stated that he would email suggested dates the following week. No suggested dates were received by the DOWR.
12/20/2016	DOWR conducted a site visit to check on the condition of the dam. It was found that the dam had continued deterioration between 2010 and 2016.
01/06/2017	DOWR emailed AECOM to see if the underwater structural inspection of the principal spillway had occurred.
01/06/2017	AECOM emailed that the City Engineer they had been working with had left the position and the City hired OHM to act as their interim City Engineer. AECOM states that their work was put on hold once it was determined that the lake drain was inoperable and could not be used to lower the water level. Therefore, the underwater structural integrity inspection did not occur. AECOM also stated they have design plans and specifications about 60% complete and would like to get the dam repaired this year.

Griffin, Tina

From: Shore, Michael <michael.shore@aecom.com>
Sent: Friday, January 06, 2017 11:16 AM
To: Griffin, Tina
Subject: RE: Sippo Creek Reservoir and Shaker Lakes Dams

OHM Advisors
http://www.ohm-advisors.com/what-we-do/services/civil-engineering/

These guys are out of their Brecksville office.

Michael M. Shore, CFM
Senior Hydrologist, Water Resources Department
D 1-216-622-2448 C 1-216-526-7586
michael.shore@aecom.com

AECOM
1300 E. 9th Street, Suite 500, Cleveland, Ohio, 44114
T 1-216-622-2300 F 1-216-622-2301
www.aecom.com

Twitter | Facebook | LinkedIn | Google+

NOTE NEW ADDRESS!

From: Tina.Griffin@dnr.state.oh.us [mailto:Tina.Griffin@dnr.state.oh.us]
Sent: Friday, January 06, 2017 11:07 AM
To: Shore, Michael
Subject: RE: Sippo Creek Reservoir and Shaker Lakes Dams

What or who is OHM?

From: Shore, Michael [mailto:michael.shore@aecom.com]
Sent: Friday, January 06, 2017 10:52 AM
To: Griffin, Tina
Subject: RE: Sippo Creek Reservoir and Shaker Lakes Dams

Tina,
Long story short, the (Ex) City Engineer, Keith Dylewski left his position and the City hired OHM to act as the interim City Engineer.
We were put on hold once we determined that the lake drain was not operable, and could not be used to lower the lake for the structural inspection.
Hence, the structural inspection below normal pool has not been completed.
The Director of OHM is David Krock, c 330-350-0521 and his right hand is Jason Papiel c 330-687-8113.

I will ask the AECOM project manager, Scott Buchanan, the status of the project and determine if it is going to restart soon.

Griffin, Tina

From: Shore, Michael <michael.shore@aecom.com>
Sent: Friday, January 06, 2017 10:52 AM
To: Griffin, Tina
Subject: RE: Sippo Creek Reservoir and Shaker Lakes Dams

Tina,
Long story short, the (Ex) City Engineer, Keith Dylewski left his position and the City hired OHM to act as the interim City Engineer.
We were put on hold once we determined that the lake drain was not operable, and could not be used to lower the lake for the structural inspection.
Hence, the structural inspection below normal pool has not been completed.
The Director of OHM is David Krock, c 330-350-0521 and his right hand is Jason Papiel c 330-687-8113.

I will ask the AECOM project manager, Scott Buchanan, the status of the project and determine if it is going to restart soon.

We have the design plans and specs to about 60 percent and would like to get the project going again.
I would like to get this dam fixed this year.

Let me know if you need more info,
Regards,
Michael

Michael M. Shore, CFM
Senior Hydrologist, Water Resources Department
D 1-216-622-2448 C 1-216-526-7586
michael.shore@aecom.com

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www.aecom.com

Twitter | Facebook | LinkedIn | Google+

NOTE NEW ADDRESS!

From: Tina.Griffin@dnr.state.oh.us [mailto:Tina.Griffin@dnr.state.oh.us]
Sent: Friday, January 06, 2017 10:34 AM
To: Shore, Michael
Subject: RE: Sippo Creek Reservoir and Shaker Lakes Dams

Michael,

Are you still working with Sippo? I never did get pictures or the report on the structural inspection. Can you give me an update and tell me who with the City are you working with?

SITE VISIT REPORT

Name of Dam: Sippo Creek Reservoir Dam **File Number**: 0614-012

County: Stark **Date of Inspection**: 12/20/2016

Site Conditions: The sky was sunny, the temperature was about 20 degrees, and the ground was frozen.

Inspectors: Tina Griffin, P.E. and Josh Garland, Construction Specialist

Others Present: None

Comments:

Inspections over the past 20 years have indicated that this dam is in very poor condition and deteriorating. It is unknown exactly when the dam was built, but it is believed to have been nearly 100 years ago. The dam has a masonry spillway that is severely deteriorated. Sippo Creek Reservoir Dam is a Class I dam; therefore, the required design flood is 100% of the Probable Maximum Flood (PMF). Currently the dam can only pass 3% of the PMF before overtopping. Failure of this structure would cause probable loss of human life and property damage downstream. There are several other required remedial measures listed in the 2015 Dam Safety Inspection Report that had also been noted in the 2010 Dam Safety Inspection Report. No modifications had been completed to address these items. Therefore, the division wanted to view the condition of the dam since the last inspection 18 months ago (June 16, 2015).

The dam did not appear to have changed much since the 2015 inspection. However, deterioration was observed since the 2010 inspection as shown on the attached photos. The voids between the stones that comprise the spillway sidewalls continue to separate.

Tina Griffin 12/30/2016

Inspector's Signature Date

SIPPO CREEK RESERVOIR DAM
June 2010 verses December 2016
FILE NUMBER: 0614-012

View of the upstream slope that abuts the right principal spillway sidewall in 2010.

View of the upstream slope that abuts the right principal spillway sidewall in 2016. Though difficult to see because of the snow cover, erosion of the slope has increased.

View of the brick cutoff wall on the right side of the spillway in 2010. Note that the wall is intact.
(View from upstream to downstream)

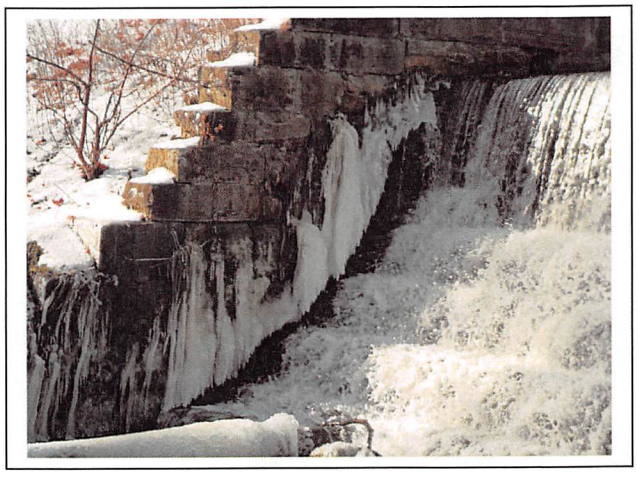
View of the brick cutoff wall on the right side of the spillway in 2016. Note that the wall has remained intact.
(View from right to left)

SIPPO CREEK RESERVOIR DAM
June 2010 verses December 2016
FILE NUMBER: 0614-012

View of the brick cutoff wall on the left side of the spillway in 2010. Note that the bricks are becoming displaced.

View of the brick cutoff wall on the left side of the spillway in 2016. Note that another layer of bricks has been displaced.

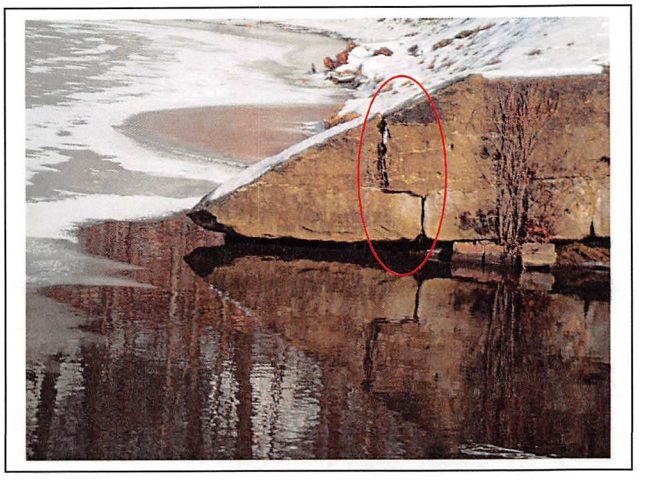
View of the right principal spillway side wall in June 2010. This wall has remained for the most part unchanged.



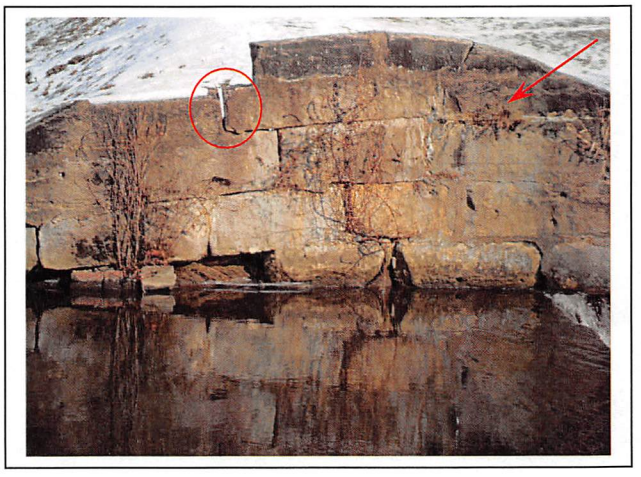
View of the right principal spillway side wall in 2016. The icicles indicate that water is flowing between the stones.

SIPPO CREEK RESERVOIR DAM
June 2010 verses December 2016
FILE NUMBER: 0614-012

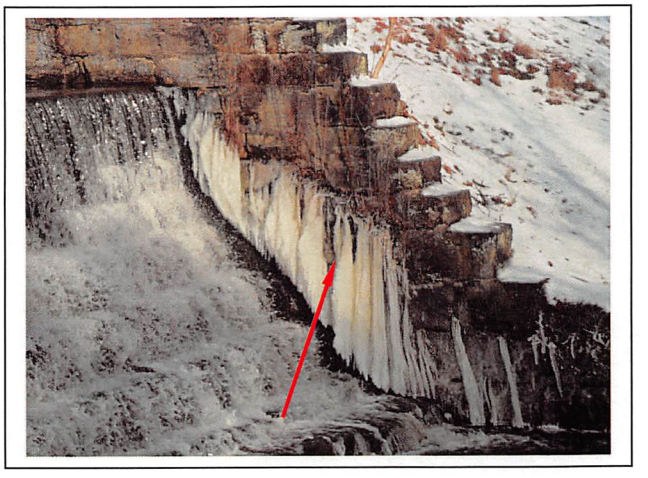
View of left principal spillway side wall in June 2010.



View of the upstream end of the left principal spillway wall in 2016. Note that the stones have shifted and now daylight can be seen between the stones.



View of the left principal spillway wall in 2016. Note again that the stones have shifted and now daylight can be seen between the stones. Also note that vegetation is growing between more of the joints, indicating the joints have separated.



View of the left principal spillway wall in 2016. The icicles indicate water is flowing through the joints of the wall.

10/7/16 Sippo Creek Res 0614-012 Stark Co City of Massillon

(330-880-3525)

Steve Petro is newly tasked w/ managing this dam. He received the 2015 Inspection Report + called to discuss.

Dia explained to him that the dam was in very poor condition. He wants to schedule a meeting here in Columbus with their Parks Director, himself, their City Engineer and ODNR. He will email Tina dates to choose from next week.

Griffin, Tina

From: Griffin, Tina
Sent: Tuesday, March 08, 2016 8:07 AM
To: 'Shore, Michael'
Subject: RE: Sippo Creek Reservoir and Shaker Lakes Dams

Michael,

I have heard from

Kimberly A. O'Farrell, CPRP
Director of Parks and Recreation
Massillon Parks & Rec Department
"City of Champions"
505 Erie Street North
Massillon, OH 44646
330.832.1621 Ext. 112

But she has no idea who you are. Who are you working through on Sippo?

From: Shore, Michael [mailto:michael.shore@aecom.com]
Sent: Friday, March 04, 2016 9:40 AM
To: Griffin, Tina
Subject: RE: Sippo Creek Reservoir and Shaker Lakes Dams

Tina,
Thanks for getting back to me on this.
I am using ACB on the right abutment at Sippo and a RCC overlay on the left abutment.
Works better that way. I will send you a conceptual plan for the project to make sure you are ok with it.
That one I am not worried about since the ACBs will be in a limited area and the head/tailwater difference is minimal.

On Green Lake, I am determining the best way to get the water off the road and into the ds channel.
The original plan had two TRM letdown auxiliary spillways, but I would rather use ACBs. Concrete is not a solution for various reasons like aesthetics, cost, etc., but rock may be an option.
I will send you a conceptual plan that shows the limits of the dam and the proposed tree removal.

I am just getting restarted on the Shaker Lakes.
I will have to look at my notes to see if we met there.
It would have been in 2013, when I was working on Briar Hill (I know I still owe you the EAP).
We wanted to meet at both sites when you were in the area, but I don't recall that we did.

Regardless, we can discuss what I am proposing on those projects, after I get Swan resolved.

We can catch up next week.
Regards,
Michael

Michael M. Shore, CFM
Senior Hydrologist, Water Resources Department
D 1-216-622-2448 C 1-216-526-7586

06/14-012

Griffin, Tina

From: Shore, Michael <michael.shore@aecom.com>
Sent: Friday, March 04, 2016 9:40 AM
To: Griffin, Tina
Subject: RE: Sippo Creek Reservoir and Shaker Lakes Dams

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Regards,
Michael

Michael M. Shore, CFM
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1300 E. 9th Street, Suite 500, Cleveland, Ohio, 44114
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www.aecom.com

Twitter | Facebook | LinkedIn | Google+

NOTE NEW ADDRESS!

From: Tina.Griffin@dnr.state.oh.us [mailto:Tina.Griffin@dnr.state.oh.us]
Sent: Thursday, March 03, 2016 4:19 PM
To: Shore, Michael
Subject: RE: Sippo Creek Reservoir and Shaker Lakes Dams

Michael,

We do not need to be there when they lower the reservoir to do the structural inspection. I would appreciate pictures and a copy of the report.

We will need to approve plans and specifications before they can replace the lake drain valve.

You say that for Green Lake you are planning on adding ACBs? Did I read that right, or do you mean Sippo. We agreed, as a special circumstance, to allow the use of ACBs on Sippo. That doesn't mean we will allow them anywhere. Actually, hardly anywhere. But whichever one it is, send it and we will review it for concept. And I could have sworn that we had been out on the dam and discussed the tree removal in the past. But you can send me a tree map and I will review it also. But if they are on the dam, they are coming off.

From: Shore, Michael [mailto:michael.shore@aecom.com]
Sent: Tuesday, March 01, 2016 1:04 PM
To: Griffin, Tina
Subject: RE: Sippo Creek Reservoir and Shaker Lakes Dams

Tina,
I forgot to mention that I am also working on completing plans for the Sippo Creek Reservoir Dam in Massillon, and the Shaker Lakes Dams restart projects (Green Lake and Horseshoe).
I have a few questions on those projects.

We are planning on lowering the Sippo Creek Reservoir to perform a structural inspection this month. Is that something that the City needs to let you know about?
Also, the City is thinking about repairing the lake drain outlet while the lake is lowered and possibly using that as the lowering mechanism.
Currently, the existing lake drain valve is not operable (we tried). They are thinking of removing the non-working valve and replacing it. (See attached photo of outlet and valve)
Do you need to have plans and specs for that repair approved before they start? I told them that I thought you did, but it is not currently in our scope.

For Green Lake we are planning on adding a parapet wall to divert overtopping flows and adding Articulated Concrete Block letdowns. Can I send you a conceptual plan to make sure the design is acceptable? We don't want to get too far with the plans and specs without some assurance that it can be approved with the proper calcs.

Also, the City/property owners around the Green Lake Dam do not want to remove the trees on the dam (or remove a few as possible). They requested that I make a determination on what was, and was not part of the dam to limit the tree removal. I am putting a map together of the trees that need to be removed. Can you look at the map and make sure we are removing enough trees?
At one time we were going to meet at the site(s) to go over the plans. That didn't happen. We would like to remove the trees before the April 1 bat tree date.

Let me know how to proceed on both these projects.
Thank you.
Michael

Michael M. Shore, CFM
Senior Hydrologist, Water Resources Department
D 1-216-622-2448 C 1-216-526-7586
michael.shore@aecom.com

AECOM
1300 E. 9th Street, Suite 500, Cleveland, Ohio, 44114

Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR | JAMES ZEHRINGER, DIRECTOR

Division of Water Resources
Michael D. Bailey, Chief
2045 Morse Road/Building B-3
Columbus, Ohio 43229
614-265-6620
Email: dswc@dnr.state.oh.us

March 11, 2016

City of Massillon
Kim O'Farrell, CPRP, Director
Parks & Recreation
505 Erie St. North
Massillon, OH 44646

RE: Sippo Creek Reservoir Dam
File Number: 0614-012
Stark County

Dear Ms. O'Farrell:

Thank you for allowing Tina Griffin and Neil Shop of the Division of Water Resources to conduct a safety inspection of Sippo Creek Reservoir Dam on June 16, 2015. This inspection was conducted by representatives of the Chief of the Division of Water Resources under the provisions of Ohio Revised Code (ORC) Section 1521.062 to evaluate the condition of the dam and its appurtenances. The Chief has the responsibility to ensure that human life, health, and property are protected from dam failures. 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. A copy of the laws and administrative rules for dam safety is available on the division's web site or by request. I have enclosed guidelines for preparing an operation, maintenance, and inspection manual and guidelines for preparing an emergency action plan.

The enclosed inspection report was generated based on available information and is hereby provided for your use and study. Listed in the report are several repair, maintenance, and monitoring items that as a dam owner you are required by law to perform. Completion of these required items will improve the safety and overall condition of the dam. The Chief must approve any plans for modifications or repairs to the dam. Modifying or repairing a dam includes, but is not limited to, installing or replacing a spillway pipe or a portion of a spillway, raising the embankment crest elevation, raising the normal pool level, and placement of fill and/or piping in an open channel spillway. Following approval of the engineered plans, all necessary repairs must be implemented by the owner under the supervision of a registered professional engineer. Failure to complete the repair, maintenance, and monitoring items may result in legal enforcement of these requirements in the form of an order from the Chief of the Division.

To gain information that will help improve the inspection program, a short survey has been developed and is enclosed. Please complete the survey and return it in the self-addressed envelope provided. Your feedback is important.

It is the Division's understanding that you are the owner(s) of this dam. Under Ohio's dam safety regulations, "owners" are "those who own, or propose to construct a dam or levee." OAC Rule 1501:21-3-01(V). A "dam" is defined as "any artificial barrier together with any appurtenant works, which either does or may impound water or other liquefied material …" OAC Rule 1501:21-3-01(F). "Appurtenant works" include but are not limited to outlet works and spillway channels.

If you are not an owner of this dam, or believe that there are additional owners of the dam not addressed in this communication, please contact Tina Griffin. Please note that ORC Section 1521.062 requires a dam owner to notify the Chief of the Division of Water Resources in writing of a change in ownership of a dam prior to the exchange of the property.

Your cooperation in improving the overall condition of this dam is appreciated. Please contact Tina Griffin at 614/265-6634 if you have any questions.

Sincerely,

Mia P. Kannik, P.E.
Program Manager
Dam Safety Program
Division of Water Resources

MPK:tmg

cc/enc: Tina Griffin, P.E., Division of Water Resources, Dam Safety Program

Enclosures

Banachowski, Keith

From: Shore, Michael <michael.shore@urs.com>
Sent: Thursday, May 09, 2013 3:55 PM
To: Banachowski, Keith
Cc: Damian, Mike
Subject: Sippo Creek Reservoir

Follow Up Flag: Follow up
Flag Status: Flagged

Keith,
This is a follow up to our conversation last week regarding you forwarding the Sippo Creek Reservoir Dam Feasibility Study to the construction group to have them make comments/recommendations/and requirements.
If you have sent the study to them for review, please let me know. The client wants to start the rehabilitation design this year.
If the construction group needs to know more about the product, I can send some lab testing information the manufacturer sent me.
Also see http://www.synteccorp.com/index-6.html
I need to know if TRM, overlain with the ScourShield product, if designed properly, can be approved on Sippo Creek Reservoir Dam and Swan Lake Dam. They are both small dams that overtop and have large drainage areas

I also need to have a statement from ODNR, to send to the client, to the effect that any reasonable engineered design that is stamped by a qualified PE with dams experience, will be approved by the dam safety section, if the design will safely pas the design flood. Is that something that you can provide?

Any help you can give me regarding this matter would be most appreciated.
Regards,
Michael M. Shore, CFM
Senior Hydrologist
URS
Architects-Engineers-Planners
1375 Euclid Avenue, Suite 600
Cleveland, OH 44115
216-622-2400 Ext. 448
216-622-2448 (Direct)
216-622-2464 (Fax)
michael.shore@urs.com

Banachowski, Keith

From: Shore, Michael <michael.shore@urs.com>
Sent: Thursday, January 17, 2013 4:49 PM
To: Banachowski, Keith
Subject: FW: Sippo Creek - Misc. Details Regarding ArmorFlex
Attachments: New Tapered Details.pdf; Sippo Reservoir Dam-Feasibility-Report_ALL_FINAL_01-17-13.pdf

Importance: High

Follow Up Flag: Follow up
Flag Status: Flagged

Keith,
I spoke to the Contech Project Consultant (see below) and their hydraulics engineer. They provided the attached details. I am not sure if you have seen this before.

I put in a cost to armor the dam with the 40T product. I priced out the stainless steel cables to be conservative.

If they select this product, I will need to get it approved by ODNR preliminarily to make sure it is acceptable.

I also had another site specific question. I did not include armoring on the west side of the abandoned pump house. Floods do pass over this area but not until the backwater has submerged the dam and the flows through this area are off the dam proper. Depths and velocities are also not expected to be erosive through this area.
In addition, the road is hard-packed and will probably act as an erosion control.
Does erosion protection need to be added to that area? Could it be a few yards of TRM? If that area needs to be protected, I will need to revise my costs.

In addition, I am attaching the Feasibility study to have you give it a cursory review to see if the options are feasible based on ODNR regulations.
I would like to believe that all these options have been thought through.
It appears that the preferred option would be the articulated block, based on cost and ease of construction.

Thanks for all your help with this.
Regards,
Michael M. Shore, CFM
Senior Hydrologist
URS
Architects-Engineers-Planners
1375 Euclid Avenue, Suite 600
Cleveland, OH 44115
216-622-2400 Ext. 448
216-622-2448 (Direct)
216-622-2464 (Fax)
michael.shore@urs.com

From: Dombroski, Ken [mailto:KDombroski@conteches.com]
Sent: Thursday, January 17, 2013 1:58 PM
To: Shore, Michael
Subject: Sippo Creek - Misc. Details Regarding ArmorFlex
Importance: High

Michael,

During our last meeting, you raised a few questions that you wanted me to confirm regarding ArmorFlex product details.

1. Intermediate trenches are not needed. See the attached details to provide clarity regarding anchoring at the top and toe of slopes. The details also show the grout seam between mats. The flanking detail refers to the mats at the outer edges of the area to be covered with Armor Flex.
2. The cables do not perform a structural function once the mats are installed. The cables are meant as a tool/aid in the installation of the block mats.
3. Since the cables do not provide a structural function, there service life might be a non-issue. None of the cable manufacturers are willing to let us publish a service life on their cables (stainless steel, galvanized steel, polyester, etc.) because they do not know the elemental conditions their product will be exposed to after installation. Our recommendation is to use the galvanized steel cables because the polyester are not that far apart on cost and provide greater factor of safety during the installation phase.
4. Stainless steel cables will add around $1.50 per sf cost to the project.

It is my understanding that we have already educated ODNR regarding the role of the cables in the AromorFlex product. Let me know if they still insist that the cables are performing a structural function after the mats are installed. Once installed, there is no load transfer from block to block via cables.

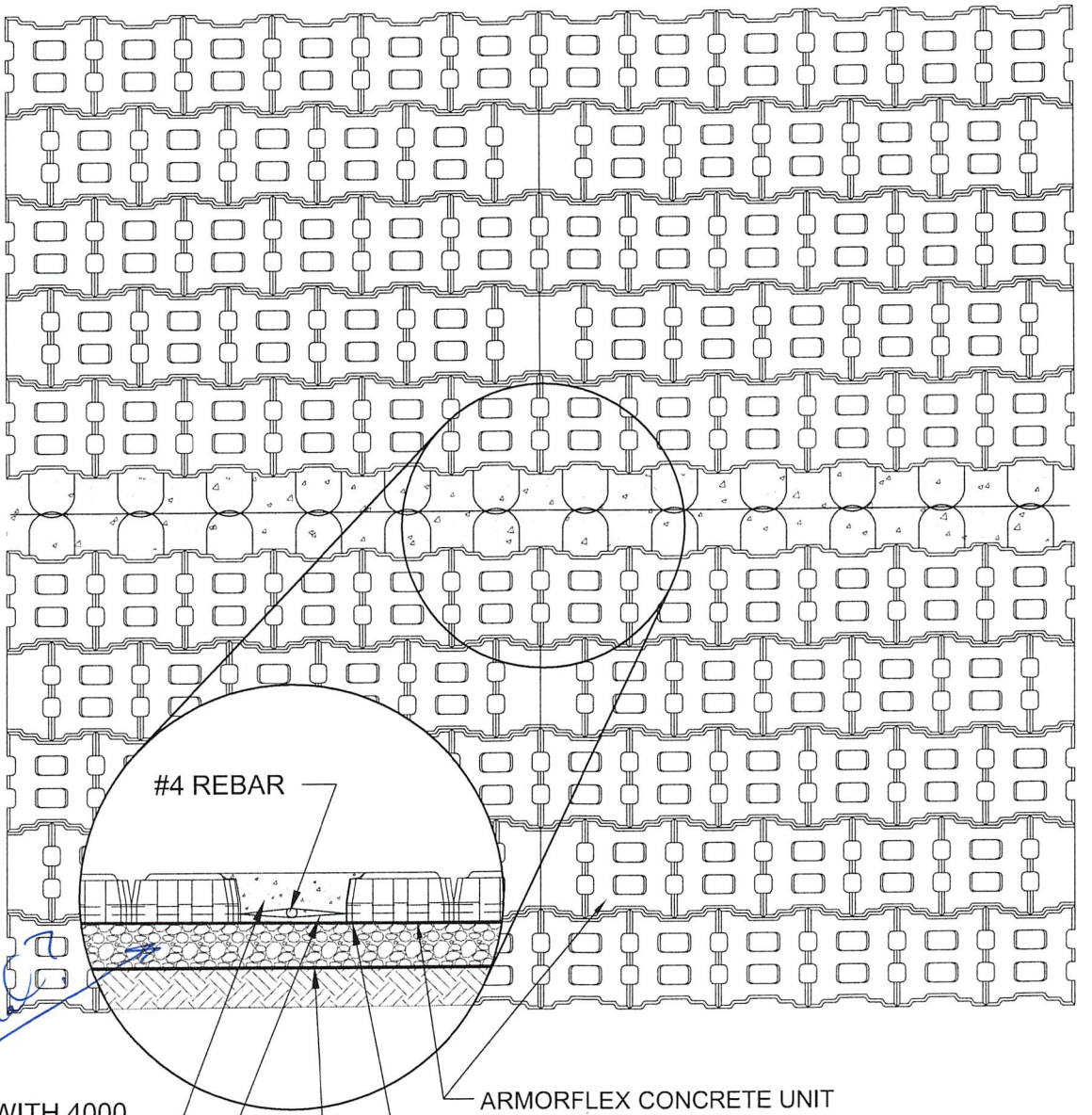
I see you and Barrie are going back and forth regarding the hydraulics. Please continue directing the hydraulic questions his way.

Talk to you soon.

Ken

Kenneth Leo Dombroski, PE, MPA
Project Consultant

Contech Engineered Solutions LLC
Off: 330-523-8073 Mob: 330-523-8073
kdombroski@conteches.com
www.ContechES.com



TYP. MAT TO MAT

NOT TO SCALE

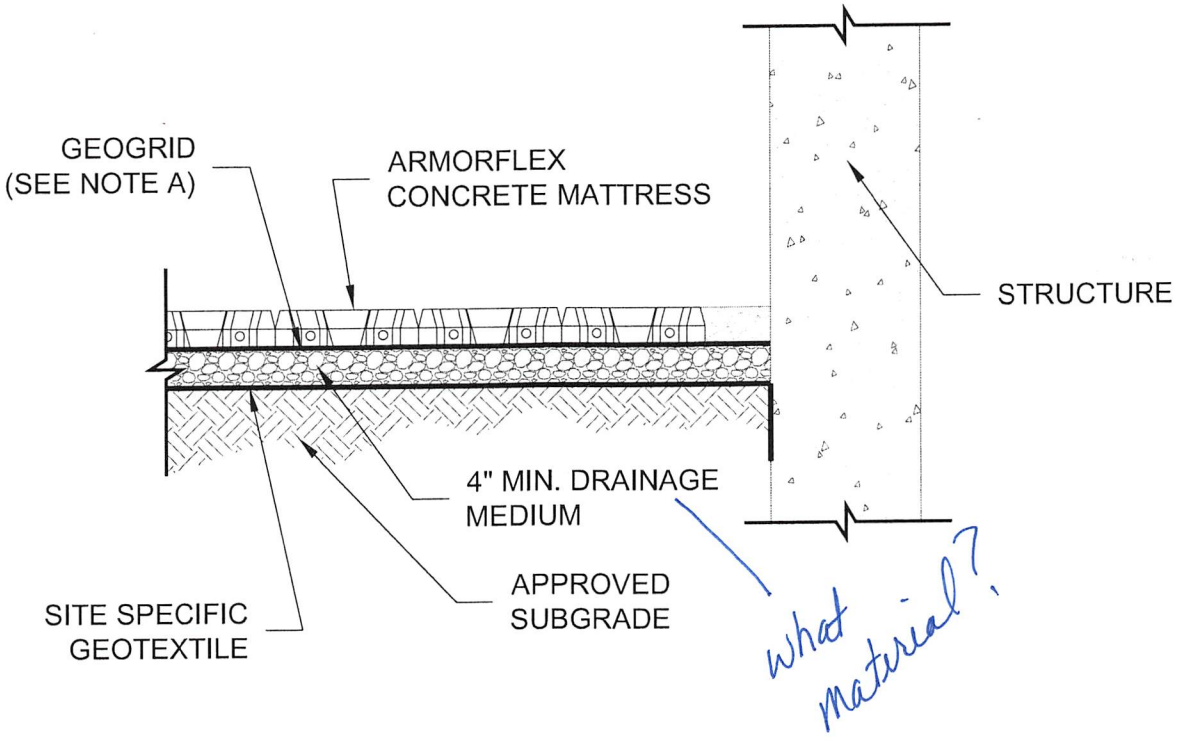
#
CT1

NOTE A: APERTURE SIZE OF GEOGRID TO BE SMALLER THAN D10 OF DRAINAGE STONE FOR RETENTION.

DRAWN BY:	CHECKED BY:	DATE:	SCALE:
KWM	CBK	7/14/07	NTS

ARMORFLEX TYP. MAT TO MAT DETAIL

ARMORTEC
Erosion Control Solutions
A CONTECH COMPANY
9025 CENTRE POINTE DR, SUITE 400
WEST CHESTER, OHIO 45069
PH: (513) 645-7000 FAX: (513) 645-7993



ARMORFLEX MAT TO STRUCTURE

2
CT1

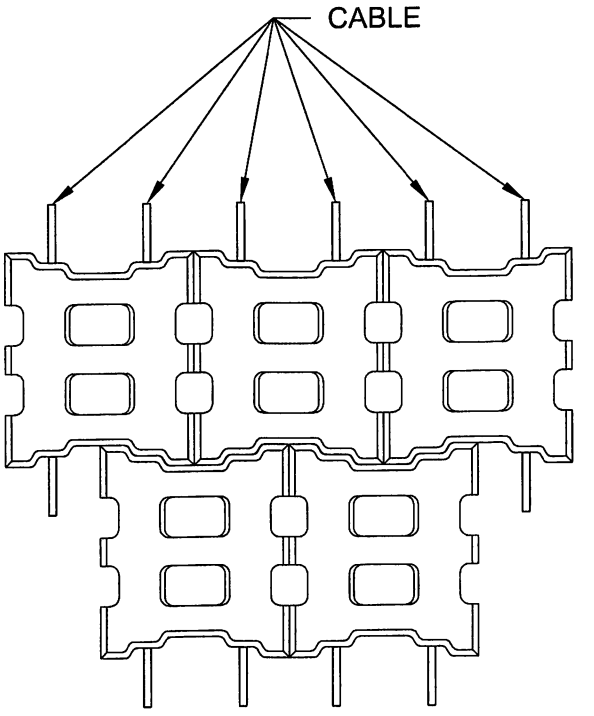
NOT TO SCALE

NOTE A: APERTURE SIZE OF GEOGRID TO BE SMALLER THAN D10 OF DRAINAGE STONE FOR RETENTION.

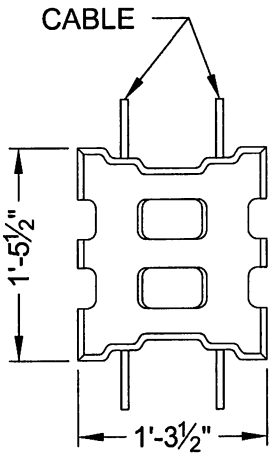
DRAWN BY:	CHECKED BY:	DATE:	SCALE:
KWM	CBK	7/14/07	NTS

ARMORFLEX TYP.
MAT TO MAT
DETAIL

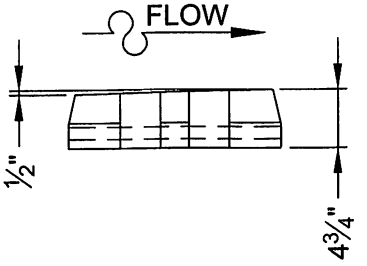
ARMORTEC
Erosion Control Solutions
A CONTECH COMPANY
9025 CENTRE POINTE DR, SUITE 400
WEST CHESTER, OHIO 45069
PH: (513) 645-7000 FAX: (513) 645-7993



PLAN



TOP



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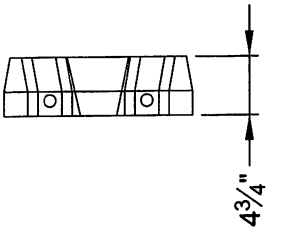

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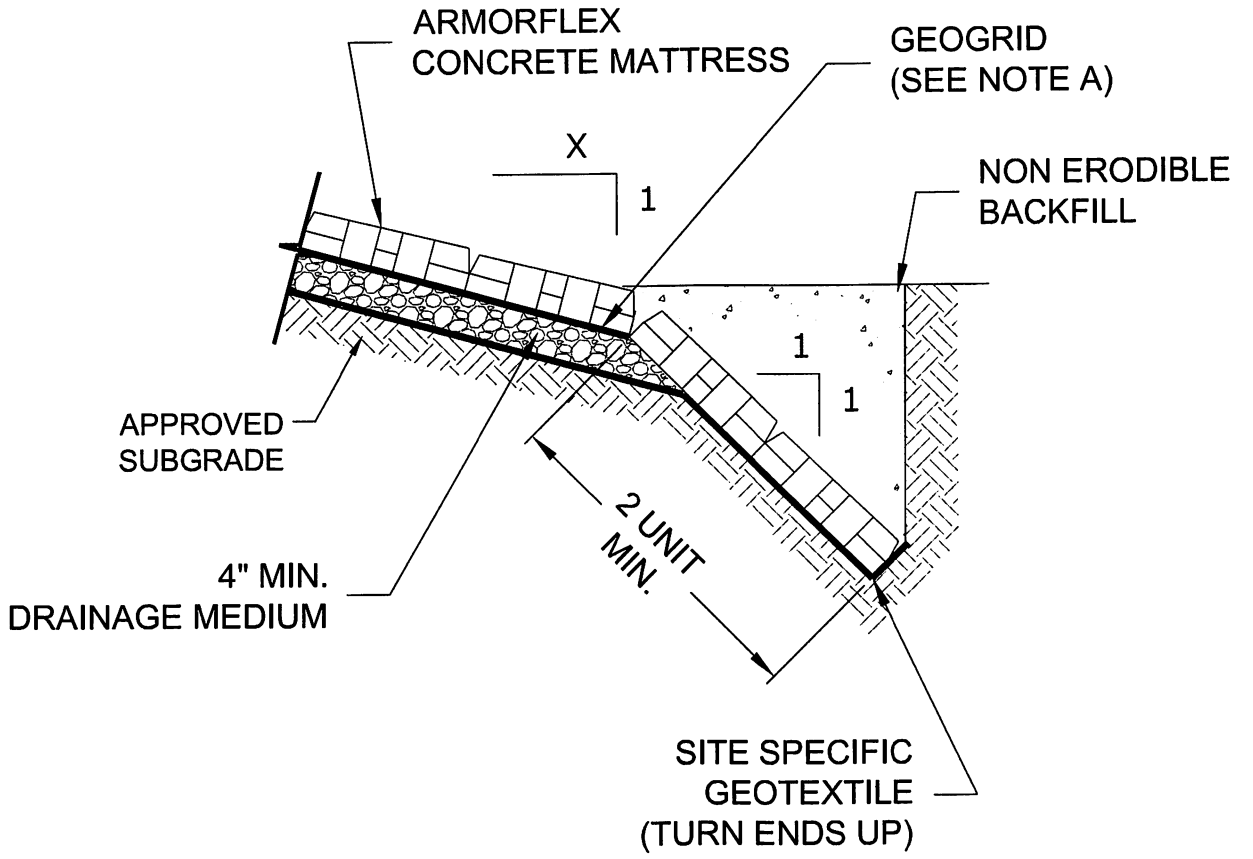
TYP. 40T BLOCK (1)

NOT TO SCALE

DRAWN BY:	CHECKED BY:	DATE:	SCALE:
KWM	CBK	7/14/07	NTS

ARMORFLEX 40T DIMENSIONS

ARMORTEC
Erosion Control Solutions
A CONTECH COMPANY
9025 CENTRE POINTE DR, SUITE 400
WEST CHESTER, OHIO 45069
PH: (513) 645-7000 FAX: (513) 645-7993



TYP. TOE OF SLOPE

NOT TO SCALE

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CT1

NOTE A: APERTURE SIZE OF GEOGRID TO BE SMALLER THAN D10 OF DRAINAGE STONE FOR RETENTION.

DRAWN BY:	CHECKED BY:	DATE:	SCALE:
KWM	CBK	7/14/07	NTS

ARMORFLEX TYP.
TOE OF SLOPE
DETAIL

ARMORTEC
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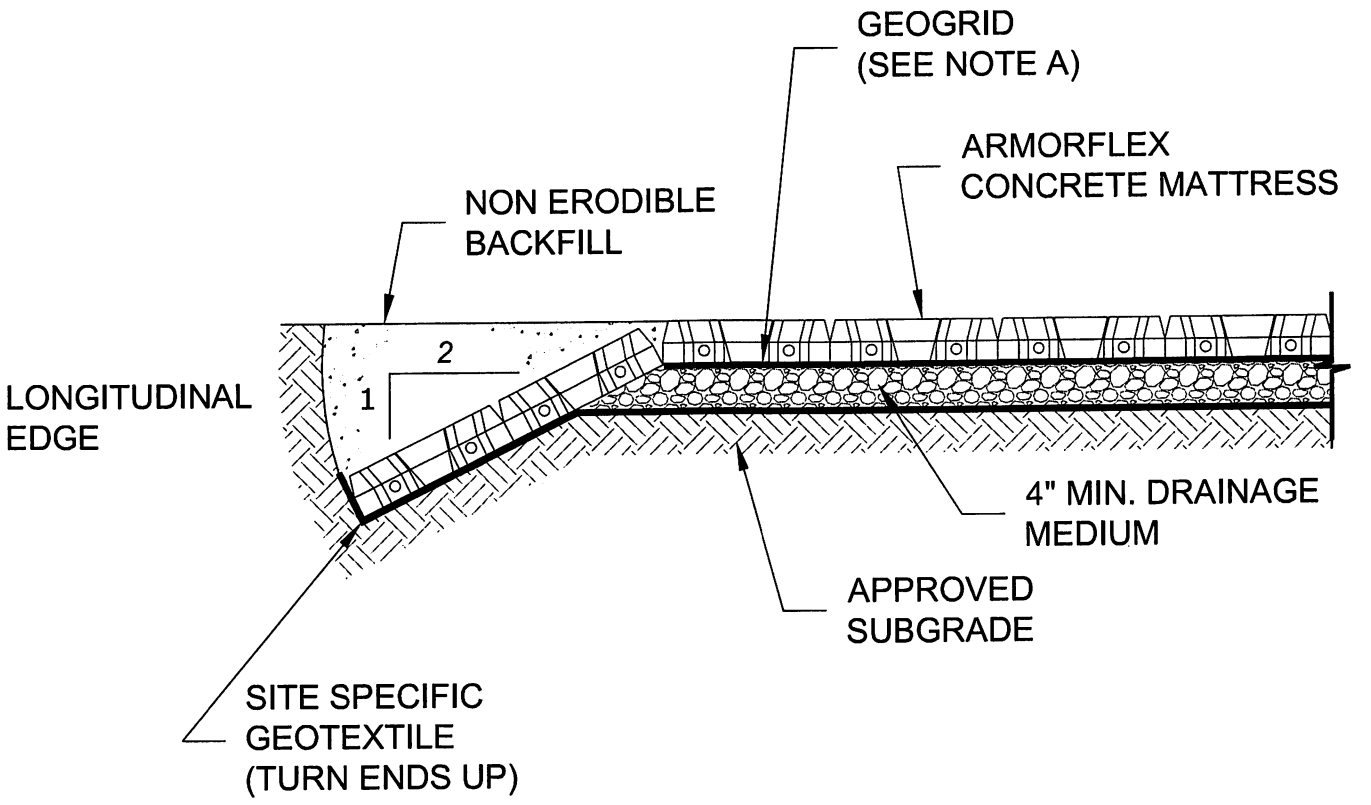

TYP. FLANK

2
CT1

NOT TO SCALE

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KWM	CBK	7/14/07	NTS

ARMORFLEX TYP
FLANK DETAIL

ARMORTEC
Erosion Control Solutions
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9025 CENTRE POINTE DR, SUITE 400
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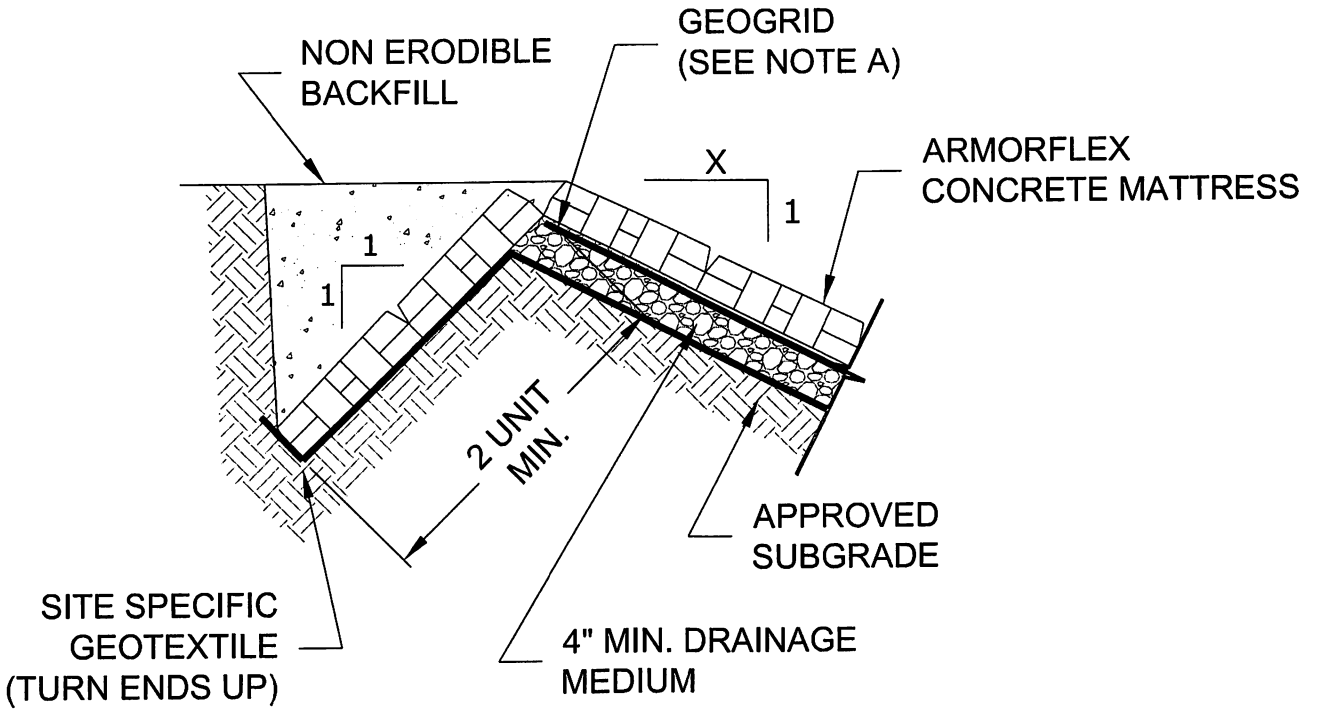

TYP. TOP OF SLOPE

NOT TO SCALE

#
CT1

NOTE A: APERTURE SIZE OF GEOGRID TO BE SMALLER THAN D10 OF DRAINAGE STONE FOR RETENTION.

DRAWN BY:	CHECKED BY:	DATE:	SCALE:
KWM	CBK	7/14/07	NTS

ARMORFLEX TYP
TOP OF SLOPE
DETAIL

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FINAL REPORT

FEASIBILITY STUDY
SIPPO CREEK RESERVOIR DAM
ODNR FILE NO. 0614-012

CITY OF MASSILLON, OHIO

Prepared for the
City of Massillon
Stark County, Ohio

January 2013

URS

1375 Euclid Avenue
Cleveland, Ohio 44115
216-622-2400
Project No. 13814498

January 16, 2013

Mr. Keith Dylewski, P.E., P.S.
City Engineer
City of Massillon – Engineering Department
151 Lincoln Way East
Massillon, OH 44646

RE: Sippo Creek Reservoir Dam
Feasibility Report

Dear Mr. Dylewski:

URS Corporation has completed an assessment of the hydraulic capacity of the Sippo Creek Reservoir Dam, its pool, and outlet works, and has presented its conclusions in a report entitled "Sippo Creek Reservoir Dam Hydrologic and Hydraulic Analysis". The report was submitted to the Ohio Department of Natural Resources (ODNR) on November 11, 2011 and ODNR comments were issued April 4, 2012. URS submitted the responses to the initial ODNR comments to ODNR on June 21, 2012 for review and comment. The report and review comments were submitted to the City of Massillon Engineering Department and the Parks and Recreations Department. ODNR issued a final determination for the design flood on December 31, 2012.

This letter and the attached Feasibility Study presents the findings of a concept-level feasibility study that examines possible dam modifications that will allow the dam to safely pass the design flood.

ASSUMED CONDITIONS

URS assumed the below listed conditions as a basis for this study:

- Sippo Creek Reservoir would be maintained at its current pool level, El. 1101.64.
- The dam crest would be leveled with about one foot of fill to an elevation of 1107.0 to pass the 100-year flood with minimal overtopping.
- Alternatively, the dam spillway and crest could be lowered to reduce or remove ODNR design flood regulations. It is assumed the spillway would be 2-feet lower than the proposed dam crest.
- The entire lake would be dredged as necessary, before dam modifications are constructed. The cost of dredging is included under common excavation in each scenario.
- A sheet pile cutoff wall will be required for all rehabilitation options. The cost of dredging is included under common excavation in each scenario.

It is possible that other combinations of solutions to the dam's deficient spillway capacity can be developed if alternative spillway types and sizes are considered, but these options were eliminated due to complexity and high cost. Breaching of the dam was not considered feasible due to the City's request that the lake be retained. However, a summary of its attributes and a conceptual cost estimate were developed for the removal option for comparison purposes.

Did we grant them a Critical Flood?

DESIGN FLOOD

The flood analyses concluded that the revised design flood for the dam is the Probable Maximum Flood (PMF) with a peak flow rate of approximately 31,590 cubic feet per second (cfs). This design flood is the ODNR approved regulatory dam discharge. As stated in the ODNR response letter, a PMF with a peak flow rate of approximately 21,087 cubic feet per second (cfs) may be acceptable after a study of revised Probable Maximum Precipitation (PMP) values are accepted by ODNR. However, this PMF discharge cannot be finalized and approved until the new PMP values have been approved by ODNR. In addition, due to the unique hydraulic situation that exists for the dam (i.e. it is submerged by larger flood due to backwater flooding by the Lincoln Way embankment), a smaller discharge has been proven to be the worst-case situation for the dam. As a result, this feasibility study used a worst-case peak flow rate of 3,000 cfs as a basis for the conceptual designs that were evaluated. Floods larger than 3,000 cfs submerge the dam, which reduces stresses on the structure.

ALTERNATIVE SOLUTIONS

URS concluded that six viable alternatives could be developed to modify the dam to safely pass the design flood.
These include:

- Option 1: Lower dam/spillway to be exempt from ODNR regulations
- Option 2: Lower dam/spillway to reduce Hazard Classification and Design Flood
- Option 3: Armor the dam with Articulated Blocks (AB)
- Option 4: Armor the dam with roller-compacted concrete (RCC)
- Option 5: Increase Spillway Capacity
- Option 6: Remove Dam

The preferred alternatives leave the lake as-is, and add overtopping protection so that the lake maintains its current functionality and appearance.

The alternatives that are less favorable are complete removal of the dam, or lowering the dam to reduce its hazard classification or exempt it from ODNR regulations, as the lake does not maintain its current functionality.

The alternatives are discussed below. An existing conditions map is provided in Attachment 1 - Figures. In addition, conceptual sketches Figures 2 and 3 depicting Options 3 and 4 are included for reference. Cost estimate calculations and Table 1- Cost Comparison are provided in Attachment 2 – Construction Cost Estimates. Other supporting data is included in Attachment 3 – Background Data.

Doing nothing is not considered an alternative due to the Hazard Classification of the dam and the ODNR requirement to upgrade the dam.

Option 1:

LOWER THE DAM/SPILLWAY TO BE EXEMPT FROM ODNR REGULATIONS

Option 1 lowers the dam and spillway to remove the structure from ODNR regulations. To be exempt from ODNR regulations, the dam must:

- be ≤ 6 feet in height regardless of storage capacity;
- have ≤ 15 acre-feet of storage capacity regardless of height; or
- be ≤ 10 feet in height and have ≤ 50 acre-feet of storage capacity

The current top of dam is estimated to have an average elevation of 1006.0. The toe of the dam has an elevation of 987.7, which is the invert at the end of the spillway slab. The total height of the dam is therefore 18.3-feet. The primary spillway overflow elevation is 1001.64, which controls the normal pool elevation of the reservoir. The current lake water surface covers approximately 6.7 acres, with a normal pool storage of 38 acre-feet. The lake has a maximum storage capacity of 83 acre-feet at the current top of dam.

Requirements for Exemption

- To satisfy the ≤6 foot height criteria, the dam crest would need to be lowered to an elevation of 993.7, and the spillway would be set at 991.7, which would leave a minimal lake of about 1.5 acres, with 4.3 acre-feet of pool storage.
- To satisfy the ≤15-acre-feet of storage criteria, the dam would need to be lowered to elevation of 996.9, and the spillway would be set at 994.9, which would leave a slightly larger lake of about 2.2 acres, with 10 acre-feet of pool storage.
- To satisfy the ≤10-foot in height, and ≤50 acre-feet of storage criteria, the dam would need to be lowered to elevation of 997.6, and the spillway would be set at 995.6, which would leave a slightly larger lake of about 2.4 acres, with 11.8-acre-feet of storage.
    - The largest lake possible while keeping the dam exempt from ODNR regulations is 2.4 acres. This option requires that the lake be dredged to maintain a healthy depth for a larger biodiversity and fishing amenities. In

addition, dredging is required to install the upstream erosion protection and the new spillway.

In all of these scenarios, the existing primary spillway would need to be partially or wholly demolished and replaced, as would the spillway sidewalls. Portions of the cutoff wall along the dam crest would need to be removed, and the dam would need to be re-graded.

In addition, although the dam would be exempt from ODNR regulations, it would be prudent to protect the upstream and downstream face of the dam with erosion protection, since large flows would over-top the lowered structure more frequently. The excavated material removed from the dam should be hauled from the site to prevent reducing flood storage, which could increase flooding downstream.

In addition, even though the dam currently offers minimal flood protection, reducing the height and storage capacity of the dam would slightly increase flooding downstream during smaller floods. Lowering the dam would have little downstream impact during larger floods.

Option 1 is not preferred because it:

- Reduces the size of the lake by almost two-thirds.
- Requires the demolition and reconstruction of the existing spillway.
- Reduces recreational amenities of the park.
- Requires erosion protection for upstream and downstream face of dam.
- Increases flooding downstream during smaller floods.
- Has a maximum estimated construction cost of $633,000.

Option 2:

LOWER THE DAM/SPILLWAY TO REDUCE HAZARD CLASSIFICATION

Option 2 lowers the dam and spillway to reduce the ODNR hazard classification for the structure. To do this, the dam is assumed to have a discharge of no more than the 100-year flood downstream during the "Sunny-Day Failure" scenario. The 100-year discharge at the residences on Tremont Avenue SE is 1,980 cfs according to the Federal Emergency Management Agency (FEMA) Flood Insurance Study. During the 100-year flood, the depth of flooding at the structures is slightly less than 2 feet, with velocities approaching 3 feet per second. Flooding depths in excess of two feet can be considered dangerous to human health/safety.

To reduce the Hazard Classification of the dam, it must be proven that the lowered dam will not cause a probable loss of life if it were to fail. As a Class I high-hazard dam, the required design flood is the Probable Maximum Flood (PMF) since failure of the dam (during smaller floods) would cause additional flooding downstream and lead to probable loss of human life. Lowering the dam and its storage capacity would reduce the potential flooding condition downstream should the dam fail during smaller floods. It is assumed, based on these analyses, that Lincoln Way would not be overtopped during a "Sunny-Day" dam failure if the outflow discharge were less than 3,000 cfs. It was further assumed that the dam would not be lowered below elevation 997.6, which would exempt it from ODNR regulations.

To reduce the dam's Hazard Classification to Class II, the dam would need to be lowered to elevation 1103.2 or less, with a spillway elevation of 998.0. This would satisfy the flood reduction criteria so that flows downstream due to a dam failure would not increase flooding by more than 2-feet. In addition, this configuration satisfies ODNR critical flood criteria that the product of the incremental increase in depth due to the dam failure times the average velocity be less than seven.

It is unlikely that the dam's Hazard Classification can be lowered below Class II due to the severely floodprone houses on Tremont Avenue SE. The road and some of the houses are subject to flooding during the 10-year flood and are likely to experience frequent flooding. Flooding conditions on this street cut off emergency services to the residences during larger floods. The pressure conduit siphon on the street makes this area especially dangerous during large floods.

Based on conversations with ODNR, the dam's Hazard Classification may only be reduced to Class II, and the design flood would only be reduced to 50-percent of the PMF (15,800 cfs), or the critical flood, which can be no less than 20-percent of the PMF (6,300 cfs). Therefore, it is not prudent to reduce the hazard classification to Class II in an attempt to reduce the design flood, because the dam is still submerged during smaller floods approaching 3,000 cfs. Total submergence lowers the stresses on the dam, so floods smaller than this are the most structurally critical.

In Option 2, the existing primary spillway would be partially or wholly demolished and replaced, as would the spillway sidewalls. Portions of the cutoff wall along the dam crest would need to be removed, and the dam would need to be re-graded.

In addition, the dam would be still need to have its upstream and downstream face covered with erosion protection, since large flows would over-top the lowered structure more frequently. The excavated material removed from the dam should be hauled away from the site to prevent reducing flood storage, which could increase flooding downstream.

In addition, even though the dam currently offers minimal flood protection, reducing the height and storage capacity of the dam would slightly increase flooding downstream during smaller floods. Lowering the dam would have little downstream impact during larger floods.

To maintain the largest lake possible, and have the Hazard Classification reduced to Class II, the dam crest should be lowered to an elevation of 1003.2. The spillway would be lowered, or replaced at an elevation of 998.0, which would leave a 3.0-acre lake, with 18.4 acre-feet of storage.

This option requires that the lake be dredged to maintain a healthy depth for a larger biodiversity and fishing amenities. In addition, dredging is required to install the upstream erosion protection and the new spillway.

Option 2 is not preferred because it:

- Reduces the size of the lake by 40 percent.
- Requires the demolition and reconstruction of the existing spillway.
- Reduces recreational amenities of the park.
- Requires erosion protection for upstream and downstream face of dam.
- Increases flooding downstream during smaller floods.
- It has a maximum estimated construction cost of $683,700.

Option 3:

ARMORING EXISTING DAM WITH ARTICULATED BLOCK

Option 3 covers the entire dam with articulated concrete blocks, such as the ArmorFlex made by Contech, Inc., leaving the existing spillway essentially as-is. Minor spillway modifications include repairing the existing sidewalls and restoring and leveling the original earth dam crest to an elevation of 1007.0. This option requires no demolition, but the playground on the left dam crest may be affected. This option requires that the lake only be dredged to install the upstream erosion protection.

? Does he mean lowered?

Option 3 incorporates the existing spillway with articulated block armor over the left and right crests and slopes of the dam. The existing spillway will not require modification. An anchor trench along the dam crest will be required to prevent movement of the blocks during high flow conditions. A downstream cutoff wall will be required to prevent undermining of the blocks at their confluence with the creek on both sides of the channel. In addition, the articulated blocks will require a 4" layer of bedding stone and geotextile, which will be integrated with toe drains to ensure proper drainage beneath the blocks.. A 1-foot earthen berm will be added to the downstream edge to guide and contain flows.

Armoring the upstream slope of the dam will also be with articulated blocks to allow for ease of construction and the costs are similar to hand-placed rip-rap. The articulated blocks will be grouted together and covered with 4-inches of topsoil to enhance aesthetics by

promoting vegetative growth and allowing for mowing and maintenance. The overall appearance of the dam would be similar to the current conditions.

The dam with this design would be able to pass the 100-year storm without overtopping, while larger floods would be passed over the articulated block armored dam embankment.

Option 3 is preferred because it:

- Maintains the present size of the lake.
- Requires no demolition and reconstruction of the existing spillway.
- Does not reduce recreational amenities of the park.
- Does not increase flooding downstream.
- Only requires minimal dredging.
- It costs slightly more than Options 1 and 2, with a maximum estimated construction cost of $706,800.

Option 4:

ARMORING EXISTING DAM WITH ROLLER COMPACTED CONCRETE

Option 4 covers the entire dam with roller compacted concrete (RCC), leaving the existing spillway essentially as-is. Minor spillway modifications include repairing the existing sidewalls and restoring and leveling the original earth dam crest to an elevation of 1007.0. This option requires no demolition, but the playground on the left dam crest may be affected. This option requires that the lake only be dredged to install the upstream erosion protection.

Option 4 incorporates the existing spillway with RCC armor placed in lifts, forming a series of steps over the left and right crest and downstream slopes of the dam. The existing spillway will not require modification. An anchor/cutoff trench along the dam crest will be required to anchor the blocks and prevent undermining. A downstream cutoff wall will be required to prevent undermining of the RCC at its confluence with the creek on both sides of the channel. In addition, the RCC will require a 6-inch layer of bedding sand for filter material and 1-foot layer of clean gravel as a drain material, and geotextile. A 1-foot curb will be added to the downstream edge of the RCC steps to guide and contain flows. Toe and blanket drains will be incorporated to ensure proper drainage beneath the RCC steps.

Armoring the upstream slope of the dam will be with hand-placed rip-rap to prevent erosion on the inside dam face during overtopping events. The RCC will be an unformed stepped dam face that will be covered with a minimum of 4-inches of topsoil to promote vegetation growth and allow for mowing and maintenance. The overall appearance of the dam would be similar to the current conditions.

The dam in this condition would be able to pass the 100-year storm without overtopping, and larger floods would be passed over the RCC armored dam embankment.

Option 4 has similar positive attributes as Option 3:

- Maintains the present size of the lake.
- Requires no demolition and reconstruction of the existing spillway.
- Maintains the present recreational amenities of the park.
- Only requires minimal dredging.
- Does not increase flooding downstream.

Option 4 is not the preferred option because:

- RCC would likely have to be produced on-site, requiring mobilization of a mixing plant and a large staging area for plant and materials.
- It is more costly than Options 1 and 2 with a maximum estimated construction cost of $785,000.
- It is more costly than the Option 3 – articulated blocks.

Option 5:

INCREASE SPILLWAY CAPACITY OF EXISTING DAM

Option 5 widens the existing spillway to accommodate the 500-year flood and covers the remainder of the entire dam with articulated block or RCC. This configuration would allow for smaller storms to pass without damaging the dam by overtopping. Since storms larger than the 500-year flood submerge the dam, they can be considered less structurally critical. Major spillway modifications include replacing the existing sidewalls, adding additional spillway capacity, and restoring and leveling the original earth dam crest. This option requires some possible demolition, and the playground on the left dam crest would probably be affected. This option requires that the lake be lowered and dredged to install the spillway and upstream erosion protection.

The existing spillway would be enlarged from 50-feet to a width of 80 feet, which will pass the 500-year flood without overtopping the dam, with its crest set at 1007.0. The increased capacity will be gained by installation of a 30-foot conventional concrete spillway and energy dissipation system similar to the existing structure, or by enlarging the existing stone masonry structure. Larger floods would be passed over the articulated block or RCC armored dam embankment. This option requires relocation or possible demolition of the existing block sidewalls, and excavation for the new spillway. The same requirements for the articulated block or RCC facing of the dam will be necessary. The volumes and areas for

this option will be slightly reduced due to the decrease in total width of the overtopping protection.

Option 5 has the following positive attributes:

- It maintains the present size of the lake.
- It maintains the present recreational amenities of the park.

Option 4 is not the preferred option because:

- Overtopping protection would still be required whether accomplished with articulated block or RCC. The dam with larger spillway would not capable of passing larger floods without overtopping.
- A widened spillway may offer a significant increase in integrity of the structure and make it safer, but would not offer much to protect it from overtopping in large floods.
- This option is more difficult to construct and may require demolition of portions of the existing block sidewalls. Unexpected storm events during construction may compromise the partially dismantled spillway, possibly failing the dam.
- RCC would be produced on-site, requiring a large staging area for batch plant and materials.
- It is the most expensive option evaluated, with a maximum estimated construction cost of $841,500.

Option 6:

REMOVING THE DAM

The City of Massillon has requested that URS consider breaching the dam as a potential solution. A full assessment and complete cost estimate of the dam breaching option is beyond the scope of this study, but a conceptual cost is included in Attachment 2-Construction Cost Estimates. Our experience has been that dam removal can often be as expensive as, or more expensive than, dam repair. The issues to be considered are discussed below.

To restore sufficient stream channel capacity for this site, the entire concrete spillway structure and cutoff wall must be removed by either blasting or mechanical means. The concrete demolition debris must be properly disposed of, either by identifying a suitable location where the debris can be buried on site or by hauling the debris to an acceptable offsite disposal area. It is unlikely that a suitable on-site location can be found for the rubble due to the park location in the 100-year floodplain.

Due to the large drainage area, large flows over the history of the reservoir have partially filled it in with sediment. Measures must be taken to prevent this sediment from being washed downstream during draining of the reservoir and after the dam is removed. Sediment washing downstream could produce adverse environmental effects, such as fish kills. Since the reservoir has a large watershed, samples of the reservoir sediments should be tested to determine oif they are free of undesirable or unacceptable chemicals. However, draining of a reservoir carries a risk that previously undetected objects or materials may be uncovered, potentially leading to expensive environmental assessment and remediation.

The stream channel through the reservoir area would need to be restored to a stable configuration. This would require grading to re-establish a stream channel with a reasonable slope. Channel protection and plantings would be required to prevent unacceptable erosion of the stream channel banks.

Depending on the depth of sediment in the reservoir area, regrading may be required to establish stable stream bank contours. The reservoir sediment is most likely very wet and soft. Drying or other moisture conditioning measures would likely be required prior to regrading.

The entire reservoir area would need to be revegetated to restore conditions approximating a natural riparian habitat. It is possible that removing the dam and reservoir would destroy wetlands that must be replaced by constructing new wetlands.

Removal of the dam would not probably lead to future liability due to loss of flood protection downstream, since the dam offers little flood control during larger flood. However, the value of the lost amenities to the community would likely be an issue. The It is likely that removal of the dam will require a great deal of community relations.

Permitting for dam removal would involve review and approval by the ODNR dam safety program, US Army Corps of Engineers (USACE) 401/404 permits, and probable review and approval by the Ohio EPA. While it is possible that dredging/disturbance of the dam and lake sediments might be permitted under a USACE Nationwide Permit for Maintenance and/or Minor Dredging, it is possible that Individual 401/404 permits would be required.

Option 6 positive attributes include:

- It replaces the present lake with stepped pools and wetlands, which may be attractive.
- It removes dam liability.

Option 6 is not the preferred option because it:

- Eliminates the lake.
- Reduces recreational amenities of the park.
- Is likely to reduce property values around the lake.

- Requires erosion protection of the exposed lake bottom.
- Requires extensive plantings.
- It may expose environmentally sensitive conditions that have long been submerged.
- Requires the removal of a large quantity of fill.
- Requires sediment controls and long-term maintenance.
- Increases flooding downstream.
- Requires the demolition and disposal of the dam structure, cutoff wall, and sidewalls.
- Is almost as costly as other options, with an estimated construction cost of $665,600, and is more expensive if a sheet pile wall is not required for the other options.

Option 6 is not a viable option for the site since it costs almost as much to remove the dam as it does to rehabilitate it to ODNR standards and requirements. If this option were selected, it would remove the lake amenities, likely reduce property values around the lake, and increase flooding downstream. This option does remove the dam's inherent liability and provides wetland habitat, but may increase environmental liabilities if undesirable materials are found in the lake bed. This option also requires the most demolition, and the playground on the left dam crest may be affected. This option requires that the lake be contoured to control erosion and prevent migration of sediment.

Other Options:

Several options exist to increase the spillway capacity of the dam. These options include using a moveable gate system, fuse blocks, and labyrinth weir configurations. A gated spillway could use the entire head of the lake to drive water through the spillway and pass the design flood. It would incorporate a multiple-section spillway that includes a 150-foot wide gated section. The gates remain closed under most conditions, allowing ordinary flows to pass over the top of the gate, but begin to open when high flow conditions require additional flow capacity. A pneumatically operated steel gate system manufactured by Obermeyer Hydro, Inc., Fort Collins, CO was used for the concept design. When fully open, the total spillway capacity is sufficient to pass the design flood. This option requires that the dam crest be raised to 1010.0, and the lake be excavated in the approach channel to a sufficient depth for construction of the steel gate system. Costs for a gated spillway system would be more expensive than the other options explored.

Fuse blocks and labyrinth weirs can be applied but have the same issues as the gated weirs system as they are expensive and would require the demolition of the existing structure. None of these spillway systems will retain the aesthetics of the current spillway system. The size and expense of these systems would preclude using them in the rehabilitation of the dam.

Removing the downstream hazards or protecting them from flooding would be too expensive as there are over 30 residences that are floodprone. Since the flooding along Tremont Avenue SE is so sever during large floods, it would not be practical to protect the residences from flooding. In addition, removing these structures would cost more than rehabilitating the dam. However, it should be noted that a program for removing the most severely floodprone structures should be implemented.

Due to the access issues on the street during flooding conditions, it would not be likely to reduce the Hazard Classification of the dam to below a Class II.

These options are not the preferred solution for several reasons:

- Non-standard spillways are too expensive for this situation.
- Non-standard spillways require demolition of the dam and its appurtenances.
- Removing all floodprone houses on Tremont avenue SE is more expensive than rehabilitating the dam.

Additional Considerations:

Due to the considerable forces that the dam would be subjected to during large floods, up to and, including the PMF, it would be prudent to perform a geotechnical investigation, and stability analysis on the structure. The geotechnical investigation and stability analysis is outside of the scope of this study. These investigations and analyses will be performed during the final design. The stability analysis should be based on a minimum of three borings of the dam and subgrade, to determine the material that makes the dam and the foundation material it is built upon. The properties determined in the geotechnical investigation will be used in the stability analysis and the rehabilitation design.

In addition, the existing cutoff wall should be partially excavated to determine its condition. It may be necessary, based on the geotechnical investigation, to need an additional cutoff wall to cutoff seepage and stabilize the dam. A cutoff wall would likely consist of a sheet pile wall or concrete wall or other similar construction. An estimate of the cost of a sheet pile wall is included in Appendix A in the attached report. The cutoff wall is assumed to be terminated at a minimum elevation of 982.0, which is six feet below the invert of the downstream creek.

CONCLUSIONS

The Hydrologic and Hydraulic report has been approved by ODNR, establishing the approved design flood for the dam to be 31,590 cfs. A lower design flood may be approved by ODNR in the foreseeable future that would lower the design flood to 21,100 cfs. The preferred method of rehabilitating the dam to satisfy ODNR requirements is to raise the dam to a level elevation of 1007.0, and protecting the upstream and downstream slopes with

either articulated block or RCC. The City will need to select a design concept for improvements. When a concept design is selected, URS will be pleased to assist The City of Massillon in preparing design drawings, technical specifications, and permit submittals for the project. If breaching of the dam will be seriously considered, URS is prepared to assist you in determining how it should be done, its probable cost, and its environmental implications.

URS appreciates the opportunity to provide services to the City of Massillon on this interesting project. If there are questions or concerns about any aspect of the project or this report, please contact us. We will also be pleased to discuss the next phase of the project at your convenience. Thank you.

Sincerely,

URS Corporation

Keith C. Mast, P.E.
Vice President

Michael Damian, P.G.
Senior Dams Specialist

MD:MMS/mg

Attachments

cc: Michael Shore, URS
File 13814498

Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR JAMES ZEHRINGER, DIRECTOR

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2045 Morse Road/Building B-3
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December 31, 2012

City of Massillon
Kenneth Kaminski, Director
Parks & Recreation
505 Erie St. North
Massillon, OH 44646

RE: Sippo Creek Reservoir Dam
File Number: 0614-012
Stark County

Dear Mr. Kaminski:

The Division of Soil and Water Resources received a submittal entitled "Hydrologic and Hydraulic Report Comments Response" from URS Corporation (URS) on June 21, 2012 via email. The submittal included a letter and other supporting calculations responding to the comments in the Dam Safety Engineering Program's April 4, 2012 letter. The Dam Safety Engineering Program has reviewed the submittal, and the program's comments are noted below.

Hydrology and Hydraulics for Sippo Creek Reservoir Watershed and Dam

1. No further action needed.
2. No further action needed.
3. The probable maximum flood of 31,970 cubic feet per second, which was provided in the original URS study, is acceptable for this dam. The study to establish new probable maximum precipitation (PMP) values will not be completed until 2013 and cannot be used until the study has been finalized and approved by the Division of Soil and Water Resources. It is estimated that URS's revised PMF of 21,087 cubic feet per second, which was provided in second submittal, will be relatively close. However, this value cannot be finalized and approved until the new PMP values have been approved.

   One small issue was noted during the second review of the hydrology. It appears that subbasin "HYD9" should connect to "8P" rather than "6C". It is not expect that this change will significantly change the PMF. Please review the connectivity of the model in this area and revise as needed.

Lincoln Way Flood Routing Analysis

1. No further action needed.
2. No further action needed.

Hydraulic Analysis of East Sippo Creek Downstream of Lincoln Way

1. No further action needed. Based on the comments that URS provided and investigation by the engineers with the Dam Safety Engineering Program, the URS HEC-RAS model is acceptable.

Results and Conclusions

1. No further action needed.
2. See below.
3. Please note that any reduction in the design flood based on the critical flood is determined as a percentage of the runoff, not of the precipitation. For example, if the PMF is calculated as 5000 cubic feet per second, 40% of the PMF is 2000 cubic feet per second – it is not the flood that results from 40% of the PMP.

   Since the crest of the dam is uneven and the dam cannot pass 40% of the current (or the likely value of the reduced) PMF, preliminary remediation plans must accompany a request for the critical flood. The final configuration and hydraulic capacity of the dam will affect potential discharge from the dam should it fail, and this would affect the determination of the critical flood.

Your cooperation in improving the overall condition of this dam is appreciated. Please contact me at 614/265-6738 if you have any questions concerning this letter or to schedule a meeting to discuss this project.

Sincerely,

Keith R. Banachowski, P.E.
Program Manager
Dam Safety Engineering Program
Division of Soil & Water Resources

cc: Michael Shore, URS Corporation

URS

June 21, 2012

Ohio Department of Natural Resources
Division of Water
c/o Mr. Keith Banachowski, P.E.
Dam Safety Engineering Program
2045 Morse Road, Building B-2
Columbus, OH 43229-6693

RE: Sippo Creek Reservoir Dam
City of Massillon, Stark County
Hydrologic and Hydraulic Report Comments Response
File Number 0614-012

Dear Mr. Banachowski:

URS Corporation (URS) is pleased to submit the following responses to the ODNR comments regarding the Hydrologic and Hydraulic Report for the Sippo Creek Reservoir Dam for the City of Massillon. This submittal reflects the responses to the H&H comments provided to the City of Massillon on April 4, 2012. URS is providing these services to develop a design discharge for the dam and to bring the dam into compliance with ODNR regulations.

Hydrology and Hydraulics for Sippo Creek Reservoir Watershed and Dam

1. The Dam Safety Engineering Program is in agreement with the methods used in the analysis and results of URS's report.

No response required.

2. Table "A", Breach Input Parameters, showed the normal pool storage to be 61 acre-feet. The normal pool storage based on the conic volume formula for a depth of 15 feet and a surface area of 7.1 acres is 36 acre-feet. The difference in volume is the result of elevation/area data below the normal pool level. Please explain how the elevation/area data below the normal pool level was developed.

Response:

The elevation/area data below the normal pool level was developed from approximated bathymetric contours. The contours were based on a proposed dredge plan to remove sediment accumulated in the reservoir, in an attempt to return the lake to its original depth. The invert of the lake near the dam was estimated to be at the same elevation as the surveyed downstream channel elevation. Interpolated bathometry was developed to approximate the wetted perimeter and area at each elevation below the normal pool. HydroCAD determined the irregular shape's stage/storage relationship from the area and perimeter data. This method provides more accurate storage calculations than does the conic volume equation.

URS Corporation
1375 Euclid Ave., Suite 600
Cleveland, OH 44115-1808
Tel: 216.622.2400
Fax: 216.622.2428

3. The State of Ohio has hired a consultant to perform a study to update the Probable Maximum Precipitation (PMP) values for the state. The preliminary results indicate that PMP values will reduce by approximately 25%. This would reduce the Probable Maximum Flood, the design flood for the dam, by a similar percentage.

Response:
Based on the estimated 25% reduction in PMP values, the current 6-hr PMP depth of 26.15 inches will be decreased to an approximate depth of 19.61 inches. Accordingly, the reduction in the PMP depth will result in lowering the existing PMF of 31,970 cfs to 21,087 cfs, which should be accepted as the dam's regulatory design discharge. The lowest acceptable critical flood is the 40-percent PMF, which has been determined to be 5, 227 cfs.

Lincoln Way Flood Routing Analysis

1. The Dam Safety Engineering Program is in agreement with the methods used in the analysis and results ofURS's report.

No response required.

2. Page 2-15 states that the maximum capacity of the culvert is approximately 3500 cubic feet per second. Review of the energy grade line for cross section 5409 just upstream of the culvert indicates that the maximum capacity of the culvert is 3000 cubic feet per second. Please address this inconsistency.

Response:

The top of the Lincoln Way Road is at an approximate elevation of 1108.0. In the URS HEC-RAS model, a large entrance loss (Ke=0.9) was used to determine the maximum head expected upstream of the embankment, and the minimum capacity of the culvert. The actual entrance loss for the culvert is estimated to be between 0.2-0.4, as shown on the attached Lincoln Way Culvert Comparison Chart. The culvert is an arch box, with 30-75° wingwalls, and square crown. The crown has become rounded by spalling. The actual entrance loss into the culvert is a best estimate. In the HydroCAD model, a much lower entrance loss (0.2) was used to minimize storage behind the embankment, to remain conservative. Using the higher entrance loss in the HEC-RAS model determines worst-case upstream flooding depths. Using a lower entrance loss in the HydroCAD model prevents increased storage from lowering the discharge downstream. Using a conservative Ke value of 0.5 for the culvert, in the HEC-RAS model, shows it has a capacity of approximately 3,350 cfs (see attached Lincoln Way Culvert Comparison Chart). Using an entrance loss value of 0.2 in the HydroCAD model indicates that the capacity of the culvert is approximately 3,480 cfs as shown in the Lincoln Way Culvert Comparison Chart. Using an entrance loss this low in the HEC-RAS model overestimates the capacity of the culvert.

Adjust K_e ↓ to ↑ d/s flood. hg
$K_e = 0.2$ $Q = 3480$

In addition, the HEC-RAS model allows for a composite Manning's roughness value, in which the invert of the culvert can be modeled as a natural channel floor. The HydroCAD model only allows for a single averaged Manning's roughness value and tends to overestimate the discharge capacity.

A conservative estimate of the entrance loss coefficient (Ke) for the culvert should not be more than 0.40. Using this Ke value in the HEC-RAS model shows that the culvert has a capacity of approximately 3,437 cfs. Ke = 0.4 3437

Hydraulic Analysis of East Sippo Creek Downstream of Lincoln Way

1. The Dam Safety Engineering Program is in agreement with the methods used in URS's report. However, for stream flows of 1980 and 2650 cubic feet per second, the submitted HEC-RAS model shows water surface elevations in the creek to be 2.3-2.9 feet lower than the current FEMA Flood Insurance Study (FIS). Please address why these differences exist.

Response: Since the original URS H&H Study was performed, an updated FIS was issued. The information in the revised FIS was incorporated into the updated URS H&H Study. It does not appear that the flood discharges, elevations, or modeling changed in the new study, but the elevations were converted to NAVD88 datum. It does appear that the limits of flooding were slightly modified in the new study.

The geometries for the FIS and the URS HEC-RAS have several differences. Furthermore, the FIS was developed using the HEC-2 modeling program and URS used the HEC-RAS modeling program for the H&H Study. The FIS model used 5 cross sections to evaluate the 2200-foot reach, and the URS HEC-RAS used 22 cross sections to evaluate the same reach. The 1982 FIS elevations are in NGVD29 and the URS HEC-RAS model elevations are in NAVD88. This discrepancy was remedied in the 2012 FIS. The NAVD88 elevations are approximately 0.656-feet lower than the NGVD29 elevations (see attached conversion sheet). URS used the NAVD88 datum to compare the sections as shown in the attached Tremont Avenue SE Comparison Table. In addition, URS estimated the Manning's roughness coefficients for the channel and overbanks areas based on field visits and aerial photos. In general, FEMA Flood Insurance Studies tend to use only three Manning's roughness coefficient values to model a typical section (left/right bank and channel) and do not tend to model houses/building as obstructions. In this manner, the FEMA FIS tends to overestimate Manning's roughness coefficient values in their models. URS used multiple horizontal values for the modeled sections and included the houses as obstructions. This method of modeling tends to yield lower water surface elevations as shown in the URS HEC-RAS model. URS slightly increased the Manning's roughness coefficients for the overbank and channel to try to calibrate the HEC-RAS model to FIS model. The URS HEC-RAS model still yields water surface elevations lower than those shown on the FIS. The URS modeling is more detailed than the FIS modeling, and should produce results that are more accurate than those in the FIS.

There are several important similarities in the two models. The URS and the FIS geometries both used a 1:24,000 topographic contour map, with a 2-foot contour interval. The area has not changed much since the 1982 FIS was performed, although the FIS used a 1970 topographic map, and the URS map was dated 2001. The cross section data should be similar for both models and the 100-year flood area of inundation for both models are similar (albeit the URS model shows lower water surface elevations). The slope of the channel along the Tremont Avenue SE reach in the FIS model appears to be consistent with that of the URS model. However, the inverts of several of the cross sections in the FIS model are lower than those used in the URS model. In addition, the Sippo Creek Pressure Conduit is included in both models, but the FIS model appears to over-estimate the pipe's capacity.

It is the opinion of URS that the FIS Manning's' roughness coefficients for the channel and overbank are slightly over-estimated, which yields higher water surface elevations. The FIS model tends to be more conservative than the URS model, which also results in higher water surface elevations. The URS model is more detailed and is likely to have more accurate results than does the Flood Insurance Rate Map shown in the Flood Insurance Study. Neither model is calibrated to actual flood data.

Results and Conclusions

1. The classification of the dam must consider failure of the dam during minor and major flood events. Based on the flood profiles in the FEMA FIS, failure of the dam with a base flow of 800 cubic feet per second (slightly less than the 10-year flood) would have the potential to increase the water surface elevation of East Sippo Creek downstream of Lincoln Way by over three feet. This would likely have significant impact to low-lying homes along Tremont Avenue Southeast. Until the comments provided in this letter have been addressed, this conclusion appears to be valid and the classification of Class I is appropriate.

Response: Based on a dam failure during a discharge approximating the 10-year flood, flows downstream of Tremont Avenue SE would increase from 1,100 cfs to 2,426 cfs as shown on the attached SippoCreek-TremontAve_ComparisonChart. The increased flow would raise flooding depths an additional 1.5 to 2.5 feet through the majority of the reach. However, since the capacity of the Sippo Creek Pressure Conduit would be exceeded during this event, the increased depth of flooding near the conduit would be significantly more in this area.

It is agreed that a dam failure during lesser floods would increase flooding downstream of Lincoln Way. This increase would cause flooding to the houses along Tremont Avenue SE, and could possibly cause a loss of life in the area. Therefore, the appropriate Hazard Classification of the dam is a Class I.

they agree Class I

2. Based on the submitted analysis and using either the URS or the FEMA flood profiles for East Sippo Creek, it appears that failure of the dam for base floods in excess of 3,000 cubic feet per second would have minimal impact on homes downstream of Lincoln Way.

Response: Agreed. Although the design flood for a Class I dam is the PMF, and the lowest critical flood allowed is 40-percent PMF, this structure has a unique situation in which a failure during a base flood of over 3,000 cfs would have minimal impact on the homes downstream of Lincoln Way. The 40-percent PMF can be proven to be a critical flood as shown on the attached SippoCreek-TremontAve_ComparisonChart. Floods larger than this are also critical floods. There is a flood between the 10-year and the 40-percent PMF that will cause additional flooding downstream of Tremont Avenue SE that would not pass the critical flood criteria. The 10-year flood does not pass the critical flood criteria, and cannot be considered a critical flood. However, it should be considered reasonable to use a design storm of no more than 4,000 cfs for this dam.

3. The submitted analysis considered the existing uneven crest profile of the dam. Any modification of the dam must address leveling the crest. Therefore, the final analysis must provide a proposed uniform crest elevation. Please be aware that the selection of the crest elevation could affect some of the results and conclusions of the submitted analysis.

Agree to OT

Response: The feasibility study will address the uneven crest of the dam. All proposed alternative will have a level crest at roughly its current elevation. Based on the H&H analysis, it would appear that the depth of flooding over the dam during extreme floods would preclude using any other method to pass the design flood, other than overtopping protection for the entire dam crest.

URS has provided these responses, which will be incorporated into the URS feasibility study, based on the design discharge once it is approved. There is no tentative start of construction date.

- The current inflow design discharge is the Probable Maximum Flood, which has been determined by URS to be 21,087 cfs, based on a 75 percent reduction in PMP depths.
- Based on the URS revised analyses, the current High Hazard Classification I appears to be the appropriate classification.
- It is the opinion of URS that a critical flood exists, which is smaller than the allowable 40-percent PMF critical flood for a High Hazard Class I dam. The revised 40-percent PMF discharge has been determined to be 5,227 cfs.
- URS requests that the 0.4 PMF smallest critical flood be used as the design flood for the Dam since it is classified as a High Hazard Class Dam.

- The feasibility study will be performed for the dam with the worst-case dam failure flooding scenario considered. This scenario has provisionally been determined to be not more than 4,000 cfs based on the revised URS H&H Study.
- An Emergency Action Plan and an Operation, Inspection and Maintenance Manual will be provided once the project is completed.

URS Corporation appreciates the opportunity to present our conclusions to ODNR, on behalf of the City of Massillon, regarding this project. If there are any questions about the revised modeling, or our responses, please contact Michael Shore at 216-622-2400. We look forward to your prompt response.

Very truly yours,

URS Corporation

Keith Mast

Keith Mast, P.E.
Vice President

Michael Shore

Michael Shore, C.F.M.
Senior Hydrologist

cc:

Keith A. Dylewski, PE – City of Massillon Engineer
Kenneth S. Kaminski, CPRP - Parks and Recreation Director
Mike T. Damian, PG – URS Project Manager
file 13814498

ATTACHMENTS

The items listed below are attached to and made a part of this submittal. They contain the revised hydraulic modeling, FIS Data, modeling output, and analyses.

Tremont Avenue SE Cross Section Comparison Chart
Lincoln Way Culvert Rating Curve Comparison Chart
HydroCAD Output
HEC-RAS Output
FIRM Panel FM39151C0192E
2012 FIS Floodway Data and Flood Profile
10-year Flood - Dam Failure Spreadsheet
40-percent PMF - Dam Failure Spreadsheet
NGVD 29 to NAVD88 Conversion Sheet

Sippo Creek - Tremont Avenue SE Cross Section Comparison Chart - FIS Calibrated Model

										10-year Dam Failure Comparison				Critical Flood Check		
FIS XS	FIS XS Invert Elevation[1]	100-yr FIS WSE [1]	FIS Flow Depth	Nearest HEC-RAS XS	HEC-RAS XS Invert Elevation	100-yr HEC-RAS WSE	100-yr HEC-RAS Flow Depth	Invert Difference (URS minus FIS)	100-yr WSE Difference (URS minus FIS)	10-yr Failure Depth[2]	10-yr HEC-RAS Flow Depth	10-yr HEC-RAS WSE	10-yr flood Dam Failure WSE[2]	Incremental Depth = 10-yr Depth minus Failure Depth	10-yr Average Velocity	10-yr Ave V * WSE Difference
A	942.40	948.2	5.80	1526	942.35	952.89	10.54	-0.05	4.69	12.65	5.38	947.73	955.00	7.27	3.67	26.68
B	946.50	958.7	12.20	1863	946.35	953.62	7.27	-0.15	-5.08	8.83	5.22	951.57	955.18	3.61	8.50	30.69
C	950.70	960.4	9.70	2316	951.80	957.99	6.19	1.10	-2.41	6.88	4.50	956.30	958.68	2.38	5.66	13.47
D	958.50	966.5	8.00	2954	960.00	965.11	5.11	1.50	-1.39	5.48	4.13	964.13	965.48	1.35	4.35	5.87
E	964.00	971.4	7.40	3765	965.45	970.23	4.78	1.45	-1.17	5.23	3.55	969.00	970.68	1.68	8.62	14.48

										40-percent PMF Dam Failure Comparison				Critical Flood Check		
FIS XS	FIS XS Invert Elevation[1]	500-yr FIS WSE [1]	FIS Flow Depth	Nearest HEC-RAS XS	HEC-RAS XS Invert Elevation	500-yr HEC-RAS WSE	HEC-RAS Flow Depth	Invert Difference (URS minus FIS)	500-yr WSE Difference (URS minus FIS)	40% PMF Failure Depth[2]	40% PMF HEC-RAS Flow Depth	40% PMF HEC-RAS WSE	40% PMF Dam Failure WSE[2]	Incremental Depth = 40% PMF Depth minus Failure Depth	40% PMF Average Velocity	40% PMF Ave V * WSE Difference
A	942.40	956.5	14.10	1526	942.35	955.56	13.21	-0.05	-0.94	17.03	16.61	959.29	959.70	0.41	14.43	5.92
B	946.50	960.0	13.50	1863	946.35	956.34	9.99	-0.15	-3.66	12.26	12.17	958.94	959.04	0.10	5.40	0.54
C	950.70	962.0	11.30	2316	951.80	959.02	7.22	1.10	-2.98	10.32	10.20	962.05	962.17	0.12	5.66	0.68
D	958.50	967.5	9.00	2954	960.00	965.69	5.69	1.50	-1.81	7.63	7.55	967.57	967.65	0.08	6.83	0.55
E	964.00	972.8	8.75	3765	965.45	970.95	5.50	1.45	-1.80	6.32	6.30	971.80	971.82	0.02	3.33	0.07

[1] - Values taken from 2012 FIS Floodway Data Sheet & Flood Profile - (NAVD88)

[2]-Water surface elevation based on Breach Equations Spreadsheet and HydroCAD output

FIS 10-yr discharge = 1,100 cfs
10-yr dam failure discharge = 5,056 cfs (Downstream of Dam)
10-yr dam failure discharge = 2,426 cfs (Downstream of Lincoln Way)

FIS 100-yr discharge = 1,980 cfs
FIS 500-yr discharge = 2,650 cfs

40-percent PMF discharge = 5,227 cfs
40-percent PMF dam failure discharge = 5,300 cfs (Downstream of Dam)
40-percent PMF dam failure discharge = 5,346 cfs (Downstream of Lincoln Way)

Critical flood must have an incremental death < 2-feet and the product of the incremental depth times the average velocity < 7 ft^2/s

Average Channel Slope Check

FIS					HEC-RAS			
FIS Channel Station	FIS Channel Slope	Invert	Station	Stream Length	Invert	Station	Stream Length	HEC-RAS Slope
3,334	0.0105	942.40	3334	390	942.35	1526	337	0.0119
3,724	0.0093	946.50	3724	450	946.35	1863	453	0.0120
4,174	0.0115	950.70	4174	680	951.80	2316	638	0.0129
4,854	0.0073	958.50	4854	750	960.00	2954	811	0.0067
5,604		964.00	5604		965.45	3765		
		21.60	2270	0.0095	23.10	2239	0.0103	
		Ave. Elev. Difference	Total Reach Length	Average Slope	Ave. Elevation Difference	Total Reach Length	Average Slope	

Lincoln Way Culvert Comparision Chart

HydroCAD Output
Lincoln Way Culvert Rating Curve (Ke=0.2)

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,007.52	3,449.72	3,449.72	0
1,007.60	3,455.22	3,455.22	0
1,007.68	3,460.71	3,460.71	0
1,007.76	3,466.19	3,466.19	0
1,007.84	3,471.66	3,471.66	0
1,007.92	3,477.13	3,477.13	0
1,008.00	3,482.58	3,482.58	0
1,008.08	3,505.69	3,488.03	17.67
1,008.16	3,544.37	3,493.47	50.91
1,008.24	3,594.15	3,498.90	95.26
1,008.32	3,653.64	3,504.32	149.32
1,008.40	3,722.14	3,509.73	212.41

HydroCAD Output
Lincoln Way Culvert Rating Curve (Ke=0.3)

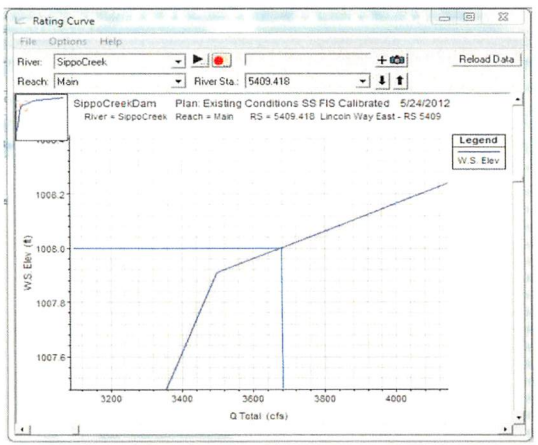
Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,007.84	3,204.61	3,204.61	0
1,007.92	3,209.66	3,209.66	0
1,008.00	3,214.69	3,214.69	0
1,008.08	3,237.38	3,219.72	17.67
1,008.16	3,275.65	3,224.74	50.91
1,008.24	3,325.01	3,229.75	95.26
1,008.32	3,384.08	3,234.75	149.32
1,008.40	3,452.16	3,239.75	212.41
1,008.48	3,528.86	3,244.74	284.12
1,008.56	3,613.92	3,249.72	364.2
1,008.64	3,707.20	3,254.69	452.51
1,008.72	3,808.61	3,259.66	548.95

HydroCAD Output
Lincoln Way Culvert Rating Curve (Ke=0.4)

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
1,007.32	2,825.87	2,825.87	0
1,007.58	2,841.36	2,841.36	0
1,007.83	2,855.93	2,855.93	0
1,008.06	2,882.35	2,869.68	12.67
1,008.28	3,002.19	2,881.90	120.3
1,008.47	3,160.83	2,889.76	271.07
1,008.63	3,331.29	2,894.57	436.71
1,008.77	3,504.81	2,897.71	607.1
1,008.89	3,673.97	2,899.66	774.31
1,008.99	3,838.44	2,900.92	937.53
1,009.09	3,999.24	2,901.75	1,097.49
1,009.18	4,157.55	2,902.33	1,255.22

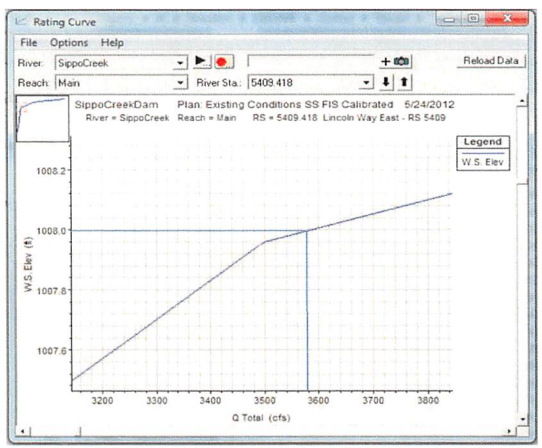
Ke	*Entrance Type*
0.5	Box, headwall w/3 square edges
0.2	Box, headwall w/3 rounded edges
0.4	Box, 30-75° wingwalls, square crown
0.2	Box, 30-75° wingwalls, rounded crown
0.5	Box, 10-30° wingwalls, square crown
0.7	Box, 0° wingwalls, square crown edge

HEC-RAS Output
Lincoln Way Culvert Rating Curve (Ke=0.2)



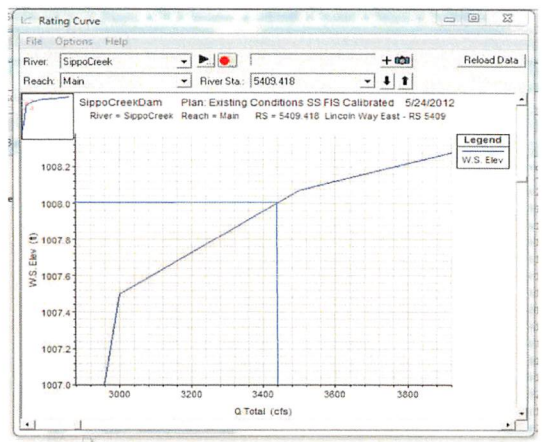
Overtopping at approximately 3,680 cfs

HEC-RAS Output
Lincoln Way Culvert Rating Curve (Ke=0.3)



Overtopping at approximately 3,580 cfs

HEC-RAS Output
Lincoln Way Culvert Rating Curve (Ke=0.4)



Overtopping at approximately 3,440 cfs

Drainage Diagram for Existing Conditions Sippo Resevoir-URS-Final-R
Prepared by URS Corporation, Printed 6/5/2012

Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR

JAMES ZEHRINGER, DIRECTOR

Division of Soil and Water Resources
Karl R. Gebhardt, Chief
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Columbus, Ohio 43229
614-265-6610
dswc@dnr.state.oh.us

April 4, 2012

City of Massillon
Kenneth Kaminski, Director
Parks & Recreation
505 Erie St. North
Massillon, OH 44646

RE: Sippo Creek Reservoir Dam
File Number: 0614-012
Stark County

Dear Mr. Kaminski:

The Division of Soil and Water Resources received a report entitled "Hydrologic and Hydraulic Analysis of the Sippo Creek Reservoir Dam Watershed" and other supporting digital files from URS Corporation (URS) on November 17, 2011 via email. The Dam Safety Engineering Program has reviewed the information and has the following comments.

Hydrology and Hydraulics for Sippo Creek Reservoir Watershed and Dam

1. The Dam Safety Engineering Program is in agreement with the methods used in the analysis and results of URS's report.
2. Table "A", Breach Input Parameters, showed the normal pool storage to be 61 acre-feet. The normal pool storage based on the conic volume formula for a depth of 15 feet and a surface area of 7.1 acres is 36 acre-feet. The difference in volume is the result of elevation/area data below the normal pool level. Please explain how the elevation/area data below the normal pool level was developed.
3. The State of Ohio has hired a consultant to perform a study to update the Probable Maximum Precipitation (PMP) values for the state. The preliminary results indicate that PMP values will reduce by approximately 25%. This would reduce the Probable Maximum Flood, the design flood for the dam, by a similar percentage.

Lincoln Way Flood Routing Analysis

1. The Dam Safety Engineering Program is in agreement with the methods used in the analysis and results of URS's report.
2. Page 2-15 states that the maximum capacity of the culvert is approximately 3500 cubic feet per second. Review of the energy grade line for cross section 5409 just upstream of the culvert indicates that the maximum capacity of the culvert is 3000 cubic feet per second. Please address this inconsistency.

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1. The Dam Safety Engineering Program is in agreement with the methods used in URS's report. However, for stream flows of 1980 and 2650 cubic feet per second, the submitted HEC-RAS model shows water surface elevations in the creek to be 2.3-2.9 feet lower than the current FEMA Flood Insurance Study (FIS). Please address why these differences exist.

Results and Conclusions

1. The classification of the dam must consider failure of the dam during minor and major flood events. Based on the flood profiles in the FEMA FIS, failure of the dam with a base flow of 800 cubic feet per second (slightly less than the 10-year flood) would have the potential to increase the water surface elevation of East Sippo Creek downstream of Lincoln Way by over three feet. This would likely have significant impact to low-lying homes along Tremont Avenue Southeast. Until the comments provided in this letter have been addressed, this conclusion appears to be valid and the classification of Class I is appropriate.
2. Based on the submitted analysis and using either the URS or the FEMA flood profiles for East Sippo Creek, it appears that failure of the dam for base floods in excess of 3000 cubic feet per second would have minimal impact on homes downstream of Lincoln Way.
3. The submitted analysis considered the existing uneven crest profile of the dam. Any modification of the dam must address leveling the crest. Therefore, the final analysis must provide a proposed uniform crest elevation. Please be aware that the selection of the crest elevation could affect some of the results and conclusions of the submitted analysis.

Your cooperation in improving the overall condition of this dam is appreciated. This study has provided valuable insight regarding the performance of the dam, the potential hazard to downstream properties, and the selection of appropriate remediation. Please contact me at 614/265-6738 if you have any questions concerning this letter or to schedule a meeting to discuss this project.

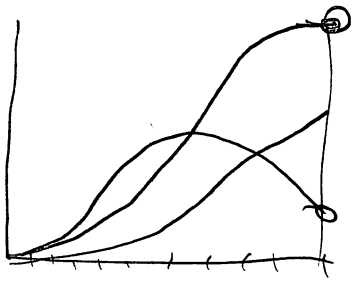
Sincerely,

Keith R. Banachowski, P.E.
Program Manager
Dam Safety Engineering Program
Division of Soil & Water Resources

cc: Michael Shore, URS Corporation

10-MIN UNIT

ID → 0 2



ERIC-1 CREATE HYDRO

- UD = 1.78 HRS LAG

0.6 T_c = LAG = 3 HOURS

(?)

$\frac{8000}{3(60)60}$ 0.7 fps

CN → 85 if TYPE C

LERIC 1 ROUTE H

(A) THRU LAKE

A SIPPO 4 CREATE

- HC 2 DOES NOT BELONG
- UD = 5.82 (BIG)

A OSPINGS 2 CREATE

- UD 2.56

(A) 4.3 T_c

COMBINE HC 2

(B) L. SIPPO C ROUTE

A SIP. RES 5 CREATE

(A)

- UD = 16.4 27 HRS T_c
- SQ - MISSED A SPACE

HC 3

OSPRINGS ROUTE

- NO SQ
- DID NOT INCLUDE OVERTOPPING

A CABLE CREATE

- UD = 5.82

COMBINE HC 2

COMBINED

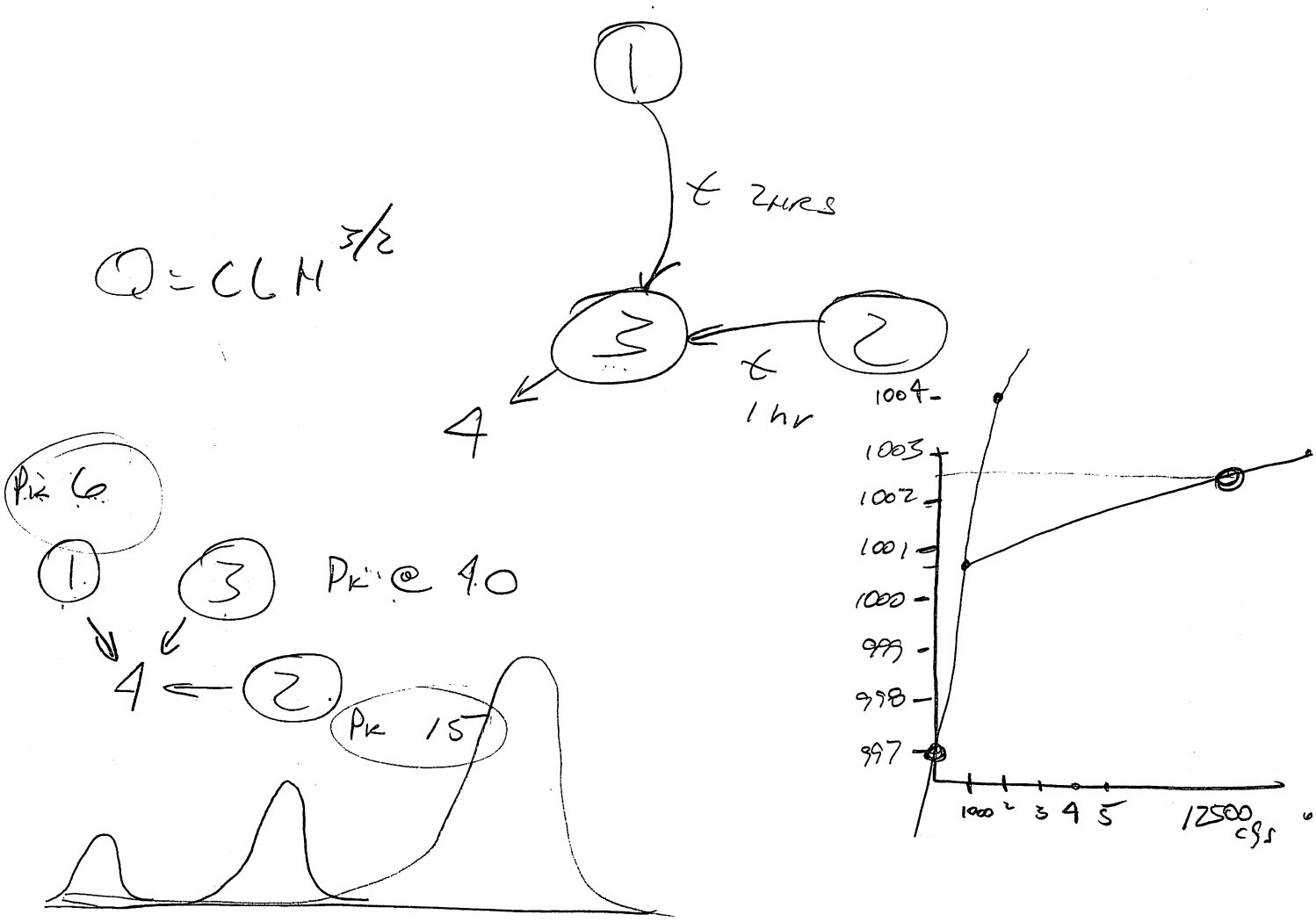
ROUTE

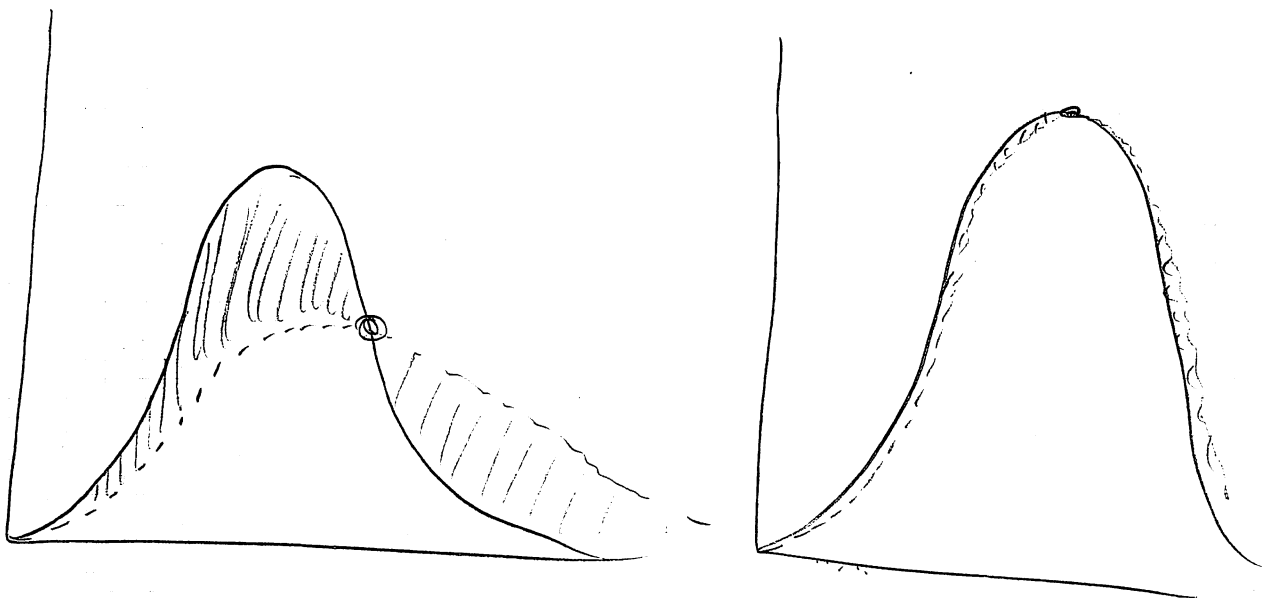
- Peak out does not make sense

(C) LAKE CABLE ROUTE

- HC 2 DOES NOT BELONG
- UD = 5.82 (BIG) T_c = 10 HRS

- ~~XXX~~ WARNING UNIT
- TIMING OF PEAKS


Q = CLH^3/2
1
t 2HRS
3
2
t
1 hr
4
Pk 6
1
3
Pk @ 40
4
2
Pk 15
1004
1003
1002
1001
1000
999
998
997
1000
2
3
4
5
12500
cfs



Ohio Department of Natural Resources

TED STRICKLAND, GOVERNOR SEAN D. LOGAN, DIRECTOR

David Hanselmann • Chief

Division of Soil & Water Resources

August 10, 2010

City of Massillon
Kenneth Kaminski, Director Parks & Recreation
505 Erie St. North
Massillon, OH 44646

RE: Sippo Creek Reservoir Dam
File Number: 0614-012
Stark County

Dear Mr. Kaminski:

Thank you for allowing Tina Griffin and Matt Hook of the Division of Soil & Water Resources to conduct a safety inspection of Sippo Creek Reservoir Dam on May 25, 2010. This inspection was conducted by representatives of the Chief of the Division of Soil & Water Resources under the provisions of Ohio Revised Code (ORC) Section 1521.062 to evaluate the condition of the dam and its appurtenances. The Chief has the responsibility to ensure that human life, health, and property are protected from dam failures. 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. A copy of the laws and administrative rules for dam safety is available on the division's web site or by request. I have enclosed guidelines for preparing an operation, maintenance, and inspection manual and guidelines for preparing an emergency action plan.

The enclosed inspection report was generated based on available information and is hereby provided for your use and study. Listed in the report are several repair, maintenance, and monitoring items that as a dam owner you are required by law to perform. Completion of these required items will improve the safety and overall condition of the dam. The Chief must approve any plans for modifications or repairs to the dam. Following approval of the engineered plans, all necessary repairs must be implemented by the owner under the supervision of a registered professional engineer. Failure to complete the repair, maintenance, and monitoring items may result in legal enforcement of these requirements in the form of an order from the Chief of the Division.

Please be advised that you may qualify for a loan to make required repairs from the Ohio Dam Safety Loan Program administered by the Ohio Water Development Authority (OWDA). To find out more about the program, please contact OWDA's Loan Officer at 614/466-5822.

To gain information that will help improve the inspection program, a short survey has been developed and is enclosed. Please complete the survey and return it in the self-addressed envelope provided. Your feedback is important.

It is the Division's understanding that you are the owner of this dam. Under Ohio's dam safety regulations, "owners" are "those who own, or propose to construct a dam or levee." OAC Rule 1501:21-3-01(V). A "dam" is defined as "any artificial barrier together with any appurtenant works, which either does or may impound water or other liquefied material ..." OAC Rule 1501:21-3-01(F). "Appurtenant works" include but are not limited to outlet works and spillway channels.

If you are not an owner of this dam, or believe that there are additional owners of the dam not addressed in this communication, please contact Tina Griffin. Please note that ORC Section 1521.062 requires a dam owner to notify the Chief of the Division of Soil & Water Resources in writing of a change in ownership of a dam prior to the exchange of the property.

Your cooperation in improving the overall condition of this dam is appreciated. Please contact Tina Griffin at 614/265-6634 if you have any questions.

Sincerely,

Keith R. Banachowski, P.E.
Program Manager
Dam Safety Engineering Program
Division of Soil & Water Resources

KRB:tmg

Enclosures

P.S. In July 2009, the Ohio Department of Natural Resources, Division of Water, merged with the Division of Soil & Water Conservation to become the Division of Soil & Water Resources.

12/1/06 KMG

— Cover page needs file number.

Plan submitted by Kenn Kaminski, Director of Parks + Recreation, City of Massillon on 11/22/06.

— The plans were dated ~~2/27/02~~ March 2002.

The submittal did not include the revised H+H study or the calculations.

I left phone message ~~to~~ with Kenn on 12/1/06 stating that it was an incomplete submittal.

Memorandum

To: Tina Lombardi, P.E. Dam Safety Engineering Program

From: Kenn Kaminski, Director of Parks and Recreation City of Massillon

Date: 11/14/2006

Re: Sippo Creek Reservoir Dam File Number: 0614-012

Ms. Lombardi,

Thank you for taking your time to answer my questions regarding the Sippo Creek Reservoir Dam in the City of Massillon. The City had a plan completed in 2004 and they never submitted the project to the Ohio Department of Nature Resources.

I am submitting the plans to your department for potential approval or recommended suggestions. I would like to move forward with this project and am looking for assistance. If you have any questions please feel free to contact me at your convenience 330.832.1621 ext. 12.

Thank you

Kenn Kaminski
City of Massillon
Director of Parks and Recreation
kkaminski@massillonohio.com

ms consultants, inc.
engineers, architects, planners

4150 Belden Village Street, N.W.
Suite 300
Canton, Ohio 44718-2539
Phone: (330) 492-6350
Fax: (330) 492-6092
www.msconsultants.com

February 27, 2002

Steven D. Hamit, P.E.
City Engineer
Municipal Government Annex
Administration Building
151 Lincoln Way East
Massillon, OH 44646

RE: Sippo Reservoir Dam

Dear Mr. Hamit:

Enclosed for your review and comment are the revised design plans for the dam improvements at Sippo Reservoir. The plans have been modified based upon comments from the Ohio Department of Natural Resources (ODNR).

In our original report, we ran a hydrologic analysis for the watershed and it was approved by ODNR. Our original plans were based upon this analysis. When we submitted the plans for construction permit approval, ODOT revisited the report and changed all of the hydraulic calculations. The new calculations show that, for the probable Maximum Flood, the water will overtop the dam regardless of how high we raise the dam. Because of this, the ODNR Division of Dams requires overtopping protection for the dam for the Probable Maximum Flood.

We have modified the plans to include placing roller compacted concrete on top of the earthen embankment to provide overtopping protection. The concrete will be covered with 4" topsoil and seeding so the appearance will remain the same as present. The estimated construction for the roller compacted concrete is $85,000. The estimated new project cost for the dam improvements is $125,000.

Please feel free to contact me if you have any questions.

Sincerely yours,

William M. Malson
Project Manager

WMM:clm
06261.206

encl.

cc: Donald A. Sever, P.E.

Ohio Department of Natural Resources

BOB TAFT, GOVERNOR SAMUEL W. SPECK, DIRECTOR

Richard S. Bartz • Chief

Division of Water

April 7, 2006

City of Massillon
Mr. Kenneth Kaminski, Director
Parks & Recreation
505 Erie St. North
Massillon, OH 44646-5549

RE: Sippo Creek Reservoir Dam
File Number: 0614-012
Stark County

Dear Mr. Kaminiski:

Thank you for allowing Tina Lombardi and Dena Barnhouse of the Division of Water to conduct a safety inspection of Sippo Creek Reservoir Dam on February 21, 2006. This inspection was conducted by representatives of the Chief of the Division of Water under the provisions of Ohio Revised Code (ORC) Section 1521.062 to evaluate the condition of the dam and its appurtenances. The Chief has the responsibility to ensure that human life, health, and property are protected from dam failures. 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. The Chief promulgated new and amended administrative rules for dam safety in January 2005. A copy of these rules is available on the division's web site or by request. I have enclosed guidelines for preparing an operation, maintenance, and inspection manual and guidelines for preparing an emergency action plan.

The enclosed inspection report was generated based on available information and is hereby provided for your use and study. Listed in the report are several past due repair, maintenance, and monitoring items that as a dam owner you are required by law to perform. Completion of these required items will improve the safety and overall condition of the dam. The Chief must approve any plans for modifications or repairs to the dam. Following approval of the engineered plans, all necessary repairs must be implemented by the owner under the supervision of a registered professional engineer. Failure to complete the repair, maintenance, and monitoring items may result in legal enforcement of these requirements in the form of an order from the Chief of the Division.

Please be advised that you may qualify for a loan to make required repairs from the Ohio Dam Safety Loan Program administered by the Ohio Water Development Authority (OWDA). To find out more about the program, please contact OWDA's Loan Officer at 614/466-5822.

To gain information that will help improve the inspection program, the Division of Water has developed the enclosed survey. Please complete the survey and return it in the self-addressed envelope provided. Your feedback is important.

Your cooperation in improving the overall condition of this dam is appreciated. Please contact Tina Lombardi at 614-265-6634 if you have any questions.

Sincerely,

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

KRB:tml

cc: Tina Lombardi, P.E., Dam Safety Engineering Program

Enclosures

Ohio Department of Natural Resources

BOB TAFT, GOVERNOR

SAMUEL W. SPECK, DIRECTOR

Richard S. Bartz • Chief

Division of Water

February 14, 2006

Mr. Jay Boodheshwar
City of Massillon
Parks & Recreation
505 Erie Street North
Massillon, OH 44646

RE: Sippo Creek Reservoir Dam
File Number: 0614-012
Stark County

Dear Mr. Boodheshwar:

The Chief of the Division of Water has the authority and responsibility under Ohio Revised Code Section 1521.062 to regulate dam safety in Ohio. As part of this responsibility, the Chief is required to make periodic safety inspections of existing dams to ensure that their continued operation and use does not constitute a hazard to life, health, or property.

I am writing to notify you confirm that a routine, periodic safety inspection of the above referenced dam has been planned for April 21, 2006 at approximately 10:00 a.m. The inspection team should be at your dam within 20 minutes before or after the time noted. The inspection team may be late due to variability in travel time and other inspections planned for this day. If this happens, I will attempt to contact you at 330/832/1621 to provide you with an estimated time of arrival. Please note that certain areas of the state have limited cellular telephone coverage or lack public telephones, so contact might not be possible.

I encourage you or your representative to attend the inspection so that we can discuss the history of the dam and you will be familiar with our inspection procedures. The inspection will take approximately 1½ hours. It will consist of interviewing you or your representative, inspecting the dam, making measurements, taking photographs, and completing a detailed inspection checklist. You may refer to the attached sheet for more information concerning the interview questions. Our files indicate that you have an operation, maintenance, and inspection manual and an emergency action plan for this dam. Please be prepared to review them at the time of this inspection. We also request that you cut the vegetation on the dam prior to the inspection, if possible. Typically, the inspection report will be completed within 30 to 60 days after the inspection. The report will list repair, maintenance, and monitoring items that as a dam owner dam owners you are required by law to perform.

I look forward to working with you to help maintain the integrity of your dam. Please contact me at 614/265/6634 if you have any questions or a conflict with this date or time.

Sincerely,

Tina Lombardi

Tina Lombardi, P.E.
Project Manager
Dam Safety Engineering Program
Division of Water

Enclosure

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
OWNER TYPE: PUBLIC, LOCAL
ADDRESS1: Parks & Recreation
PARCEL NO:
ADDRESS2: 505 Erie St North
ADDRESS3:
CITY: Massillon **STATE:** OH **ZIP+4:** 44646-5549
CONTACT PERSON: Jay Boodheshwar, Director **TELEPHONE:** 330/832-1621

LOCATION INFORMATION

COUNTY: STARK
TOWNSHIP: PERRY
LATITUDE DEG: 40 **MIN:** 48 **SEC:** 18
LONGITUDE DEG: 81 **MIN:** 30 **SEC:** 30
STREAM: SIPPO CREEK
NEAREST AFFECTED COMMUNITY: MASSILON
COMMUNITY'S DISTANCE FROM DAM (miles): 0
USGS QUAD: MASSILLON
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): 14.9 **or (acres):** 9566

EMBANKMENT DATA

LENGTH (ft): 265.0
UPSTREAM SLOPE: 2H:1V
MAX. HEIGHT (ft): 18.9
DOWNSTREAM SLOPE: 2H:1V
TOP WIDTH (ft): 6.0
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

** Survey data is best available and not necessarily based on USGS benchmark*

INSPECTION INFORMATION

LAST INSPECTION (m/d/y): 4/26/2001 **INSPECTOR:** WDE
PHASE I:
PRIOR INSPECTIONS: 12/19/1991

OTHER SITE VISITS:

OPERATION INFORMATION/REMARKS

RECEIVED REPAIR PLANS 2000, COMMENTS PROVIDED, NO PROGRESS MADE

EMERGENCY ACTION PLAN: NO **FORMAT:**
ANNUAL FEE: $219.00
LAST DATA ENTRY: 8/26/2004

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
OWNER TYPE: PUBLIC, LOCAL
ADDRESS1: Parks & Recreation
PARCEL NO:
ADDRESS2: 505 Erie St North
ADDRESS3:
CITY: Massillon **STATE:** OH **ZIP+4:** 44646-554
CONTACT PERSON: Jay Boodheshwar, Director **TELEPHONE:** 330/832-1621

LOCATION INFORMATION

COUNTY: STARK
TOWNSHIP: PERRY
LATITUDE DEG: 40 **MIN:** 48 **SEC:** 18
LONGITUDE DEG: 81 **MIN:** 30 **SEC:** 30
STREAM: SIPPO CREEK
NEAREST AFFECTED COMMUNITY: MASSILON
COMMUNITY'S DISTANCE FROM DAM (miles): 0
USGS QUAD: MASSILLON
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): 14.9 **or (acres):** 9566

EMBANKMENT DATA

LENGTH (ft): 265.0
UPSTREAM SLOPE: 2H:1V
MAX. HEIGHT (ft): 18.9
DOWNSTREAM SLOPE: 2H:1V
TOP WIDTH (ft): 6.0
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 (m/d/y): 4/26/2001 **INSPECTOR:** WDE
PHASE I:
PRIOR INSPECTIONS: 12/19/1991
comments provided but
OTHER SITE VISITS:

OPERATION INFORMATION/REMARKS

2000 - Rec'd repair plans; ~~[illegible]~~, no progss made.

EMERGENCY ACTION PLAN: NO **FORMAT:**
ANNUAL FEE: EXEMPT
LAST DATA ENTRY: 7/29/2002

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
OWNER TYPE: PUBLIC, LOCAL
ADDRESS1: Parks & Recreation
PARCEL NO:
ADDRESS2: 195 Oak Avenue, SE
ADDRESS3:
CITY: Massillon STATE: OH ZIP+4:44646
CONTACT PERSON: Jay Boodheshwar, Director TELEPHONE: 330/832-1621

LOCATION INFORMATION

COUNTY: STARK
LATITUDE Deg: 40 Min: 48 Sec: 18
TOWNSHIP: PERRY
LONGITUDE Deg: 81 Min: 30 Sec: 30
STREAM: SIPPO CREEK
NEAREST AFFECTED COMMUNITY: MASSILON
COMMUNITY'S DISTANCE FROM DAM (miles): 0.00
USGS QUAD: MASSILLON
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	UPSTREAM SLOPE	: 2H:1V
MAX. HEIGHT (ft)	: 18.9	DOWNSTREAM SLOPE	: 2H:1V
TOP WIDTH (ft)	: 6	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

Ohio Department of Natural Resources

BOB TAFT, GOVERNOR SAMUEL W. SPECK, DIRECTOR

James R. Morris • Chief

Division of Water

May 18, 2001

Mr. Jay Boodheshwar
Director of Parks & Recreation
City of Massillon
195 Oak Avenue
Massillon, Ohio 44646

RE: Sippo Creek Reservoir Dam
Stark County
File Number: 0614-012

Dear Mr. Boodheshwar:

Thank you for allowing Doug Evans and me of the Division of Water to conduct a safety inspection of Sippo Creek Reservoir Dam on April 26, 2001. This inspection was conducted under the provisions of Section 1521.062 of the Ohio Revised Code (ORC) to evaluate the condition of the dam and its appurtenances. The Dam Safety Engineering Program has the responsibility to ensure that human life, health, and property are protected from dam failures. 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. The division promulgated new and amended administrative rules for dam safety in December of 1999. A copy of these rules and an information sheet were provided during the inspection. I have also enclosed a copy of the ORC governing dams, guidelines for preparing an operation, maintenance, and inspection manual, and guidelines for preparing an emergency action plan.

An inspection report was generated based on available information and is hereby provided for your use and study. Listed in the report are several repair, maintenance, and monitoring items that as a dam owner you are required by law to perform. They will improve the safety and overall condition of the dam. The Division of Water must approve any plans for modifications or repairs to the dam. Following approval of the engineered plans, all necessary repairs must be implemented by the owner under the supervision of a registered professional engineer.

The Division of Water has not thoroughly investigated the structural stability of the embankment and spillway and the hydraulic adequacy of the dam to safely pass the required design flood. Any problems in these areas could lead to dam failure. To ensure the safety of this dam and the protection of downstream areas in accordance with Ohio's dam safety laws, you should have a professional engineer make an in-depth safety evaluation and initiate timely repairs.

Please be advised that you may qualify for a loan to make required repairs from the Ohio Dam Safety Loan Program administered by the Ohio Water Development Authority (OWDA). To find out more about the program, please contact OWDA's Loan Officer, Sue Farmer, at 614/466-5822.

To gain information that will help improve our program, the Division of Water has developed the enclosed survey. We would appreciate it if you would fill out the survey and return it to us in the self-addressed envelope provided. Your feedback is important to us.

We appreciate your cooperation in improving the overall condition of this dam. Please contact Doug Evans at 614/265-6780 if you have any questions.

Sincerely

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

KRB:wde

cc: Doug Evans, E.I., Dam Safety Engineering Program

Enclosures

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  05/07/2001  TIME  07:23:13 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

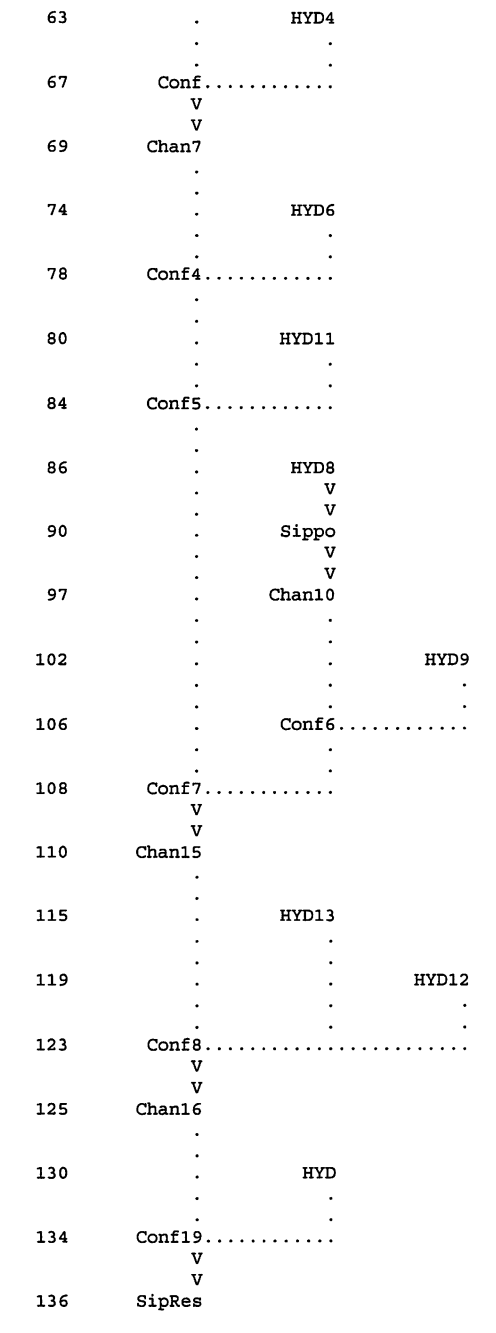

```
          LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

*** FREE ***
                        *DIAGRAM
              1         ID   Sippo reservoir
              2         ID   May 2001
              3         ID   Using Muskingum-Cunge, 8-pt est. from consult.#
              4         ID
              5         ID   Doug and Keith
              6         IT      20       0       0     300
                        * IT based on a UD of 1.25 - most basins ~1.5 squ miles
              7         IN      15
              8         IO       5       0
              9         JR    FLOW       1      .5     .25      .1     .08     .06     .04     .03     .02

             10         KK    Hyd1
             11         BA    0.18
             12         PB      32
                        * 10 squ mile 24-hour pmp
             13         PI   0.064   0.096   0.096   0.096   0.096   0.096   0.096   0.096   0.096   0.096
             14         PI   0.096   0.096   0.096   0.096   0.096   0.128   0.128   0.128   0.128   0.128
             15         PI   0.128   0.128   0.128   0.128   0.160   0.160   0.160   0.160   0.160   0.160
             16         PI   0.160   0.160   0.192   0.224   0.224   0.224   0.256   0.256   0.288   0.288
             17         PI   0.320   0.384   0.480   0.576   0.672   0.832   3.328   8.832   1.408   0.896
             18         PI   0.736   0.576   0.480   0.416   0.352   0.320   0.288   0.256   0.224   0.224
             19         PI   0.224   0.192   0.192   0.192   0.192   0.192   0.160   0.160   0.160   0.160
             20         PI   0.160   0.128   0.128   0.128   0.128   0.128   0.128   0.128   0.128   0.096
             21         PI   0.096   0.096   0.096   0.096   0.096   0.096   0.096   0.096   0.096   0.096
             22         PI   0.096   0.096   0.096   0.096   0.096   0.064
             23         LS       0      74
             24         UD    0.44
                        * lag times are estimated by consultant submittal
                        * lags appear a bit long bec. slope slightly under estimated, ok to est. flood

             25         KK    Eric
             26         RS       1    ELEV  1116.5
             27         SA     3.7     3.9     4.2     6.2     8.1
             28         SE  1116.5    1118    1120    1125    1130
             29         SQ       0       3      17      40      69     600    1130
             30         SE  1116.5    1117    1118    1119    1120    1121  1121.5
             31         ST    1120     150     2.8     1.5
                        * 1121.5 1121
                        * fictious tod info

             32         KK    HYD2
             33         BA    0.42
             34         LS       0      75
             35         UD    0.65

             36         KK    Conf1
             37         HC       2
```

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  38          KK    Ospr
  39          RS       1    ELEV    1106
  40          SA       0      27      30      40      44
  41          SE  1104.2   1106.  1108.7    1110  1112.9
  42          SQ       0      60     180     300    1240    3930
  43          SE    1106    1107    1108  1108.7    1109    1110
  44          ST  1108.7     150     2.8     1.5
              * fictious tod info

  45          KK    HYD3
  46          BA    2.19
  47          LS       0      70
  48          UD    2.26

  49          KK    Conf2
  50          HC       2

  51          KK    Cable
  52          RS       1    ELEV  1097.4
  53          SA       0     220     296   316.7     405     500
  54          SE    1080  1097.4  1099.5    1100    1103    1104
  55          SQ       0       7      14      71     242     262     347
  56          SE  1096.4    1097  1097.4    1098    1099  1099.1  1099.5
  57          ST  1099.5    1000     2.8     1.5

  58          KK    Chan5
  59          RD
  60          RC    0.06    0.05    0.06    8800   0.024    1085
  61          RX       0     200     465     494     500     530     900    1000
  62          RY    1085    1078    1076    1069    1069    1076    1077    1085

  63          KK    HYD4
  64          BA    1.68
  65          LS       0      68
  66          UD    1.28

  67          KK    Conf3
  68          HC       2

  69          KK    Chan7
  70          RD
  71          RC    0.06    0.05    0.06    5900  0.0017    1080
  72          RX       0     100     350     460     490     500     550     700    1000
  73          RY    1080    1065    1052    1045    1033    1033    1045    1052    1075

  74          KK    HYD6
  75          BA    1.67
  76          LS       0      69
  77          UD    1.55
```



```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  78          KK    Conf4
  79          HC       2

  80          KK    HYD11
  81          BA    1.21
  82          LS       0      67
  83          UD    1.29

  84          KK    Conf5
  85          HC       2

  86          KK    HYD8
  87          BA    3.07
  88          LS       0      75
  89          UD    1.56

  90          KK    SippoLake
  91          RS       1    ELEV    1027
  92          SA       0      88     106     126
  93          SE    1022    1027  1029.3    1036
  94          SQ       0     350    1380    4210    7150   12300   16350
  95          SE    1027  1029.3  1030.3    1031  1032.3    1033    1035
  96          ST  1029.3     450     2.8     1.5
              * TOD from inventory

  97          KK  Chan10
  98          RD
  99          RC    0.06    0.05    0.06    4100   0.003    1032
 100          RX       0     190     485     495     505     515     820     900    1000
 101          RY    1032    1024    1022    1017    1017    1022    1024    1027    1032
```

```
          102          KK    HYD9
          103          BA    1.02
          104          LS       0      67
          105          UD    1.51

          106          KK    Conf6
          107          HC       2

          108          KK    Conf7
          109          HC       2

          110          KK  Chan15
          111          RD
          112          RC    0.06    0.05    0.06    8800   0.001    1060
          113          RX       0     300     470     493     507     520     630     750    1000
          114          RY    1060    1026    1023    1017    1017    1020    1022    1037    1038

          115          KK   HYD13
          116          BA    1.15
          117          LS       0      75
          118          UD    0.72
1                                        HEC-1 INPUT                                        PAGE  4

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          119          KK   HYD12
          120          BA    1.13
          121          LS       0      74
          122          UD     1.1

          123          KK    Conf8
          124          HC       3

          125          KK  Chan16
          126          RD
          127          RC    0.06    0.05    0.06    7500   0.001    1055
          128          RX       0     220     350     470     493     505     590     700     800
          129          RY    1032    1030    1012    1012    1006    1006    1026    1034    1055

          130          KK     HYD14
          131          BA    1.06
          132          LS       0      80
          133          UD    0.78

          134          KK  Conf19
          135          HC       2

          136          KK  SipRes
          137          RS       1    ELEV     997
          138          SA       0     4.4      34      40      75     100     105
          139          SE     983     997  1000.6    1004    1010    1015    1016
          140          SQ       0     110     305     561     864    1207    3415
          141          SE     997     998     999    1000    1001    1002    1007
          142          ST  1000.6     265     2.8     1.5
          143          ZZ
1
               SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    10        Hyd1
                 V
                 V
    25        Eric
                 .
                 .
    32           .        HYD2
                 .           .
                 .           .
    36        Conf.............
                 V
                 V
    38        Ospr
                 .
                 .
    45           .        HYD3
                 .           .
                 .           .
    49       Conf2.............
                 V
                 V
    51       Cable
                 V
                 V
    58       Chan5
                 .
                 .
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*         SEPTEMBER 1990                *
*          VERSION 4.0                  *
*                                       *
*  RUN DATE  05/07/2001  TIME  07:23:13 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*            (916) 756-1104             *
*                                       *
*****************************************
```

Sippo reservoir
May 2001
Using Muskingum-Cunge, 8-pt est. from consult.#

Doug and Keith

```
  8 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN          20  MINUTES IN COMPUTATION INTERVAL
```

```
                IDATE      1    0  STARTING DATE
                ITIME           0000  STARTING TIME
                   NQ            300  NUMBER OF HYDROGRAPH ORDINATES
               NDDATE      5    0  ENDING DATE
               NDTIME           0340  ENDING TIME
                ICENT             19  CENTURY MARK

          COMPUTATION INTERVAL      .33 HOURS
              TOTAL TIME BASE   99.67 HOURS

    ENGLISH UNITS
         DRAINAGE AREA          SQUARE MILES
         PRECIPITATION DEPTH    INCHES
         LENGTH, ELEVATION      FEET
         FLOW                   CUBIC FEET PER SECOND
         STORAGE VOLUME         ACRE-FEET
         SURFACE AREA           ACRES
         TEMPERATURE            DEGREES FAHRENHEIT

  JP       MULTI-PLAN OPTION
               NPLAN           1  NUMBER OF PLANS

  JR       MULTI-RATIO OPTION
           RATIOS OF RUNOFF
            1.00      .50       .25       .10       .08       .06       .04       .03       .02
1

          PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                      FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                  TIME TO PEAK IN HOURS
```

					RATIOS APPLIED TO FLOWS								
OPERATION	STATION	AREA	PLAN		RATIO 1 1.00	RATIO 2 .50	RATIO 3 .25	RATIO 4 .10	RATIO 5 .08	RATIO 6 .06	RATIO 7 .04	RATIO 8 .03	RATIO 9 .02
HYDROGRAPH AT													
+	Hyd1	.18	1	FLOW	1731.	866.	433.	173.	138.	104.	69.	52.	35.
				TIME	12.33	12.33	12.33	12.33	12.33	12.33	12.33	12.33	12.33
ROUTED TO													
+	Eric	.18	1	FLOW	1761.	835.	426.	59.	44.	30.	17.	12.	7.
				TIME	12.33	12.33	12.33	13.00	13.00	13.33	13.33	13.33	13.67
			** PEAK STAGES IN FEET **										
			1	STAGE	1121.42	1120.84	1120.44	1119.67	1119.13	1118.58	1117.98	1117.64	1117.29
				TIME	12.33	12.33	12.33	13.00	13.00	13.33	13.33	13.33	13.67
HYDROGRAPH AT													
+	HYD2	.42	1	FLOW	3171.	1586.	793.	317.	254.	190.	127.	95.	63.
				TIME	12.33	12.33	12.33	12.33	12.33	12.33	12.33	12.33	12.33
2 COMBINED AT													
+	Conf	.60	1	FLOW	4932.	2420.	1218.	364.	287.	213.	139.	103.	68.
				TIME	12.33	12.33	12.33	12.67	12.67	12.67	12.67	12.67	12.67
ROUTED TO													
+	Ospr	.60	1	FLOW	4663.	2400.	949.	112.	81.	54.	35.	26.	17.
				TIME	12.67	12.67	13.00	14.00	14.33	14.33	14.33	14.33	14.33
			** PEAK STAGES IN FEET **										
			1	STAGE	1110.03	1109.35	1108.90	1107.43	1107.18	1106.89	1106.58	1106.43	1106.28
				TIME	12.67	12.67	13.00	14.00	14.33	14.33	14.33	14.33	14.33
HYDROGRAPH AT													
+	HYD3	2.19	1	FLOW	7527.	3764.	1882.	753.	602.	452.	301.	226.	151.
				TIME	14.33	14.33	14.33	14.33	14.33	14.33	14.33	14.33	14.33
2 COMBINED AT													
+	Conf2	2.79	1	FLOW	8606.	4283.	2169.	864.	683.	505.	336.	252.	168.
				TIME	13.67	13.67	14.00	14.33	14.33	14.33	14.33	14.33	14.33
ROUTED TO													
+	Cable	2.79	1	FLOW	7660.	3087.	693.	152.	116.	80.	53.	42.	30.
				TIME	14.67	15.33	17.67	20.33	20.67	21.33	21.33	21.00	20.67
			** PEAK STAGES IN FEET **										
			1	STAGE	1101.33	1100.44	1099.72	1098.47	1098.26	1098.05	1097.82	1097.69	1097.57
				TIME	14.67	15.33	17.67	20.33	20.67	21.33	21.33	21.00	20.67
ROUTED TO													
+	Chan5	2.79	1	FLOW	7583.	3068.	690.	152.	116.	80.	53.	42.	30.
				TIME	15.00	15.67	18.00	20.67	21.33	22.00	22.00	21.67	21.33
HYDROGRAPH AT													
+	HYD4	1.68	1	FLOW	8314.	4157.	2079.	831.	665.	499.	333.	249.	166.
				TIME	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00
2 COMBINED AT													
+	Conf	4.47	1	FLOW	11765.	4358.	2125.	854.	684.	515.	347.	263.	180.

				TIME	13.67	13.33	13.00	13.00	..00	13.00	13.00	13.00	13.00
ROUTED TO													
+	Chan7	4.47	1	FLOW	11676.	4148.	2058.	828.	661.	494.	330.	247.	167.
				TIME	14.00	15.67	13.67	13.67	13.67	13.67	13.67	14.00	14.00
HYDROGRAPH AT													
+	HYD6	1.67	1	FLOW	7381.	3690.	1845.	738.	590.	443.	295.	221.	148.
				TIME	13.33	13.33	13.33	13.33	13.33	13.33	13.33	13.33	13.33
2 COMBINED AT													
+	Conf4	6.14	1	FLOW	18542.	7648.	3867.	1552.	1240.	929.	619.	458.	300.
				TIME	13.67	13.67	13.67	13.67	13.67	13.67	13.67	13.67	13.67
HYDROGRAPH AT													
+	HYD11	1.21	1	FLOW	5915.	2958.	1479.	592.	473.	355.	237.	177.	118.
				TIME	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00
2 COMBINED AT													
+	Conf5	7.35	1	FLOW	23762.	10342.	5307.	2100.	1668.	1242.	828.	615.	404.
				TIME	13.67	13.33	13.33	13.33	13.33	13.67	13.67	13.67	13.67
HYDROGRAPH AT													
+	HYD8	3.07	1	FLOW	13900.	6950.	3475.	1390.	1112.	834.	556.	417.	278.
				TIME	13.33	13.33	13.33	13.33	13.33	13.33	13.33	13.33	13.33
ROUTED TO													
+	Sippo	3.07	1	FLOW	13503.	6842.	3171.	564.	317.	241.	163.	123.	83.
				TIME	13.67	13.67	14.00	15.33	16.00	16.00	16.00	16.00	16.00
			** PEAK STAGES IN FEET **										
			1	STAGE	1032.26	1030.98	1030.39	1029.44	1029.08	1028.58	1028.07	1027.81	1027.55
				TIME	13.67	13.67	14.00	15.33	16.00	16.00	16.00	16.00	16.00
ROUTED TO													
+	Chan10	3.07	1	FLOW	13353.	6745.	3174.	551.	316.	241.	163.	123.	83.
				TIME	14.00	14.00	14.33	16.00	16.33	16.33	16.33	16.33	16.33
HYDROGRAPH AT													
+	HYD9	1.02	1	FLOW	4555.	2277.	1139.	455.	364.	273.	182.	137.	91.
				TIME	13.33	13.33	13.33	13.33	13.33	13.33	13.33	13.33	13.33
2 COMBINED AT													
+	Conf6	4.09	1	FLOW	17367.	8910.	3978.	684.	530.	398.	265.	197.	130.
				TIME	13.67	13.67	14.33	15.67	14.00	14.00	14.00	14.00	14.00
2 COMBINED AT													
+	Conf7	11.44	1	FLOW	41129.	19168.	7795.	2736.	2186.	1638.	1090.	809.	532.
				TIME	13.67	13.67	14.33	13.67	13.67	13.67	13.67	13.67	13.67
ROUTED TO													
+	Chan15	11.44	1	FLOW	38500.	17186.	7281.	2399.	1907.	1422.	937.	697.	461.
				TIME	14.00	14.33	14.67	14.67	14.67	14.67	15.00	15.00	15.00
HYDROGRAPH AT													
+	HYD13	1.15	1	FLOW	8367.	4184.	2092.	837.	669.	502.	335.	251.	167.
				TIME	12.67	12.67	12.67	12.67	12.67	12.67	12.67	12.67	12.67
HYDROGRAPH AT													
+	HYD12	1.13	1	FLOW	6428.	3214.	1607.	643.	514.	386.	257.	193.	129.
				TIME	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00
3 COMBINED AT													
+	Conf8	13.72	1	FLOW	44157.	19571.	8123.	2778.	2179.	1624.	1059.	777.	514.
				TIME	14.00	14.00	14.67	14.33	14.33	14.67	14.67	15.00	15.00
ROUTED TO													
+	Chan16	13.72	1	FLOW	41472.	18816.	7926.	2650.	2063.	1498.	968.	726.	484.
				TIME	14.33	14.33	15.00	15.00	15.33	15.67	16.00	16.00	16.00
HYDROGRAPH AT													
+	HYD	1.06	1	FLOW	7588.	3794.	1897.	759.	607.	455.	304.	228.	152.
				TIME	12.67	12.67	12.67	12.67	12.67	12.67	12.67	12.67	12.67
2 COMBINED AT													
+	Conf19	14.78	1	FLOW	43164.	19662.	8188.	2755.	2132.	1544.	994.	746.	497.
				TIME	14.33	14.33	15.00	15.00	15.33	15.33	15.67	16.00	16.00
ROUTED TO													
+	SipRes	14.78	1	FLOW	42422.	19439.	8159.	2720.	2098.	1517.	960.	681.	459.
				TIME	14.67	14.67	15.00	15.33	15.67	16.00	16.33	16.67	16.67
			** PEAK STAGES IN FEET **										
			1	STAGE	1013.89	1008.19	1004.55	1002.16	1001.79	1001.39	1000.90	1000.40	999.60
				TIME	14.67	14.67	15.00	15.33	15.67	16.00	16.33	16.67	16.67

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
INTERPOLATED TO
COMPUTATION INTERVAL

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .00									
	Chan5 MANE	18.54	7627.54	908.54	27.51	20.00	7583.22	900.00	27.48

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4090E+04 EXCESS= .0000E+00 OUTFLOW= .4093E+04 BASIN STORAGE= .2424E+00 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00									
	Chan5 MANE	12.01	3068.29	948.65	13.74	20.00	3067.50	940.00	13.74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2045E+04 EXCESS= .0000E+00 OUTFLOW= .2045E+04 BASIN STORAGE= .1730E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
	Chan5 MANE	18.17	691.48	1072.09	6.87	20.00	690.10	1080.00	6.87

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1023E+04 EXCESS= .0000E+00 OUTFLOW= .1023E+04 BASIN STORAGE= .9039E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
	Chan5 MANE	20.00	151.60	1240.00	2.85	20.00	151.60	1240.00	2.85

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4249E+03 EXCESS= .0000E+00 OUTFLOW= .4250E+03 BASIN STORAGE=-.6465E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
	Chan5 MANE	20.00	116.14	1280.00	2.33	20.00	116.14	1280.00	2.33

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3472E+03 EXCESS= .0000E+00 OUTFLOW= .3473E+03 BASIN STORAGE=-.8711E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
	Chan5 MANE	20.00	80.09	1320.00	1.82	20.00	80.09	1320.00	1.82

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2714E+03 EXCESS= .0000E+00 OUTFLOW= .2716E+03 BASIN STORAGE=-.1175E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
	Chan5 MANE	20.00	53.48	1320.00	1.34	20.00	53.48	1320.00	1.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1995E+03 EXCESS= .0000E+00 OUTFLOW= .1997E+03 BASIN STORAGE=-.1676E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
	Chan5 MANE	20.00	41.83	1300.00	1.11	20.00	41.83	1300.00	1.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1653E+03 EXCESS= .0000E+00 OUTFLOW= .1655E+03 BASIN STORAGE=-.2008E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
	Chan5 MANE	20.00	29.95	1280.00	.89	20.00	29.95	1280.00	.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1326E+03 EXCESS= .0000E+00 OUTFLOW= .1329E+03 BASIN STORAGE=-.2440E+00 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00									
	Chan7 MANE	20.00	11676.43	840.00	27.35	20.00	11676.43	840.00	27.35

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6506E+04 EXCESS= .0000E+00 OUTFLOW= .6521E+04 BASIN STORAGE= .3531E+00 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00									
	Chan7 MANE	20.00	4147.99	940.00	13.60	20.00	4147.99	940.00	13.60

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3253E+04 EXCESS= .0000E+00 OUTFLOW= .3243E+04 BASIN STORAGE= .2474E+00 PERCENT ERROR= .3

FOR PLAN = 1 RATIO= .00									
	Chan7 MANE	20.00	2057.81	820.00	6.82	20.00	2057.81	820.00	6.82

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1627E+04 EXCESS= .0000E+00 OUTFLOW= .1626E+04 BASIN STORAGE= .1543E+00 PERCENT ERROR= .1

FOR PLAN = 1 RATIO= .00

Chan7	MANE	20.00	827.91	820.00	2.80	20.00	827.91	820.00	2.80	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6666E+03 EXCESS= .0000E+00 OUTFLOW= .6670E+03 BASIN STORAGE=-.7783E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

Chan7	MANE	20.00	660.66	820.00	2.27	20.00	660.66	820.00	2.27	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5407E+03 EXCESS= .0000E+00 OUTFLOW= .5410E+03 BASIN STORAGE=-.1071E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

Chan7	MANE	20.00	494.35	820.00	1.75	20.00	494.35	820.00	1.75	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4166E+03 EXCESS= .0000E+00 OUTFLOW= .4170E+03 BASIN STORAGE=-.1454E+00 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

Chan7	MANE	20.00	329.52	820.00	1.24	20.00	329.52	820.00	1.24	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2964E+03 EXCESS= .0000E+00 OUTFLOW= .2970E+03 BASIN STORAGE=-.2111E+00 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

Chan7	MANE	20.00	246.78	840.00	1.00	20.00	246.78	840.00	1.00	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2380E+03 EXCESS= .0000E+00 OUTFLOW= .2384E+03 BASIN STORAGE=-.2549E+00 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

Chan7	MANE	20.00	167.17	840.00	.76	20.00	167.17	840.00	.76	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1813E+03 EXCESS= .0000E+00 OUTFLOW= .1817E+03 BASIN STORAGE=-.3105E+00 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

Chan10	MANE	16.74	13444.47	837.05	28.32	20.00	13352.73	840.00	28.33	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4636E+04 EXCESS= .0000E+00 OUTFLOW= .4637E+04 BASIN STORAGE= .1391E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

Chan10	MANE	20.00	6745.07	840.00	14.18	20.00	6745.07	840.00	14.18	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2318E+04 EXCESS= .0000E+00 OUTFLOW= .2321E+04 BASIN STORAGE= .1391E-01 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

Chan10	MANE	20.00	3174.28	860.00	7.08	20.00	3174.28	860.00	7.08	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1160E+04 EXCESS= .0000E+00 OUTFLOW= .1159E+04 BASIN STORAGE= .1391E-01 PERCENT ERROR= .1

FOR PLAN = 1 RATIO= .00

Chan10	MANE	16.02	550.97	961.13	2.83	20.00	550.95	960.00	2.83	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4640E+03 EXCESS= .0000E+00 OUTFLOW= .4640E+03 BASIN STORAGE= .1391E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

Chan10	MANE	18.81	316.48	978.32	2.27	20.00	316.37	980.00	2.27	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3714E+03 EXCESS= .0000E+00 OUTFLOW= .3713E+03 BASIN STORAGE= .1391E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

Chan10	MANE	20.00	241.02	980.00	1.70	20.00	241.02	980.00	1.70	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2786E+03 EXCESS= .0000E+00 OUTFLOW= .2786E+03 BASIN STORAGE= .1391E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

Chan10	MANE	20.00	163.22	980.00	1.14	20.00	163.22	980.00	1.14	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1860E+03 EXCESS= .0000E+00 OUTFLOW= .1860E+03 BASIN STORAGE= .1391E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

Chan10	MANE	20.00	123.39	980.00	.85	20.00	123.39	980.00	.85

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1396E+03 EXCESS= .0000E+00 OUTFLOW= .1396E+03 BASIN STORAGE= .1391E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

Chan10	MANE	20.00	82.96	980.00	.57	20.00	82.96	980.00	.57

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9328E+02 EXCESS= .0000E+00 OUTFLOW= .9328E+02 BASIN STORAGE= .1391E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

Chan15	MANE	20.00	38500.09	840.00	27.46	20.00	38500.09	840.00	27.46

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1676E+05 EXCESS= .0000E+00 OUTFLOW= .1675E+05 BASIN STORAGE= .8149E+00 PERCENT ERROR= .1

FOR PLAN = 1 RATIO= .00

Chan15	MANE	20.00	17185.76	860.00	13.69	20.00	17185.76	860.00	13.69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8366E+04 EXCESS= .0000E+00 OUTFLOW= .8354E+04 BASIN STORAGE= .6076E+00 PERCENT ERROR= .1

FOR PLAN = 1 RATIO= .00

Chan15	MANE	20.00	7281.03	880.00	6.85	20.00	7281.03	880.00	6.85

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4186E+04 EXCESS= .0000E+00 OUTFLOW= .4178E+04 BASIN STORAGE= .4758E+00 PERCENT ERROR= .2

FOR PLAN = 1 RATIO= .00

Chan15	MANE	20.00	2398.99	880.00	2.77	20.00	2398.99	880.00	2.77

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1691E+04 EXCESS= .0000E+00 OUTFLOW= .1689E+04 BASIN STORAGE=-.1052E+00 PERCENT ERROR= .2

FOR PLAN = 1 RATIO= .00

Chan15	MANE	20.00	1907.05	880.00	2.22	20.00	1907.05	880.00	2.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1361E+04 EXCESS= .0000E+00 OUTFLOW= .1358E+04 BASIN STORAGE=-.1591E+00 PERCENT ERROR= .2

FOR PLAN = 1 RATIO= .00

Chan15	MANE	20.00	1421.79	880.00	1.69	20.00	1421.79	880.00	1.69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1032E+04 EXCESS= .0000E+00 OUTFLOW= .1030E+04 BASIN STORAGE=-.2325E+00 PERCENT ERROR= .2

FOR PLAN = 1 RATIO= .00

Chan15	MANE	20.00	936.57	900.00	1.16	20.00	936.57	900.00	1.16

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7071E+03 EXCESS= .0000E+00 OUTFLOW= .7065E+03 BASIN STORAGE=-.3643E+00 PERCENT ERROR= .1

FOR PLAN = 1 RATIO= .00

Chan15	MANE	20.00	696.90	900.00	.89	20.00	696.90	900.00	.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5462E+03 EXCESS= .0000E+00 OUTFLOW= .5464E+03 BASIN STORAGE=-.4496E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

Chan15	MANE	20.00	460.75	900.00	.64	20.00	460.75	900.00	.64

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3871E+03 EXCESS= .0000E+00 OUTFLOW= .3890E+03 BASIN STORAGE=-.5577E+00 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

Chan16	MANE	19.73	41523.02	868.03	27.50	20.00	41472.00	860.00	27.49

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2018E+05 EXCESS= .0000E+00 OUTFLOW= .2012E+05 BASIN STORAGE= .7262E+00 PERCENT ERROR= .3

FOR PLAN = 1 RATIO= .00

Chan16	MANE	20.00	18815.78	860.00	13.75	20.00	18815.78	860.00	13.75

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1007E+05 EXCESS= .0000E+00 OUTFLOW= .1006E+05 BASIN STORAGE= .5791E+00 PERCENT ERROR= .1

FOR PLAN = 1 RATIO= .00

Chan16	MANE	20.00	7926.37	900.00	6.90	20.00	7926.37	900.00	6.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5037E+04 EXCESS= .0000E+00 OUTFLOW= .5046E+04 BASIN STORAGE= .5216E+00 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

Chan16	MANE	20.00	2650.26	900.00	2.78	20.00	2650.26	900.00	2.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2032E+04 EXCESS= .0000E+00 OUTFLOW= .2034E+04 BASIN STORAGE=-.6456E-01 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

Chan16	MANE	20.00	2062.74	920.00	2.23	20.00	2062.74	920.00	2.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1632E+04 EXCESS= .0000E+00 OUTFLOW= .1632E+04 BASIN STORAGE=-.1064E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

Chan16	MANE	20.00	1497.83	940.00	1.69	20.00	1497.83	940.00	1.69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1236E+04 EXCESS= .0000E+00 OUTFLOW= .1235E+04 BASIN STORAGE=-.1666E+00 PERCENT ERROR= .2

FOR PLAN = 1 RATIO= .00

Chan16	MANE	20.00	967.67	960.00	1.15	20.00	967.67	960.00	1.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8438E+03 EXCESS= .0000E+00 OUTFLOW= .8430E+03 BASIN STORAGE=-.2763E+00 PERCENT ERROR= .1

FOR PLAN = 1 RATIO= .00

Chan16	MANE	20.00	725.89	960.00	.89	20.00	725.89	960.00	.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6493E+03 EXCESS= .0000E+00 OUTFLOW= .6504E+03 BASIN STORAGE=-.3450E+00 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

Chan16	MANE	20.00	484.12	960.00	.63	20.00	484.12	960.00	.63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4576E+03 EXCESS= .0000E+00 OUTFLOW= .4589E+03 BASIN STORAGE=-.4339E+00 PERCENT ERROR= -.2

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION Eric
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1116.50	1120.00	1120.00
STORAGE	0.	14.	14.
OUTFLOW	0.	69.	69.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1121.42	1.42	20.	1761.	7.67	12.33	.00
.50	1120.84	.84	17.	835.	3.00	12.33	.00
.25	1120.44	.44	16.	426.	1.67	12.33	.00
.10	1119.67	.00	12.	59.	.00	13.00	.00
.08	1119.13	.00	10.	44.	.00	13.00	.00
.06	1118.58	.00	8.	30.	.00	13.33	.00
.04	1117.98	.00	6.	17.	.00	13.33	.00
.03	1117.64	.00	4.	12.	.00	13.33	.00
.02	1117.29	.00	3.	7.	.00	13.67	.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION Ospr
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1106.00	1108.70	1108.70
STORAGE	16.	93.	93.
OUTFLOW	0.	300.	300.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1110.03	1.33	140.	4663.	5.33	12.67	.00
.50	1109.35	.65	114.	2400.	2.67	12.67	.00
.25	1108.90	.20	99.	949.	1.00	13.00	.00
.10	1107.43	.00	56.	112.	.00	14.00	.00
.08	1107.18	.00	49.	81.	.00	14.33	.00
.06	1106.89	.00	41.	54.	.00	14.33	.00
.04	1106.58	.00	32.	35.	.00	14.33	.00
.03	1106.43	.00	28.	26.	.00	14.33	.00
.02	1106.28	.00	24.	17.	.00	14.33	.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION Cable
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1097.40	1099.50	1099.50
STORAGE	1276.	1816.	1816.
OUTFLOW	14.	347.	347.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1101.33	1.83	2415.	7660.	16.67	14.67	.00
.50	1100.44	.94	2110.	3087.	13.67	15.33	.00
.25	1099.72	.22	1883.	693.	7.67	17.67	.00
.10	1098.47	.00	1531.	152.	.00	20.33	.00
.08	1098.26	.00	1479.	116.	.00	20.67	.00
.06	1098.05	.00	1427.	80.	.00	21.33	.00
.04	1097.82	.00	1370.	53.	.00	21.33	.00
.03	1097.69	.00	1342.	42.	.00	21.00	.00
.02	1097.57	.00	1313.	30.	.00	20.67	.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION Sippo
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1027.00	1029.30	1029.30
STORAGE	147.	369.	369.
OUTFLOW	0.	350.	350.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1032.26	2.96	696.	13503.	16.67	13.67	.00
.50	1030.98	1.68	551.	6842.	13.00	13.67	.00
.25	1030.39	1.09	487.	3171.	7.33	14.00	.00
.10	1029.44	.14	385.	564.	2.67	15.33	.00
.08	1029.08	.00	346.	317.	.00	16.00	.00
.06	1028.58	.00	296.	241.	.00	16.00	.00
.04	1028.07	.00	245.	163.	.00	16.00	.00
.03	1027.81	.00	221.	123.	.00	16.00	.00
.02	1027.55	.00	196.	83.	.00	16.00	.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION SipRes
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	997.00	1000.60	1000.60
STORAGE	21.	81.	81.
OUTFLOW	0.	743.	743.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1013.89	13.29	875.	42422.	23.67	14.67	.00
.50	1008.19	7.59	421.	19439.	21.00	14.67	.00
.25	1004.55	3.95	230.	8159.	17.33	15.00	.00
.10	1002.16	1.56	136.	2720.	10.33	15.33	.00
.08	1001.79	1.19	123.	2098.	8.33	15.67	.00
.06	1001.39	.79	109.	1517.	6.00	16.00	.00
.04	1000.90	.30	92.	960.	3.00	16.33	.00
.03	1000.40	.00	75.	681.	.00	16.67	.00
.02	999.60	.00	53.	459.	.00	16.67	.00

*** NORMAL END OF HEC-1 ***

Ohio Department of Natural Resources

BOB TAFT, GOVERNOR SAMUEL W. SPECK, DIRECTOR

James R. Morris • Chief

Division of Water

April 16, 2001

Mr. Jay Boodhswar
City of Massillon
195 Oak Avenue, SE
Massillon, Ohio 44646

RE: Sippo Creek Reservoir Dam
Stark County
File Number: 0614-012

Dear Mr. Boodhswar:

I am writing to schedule the routine, periodic safety inspection of the above referenced dam on April 26, 2001, at approximately 10:00 a.m. The inspection will consist of visual observations of the dam and its appurtenances and any necessary survey measurements. I encourage you or your representative to attend the inspection so that we can discuss the history of the dam and so you will be familiar with our inspection procedures.

The Division of Water has the authority and responsibility under Ohio Revised Code Section 1521.062 to regulate dam safety in Ohio. As part of this responsibility, the division is required to make periodic safety inspections of existing dams to ensure that their continued operation and use does not constitute a hazard to life, health, or property.

Upon completion of the inspection and subsequent analysis you will be provided with a report. The report will include the inspection observations and a list of all required remedial measures as well as maintenance and monitoring items. I look forward to working with you to help maintain the integrity of your dam. Please contact me at 614/265-6780 if you have any questions or a conflict with this date or time.

Sincerely,

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

Prepared By: Doug Evans
Subject: SIPPO CREEK CONFERENCE CALL Date: 12-14-00
Dam Name: SIPPO CREEK RESERVOIR DAM File Number: 0614-012
Checked By:_____ Date:_____

DON SEVER DIXON/GIBSON CONSULTANTS
formerly MS CONSULTANTS

- PLANNING ON OVERTOPPING PROTECTION FOR THE DAM

KEITH
- SOME SUB BASIN AREAS were smaller than EXPECTED BUT OVERALL AREA LOOKED OK.
- THE DETERMINATION OF THE SLOPE IS UNCLEAR
DON ——— REPRESENTATIVE CROSS-SECTION
- DISCHARGE CAPACITIES FOR UPPER DAMS NOT CLEAR BUT DON'T LOOK TOO BAD.
DON ——— BASED OFF OF ODNR HEC INFO
- LOW "IT" CARD MAY BE VERY CONSERVATIVE. THE LOW "IT" APPEARS TO BE USED BECAUSE MUSKINGUM METHOD WAS USED. WE LOOKED AT MUSKINGUM - CUNGE AND IT LOWERED THE PEAK SOMEWHAT
- AS A NOTE THE PMF DOES NOT SEEM TO EXCESSIVE FOR WHAT WE'VE SEEN ON SIMILAR ANALYSES.

DON — WILL TRY TO LOWER IT CARD

KEITH & DOUG
We will PUT TOGETHER AN EMAIL OF SOME ACCEPTABLE Alternatives THAT MAY PROVIDE A LOWER PMF VALUE.
FOR THIS ANALYSIS

Evans, Doug

From: Evans, Doug
Sent: Monday, December 11, 2000 3:38 PM
To: 'Don Sever'
Subject: RE: Sippo Reservoir

Hi Don,
Had trouble reaching you via telephone. I may not have you correct number (919) 774-7303. Anyhow, Keith and I have reviewed the HEC1 data for Sippo Creek Reservoir and would like to discuss the review with you in a conference call. We are available before 11 am and after 2 pm on Tue Dec 12, and all day on Thur & Fri Dec 13 & 14. Please email me or call me at 614/265-6780.

Thanks,
Doug Evans

-----Original Message-----
From: Don Sever [mailto:dasever@msconsultants.com]
Sent: Tuesday, December 05, 2000 8:35 AM
To: Doug. Evans
Subject: Sippo Reservoir

Attached is the HEC-1 file for Sippo Reservoir. Call if you have any trouble reading the file. Don

Evans, Doug

From: Don Sever [dasever@msconsultants.com]
Sent: Tuesday, December 05, 2000 8:35 AM
To: Doug. Evans
Subject: Sippo Reservoir

Attached is the HEC-1 file for Sippo Reservoir. Call if you have any trouble reading the file. Don

CONVERSATION/SITE VISIT RECORD

Time 8:30 AM **Date** 12-5-00

TYPE

Visit _ **Conference** ✓ **Telephone** ✓ **Incoming** _ **Outgoing**

Name of Person(s) Contacted or in Contact with you	Organization (Ofc., Dept., Bureau)	Telephone No.
Don Sever	MS. Consultants	(919) 774-7303

Summary

Return call

Name of Person Documenting Conversation **Date**

Doug Evans 12-5-00

Action Taken

Awaiting electronic file

- ~~AT~~

~~Don~~

- Confirmed reciept of HEC-1 Runs for Sippo Creek Reservoir.

- Requested electronic file.

Dixon Gibson ms consultants, inc.
engineers, architects, planners

216 Hawkins Ave., Suite 113
Sanford, North Carolina 27330-4364
Phone: (919) 774-7303
Fax: (919) 774-6109
www.msconsultants.com

November 17, 2000

Mr. Doug Evans
Ohio Department of Natural Resources
Division of Water, Engineering Group
1939 Fountain Square, Bldg. E-3
Columbus, OH 43224-1336

RE: Sippo Reservoir Improvements
City of Massillon, Stark County, Ohio
Revised HEC-1 Analysis

Dear Mr. Evans:

Enclosed please find one (1) set of revised calculations for the Sippo Reservoir dam. The watershed has been further subdivided into 14 basins. The HEC-1 runs for the 0.1, 0.25, 0.50 and 1.0 PMF are included for your review.

Reviewing the results, the PMF is now estimated at 51,700 cfs. This is a considerable difference from the original report. We are having a hard time accepting this number because the USGS gage No. 03117000 (south of Massillon on the Tuscarawas River) estimates a flow of 10,600 cfs for a 500 year storm. This gaging station covers a watershed of 518 square miles.

We would appreciate your review to see if you agree with our HEC-1 run. We are continually reviewing to see what could be the reason for such a large discrepancy.

If you have any questions, please feel free to contact us.

Sincerely,

Donald A. Sever, P.E.
Project Engineer

Cc: Dick Fawcett
06216.206

Evans, Doug

From: Evans, Doug
Sent: Tuesday, September 19, 2000 10:09 AM
To: Banachowski, Keith; 'Don Sever'
Subject: RE: Hec 1 Run - Sippo Creek

Don, you do not need a UD card for HEC-1 when using the USACE 6 hour hydrograph method, a UI card would allow you to manually input a unit hydrograph into the model without the need for a time of concentration. Otherwise, the UD card value can be derived using the curve number method from NEH-4 or, if field conditions have been verified, from TR-55's time to concentration value. If you do use the USACE method, please make sure that the drainage basin meets the following criteria;

- Drainage area not less than 5.44 nor greater than 251 square miles,
- 0.7 times the main stream length is not less than 2.55 nor greater than 30.17 miles,
- Stream slope is not less than 2.96 nor greater than 43.11 (ft/mile), and
- Basin width to length ratio is not less than 0.220 nor greater than 1.232.

And if you use a UI card, please make sure that the total cumulative volume under the hydrograph is equal to 1.0 before entering the unit hydrograph and that the first record in field 1 is not zero.

-----Original Message-----
From: Banachowski, Keith
Sent: Monday, September 18, 2000 9:02 AM
To: 'Don Sever'
Cc: Evans, Doug
Subject: RE: Hec 1 Run - Sippo Creek

Don-
Doug Evans is the project engineer for this project and should be your main contact. His e-mail address is Doug.Evans@dnr.state.oh.us, and I have forwarded him a copy of your e-mail message. I will be assisting Doug with the hydrology and hydraulics for the project, so please feel free to copy me on any e-mails regarding the hydrology and hydraulics in the future.

Doug and I will review your questions, and Doug will provide you with a response as soon as possible.

Take care,

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

-----Original Message-----
From: Don Sever [mailto:dasever@msconsultants.com]
Sent: Monday, September 18, 2000 8:11 AM
To: Banachowski, Keith
Subject: Hec 1 Run - Sippo Creek

Keith, when determining the UD card for the HEC 1 run, I am being told a couple different ways to calculate the value for this card. Since this is the critical item in the run itself, what is recommended to do to determine this value for each reservoir in a series (as is the case for Sippo) and using the US Army Corps method for determining the 6 hour unit hydrograph. Thanks Don Sever

Evans, Doug

From: Evans, Doug
Sent: Thursday, September 21, 2000 3:42 PM
To: 'Don Sever'
Cc: Banachowski, Keith
Subject: RE: Sippo Creek

Don, Here is a copy of some work illustrating how the input data for the UI card (using USACE method) is derived and a copy of a HEC-1 run. Keith and I are both in the office tomorrow if you would like to discuss the attached information or Sippo Creek Dam in general. Please call me if you would like to set up a conference call.

Best Regards,
Doug Evans

-----Original Message-----
From: Don Sever [mailto:dasever@msconsultants.com]
Sent: Tuesday, September 19, 2000 12:51 PM
To: Doug. Evans
Subject: Sippo Creek

Doug, I tried to make the changes for the full basin (without any other reservoirs) and I am not getting any flow with the UI cards. Can you forward a similar HEC1 run for me to look at the input file and see where I am going wrong. Thanks Don+

CONVERSATION/SITE VISIT RECORD | **Time** 11 am | **Date** 9-8-00

TYPE

Visit _ | **Conference** _ | **Telephone** X **Incoming** _ **Outgoing**

Name of Person(s) Contacted or in Contact with you	Organization (Ofc., Dept., Bureau)	Telephone No.
Don Sever	MS Consultants	919. 774-7303

Summary Request fax

Name of Person Documenting Conversation Doug Ewing | **Date** 9-8-00

Action Taken

Faxed Requested info

Mr. Sever was missing page 2 of the 8/30/00 Comment letter for ~~REPAIRS~~ PROPOSED REPAIRS to Sippo Creek Reservoir Dam file # 0614-012.

Also informed Mr Sever that Sippo Lake & Lake CABLE were ~~&~~ last inspected in 1992.

CONFERENCE CALL MEMORANDUM

Name of Dam: Sippo Creek Reservoir, Stark County, File # 0613-012

Date/Type of call: September 9, 2000/Outgoing/919.774-7303

Personnel: Doug Evans - project engineer and call recorder
Keith Banachowski.- technical assistance

Others: Mr. Don Sever of ms consultants, inc.

Purpose:
Mr. Sever requested the call to further clarify comments provided in the August 30, 2000 letter from the Dam Safety Engineering Program pertaining to a design report submitted on August 8, 2000.

Background:
A preliminary design report for repairs to Sippo Creek Reservoir Dam was submitted on April 28, 1999, this report included a hydrologic & hydraulic study and several alternatives for bringing the dam into compliance. The preliminary design report was subsequently approved on May 27, 1999. On August 1, 2000 a design submittal for repairs to Sippo Creek Reservoir Dam was received by this office. The submittal consisted of plans and specifications for the construction of a concrete parapet wall on the upstream slope of the dam, a sidewalk along the crest of the dam, and superficial spillway repair. As a part of the review for this report the hydrologic characteristics of the drainage basin and the hydraulic capabilities of the dam were revisited, bringing to light several discrepancies pertaining to the previously submitted hydrologic and hydraulic information. These discrepancies were noted in a DOW comment letter dated August 30, 2000 along with several deficiencies for the most recent submittal.

Discussion Topics:
Keith covered item by item the discrepancies noted from the in the HEC-1 computer model input and output provided in the earlier submittal.

Mr. Sever noted that HEC-1 input files used for floods into Lakes Eric and Cable (which in turn flow into Sippo Creek Reservoir) were obtained from DOW calculations in DOW files. Keith reviewed these calculations and reasoned that was a decimal point error in the lag times. It was also pointed out that DOW's calculations are cursory in nature and used to determine if more precise calculations are needed from a professional engineer for a particular dam.

Mr. Sever expressed his frustration at the program for failing to note the inadequacies of the hydrologic and hydraulic study at the time that the preliminary design was approved.

Mr. Sever said that the city of Massillon is currently dredging Sippo Creek Reservoir at a cost of approximately $300,000 and that now it appears that the selected remedy (the concrete parapet wall) may not be feasible.

The dam's classification was discussed. The files for the dam show that the classification was upgraded from II to I in 1992. This appears to be due to a heavily populated area less than one mile downstream.

Mr. Sever asked when the upstream reservoirs had been last inspected.

Action Items:
DOW to review files for last inspection dates of upstream reservoirs and provide feedback to Mr. Sever.
DOW will await the submittal of revisions to the design report.

0613-005 ~~STARK~~
0614-012 STARK

To: Jim Morris
Dick Bartz
Mark Ogden
From: Andy Ware
Boris ✓

MASSILLON INDEPENDENT
[from Internet Page 2/1/00]

City will borrow funds for reservoir project

By R. J. Villella, staff writer

After lengthy discussion, City Council members reached a consensus at Monday night's committee sessions to borrow the funds to allow the Sippo Reservoir dredging project to get started this year.

The cost of the work is estimated at $690,000. Council members want to borrow about $500,000 and use Recreation Department funds or other city money to pay the remainder.

The proposal must be approved by council

The reservoir work is not in this year's capital budget, and Mayor Francis Cicchinelli said the only way to do the project this year is to borrow the funds.

Sippo Reservoir was constructed in 1886 for the Massillon Water Co. as a water supply for the city, but now is purely a park setting.

There are two major problems the project must address.

First, the Ohio Department of Natural Resources (ODNR) sent a letter to the city in the early 1990s stating the reservoir dam must be brought into compliance with state standards.

Jim Benekos, city engineer, said ODNR wants the dam raised about three feet so there is no "catastrophic failure" in the future. It is estimated it will cost about $50,000 to increase the dam's height.

The second problem, the one most noticed by park users, is the silt buildup.

The water level of the six-acre reservoir has slowly decreased over the years until it is only six inches deep in some spots. This allows weeds to grow and causes fish to die from lack of oxygen.

The reservoir also is the collection point for a wide drainage system which includes portions of Perry and Jackson townships. The drainage area, almost 15 square miles, includes the Lake Cable area and parts of Jackson Township all the way north to Strausser Road Northwest. New development in the drainage area has added to the silting problem.

"This is not a problem the people of Massillon have caused," Cicchinelli said. "But they will be picking up the tab. The bottom line is that everyone wants the reservoir cleaned up. The question is how to pay for it."

Council and the recreation board have been trying to come up with the most cost effective plan to handle the problems at the reservoir for about two years.

Various ideas were discussed: filling in the reservoir; draining it and using a bulldozer to push the silt out; pumping the silt downstream; or trucking it out. But there are few locations capable of handling the estimated 36,000 to 40,000 cubic yards of sediment.

In the end, it was decided the best course of action is to use ahydraulic dredging system to pump the silt to a property located near the intersection of Hankins Road and Valerie Avenue where a drainage area will be built. A wall will be constructed of "geotechnical tubes," made of porous fabric which will allow the water to drain while retaining the silt.

Keith
Fyi

Found this in Sippo Lake file but it is for Sippo Res. It looks as though the dredging that the city is doing ~~that~~ is being done with borrowed money.

Ohio Department of Natural Resources

BOB TAFT, GOVERNOR — SAMUEL W. SPECK, DIRECTOR

James R. Morris • Chief

Division of Water

August 30, 2000

Post-it® Fax Note 7671	Date 9-8-00	# of pages ▶ 3
To Don Sever	From Doug Evans	
Co./Dept. MS Consultants	Co. ODNR	
Phone # 919.774-7303	Phone # 614.265-6786	
Fax # 919.774-6109	Fax #	

Mr. Jim Seikel, Director
Parks & Recreation
195 Oak Avenue, SE
Massillon, OH 44646

RE: Sippo Creek Reservoir Dam
File Number: 0614-012

Dear Mr. Seikel:

On August 1, 2000 a detailed design submittal for repairs to Sippo Creek Reservoir Dam was received by this office. The submittal consisted of plans and specifications for the construction of a concrete parapet wall on the upstream slope of the dam, a sidewalk along the crest of the dam, and spillway surface repair. We have completed our review of the submittal and have the following comments.

1. A detailed review of the hydrologic characteristics of the drainage basin and the hydraulic capabilities of the subject structure revealed several questions pertaining to hydrologic and hydraulic information.

   a. The provided information includes only a summary of the HEC-1 computer analysis program. A warning in the output indicates that the unit hydrograph has been truncated. In order to properly review the HEC analysis, please provide either a hard copy of the entire output or a digital copy of the input file.

   b. The lag times used in the computer modeling appear extremely long for an urban watershed. Please explain the methods and assumptions used for developing the lag times.

   c. The development of the individual drainage basins for the lakes feeding into Sippo Creek Reservoir are not clear. Please provide a delineation for each sub-basin within the Sippo Creek Reservoir drainage area.

   d. The model does not appear to allow the discharge from Lake Slagle and Lake O'Springs to enter Lake Cable nor subsequently enter Sippo Creek Resevoir. Please provide clarification.

e. The time to peak for the floods from Lake Cable, Sippo Lake, and the immediate drainage area for Sippo Creek do not appear to have been taken into consideration in this analysis and may not be a conservative assumption. Please provide clarification.

f. In both of the provided HEC-1 inputs, it appears that an empty space has inadvertently been incorporated into the column for the discharge rating for Sippo Creek Reservoir. If this is the case, the program will increase the discharge by a factor of ten. Please provide a rating curve for Sippo Creek Reservoir.

2. The detailed design submittal does not include calculations demonstrating that the proposed concrete parapet wall will not overturn during the design flood. Please provide calculations demonstrating that the concrete wall maintains a factor of safety against overturning of at least 1.5 for the probable maximum flood condition.

3. It is not clear if the portion of the concrete wall below grade will be poured in place or formed. If formed, backfilling specifications must be included such as backfill material and compaction methods. Please provide additional information detailing how the subsurface portion of the concrete wall will be constructed to minimize the development of seepage pathways along or underneath the wall.

4. The design must include the material specifications for the concrete and any quality control testing criteria that will be used.

5. The plan sheets must specify that a mastic material be placed in the joints between the proposed concrete parapet walls and sidewalks, and also between the existing principal spillway side walls and proposed concrete parapet walls.

6. The second plan sheet shows that a total of 65 cubic yards of compacted fill will be placed on the embankment. Specifications for clearing and grubbing, fill compaction, and mulching and seeding must be included.

7. The second plan sheet states "Contractor shall remove and properly dispose of trees marked on the plan" and shows trees on the left side (looking downstream) of the dam to be removed. However, the 1991 inspection report and photographs from the 1998 hydrologic and hydraulic study show trees and brush on both the left and the right sides of the dam. The plans must make it evident that all trees and brush on the upstream and downstream slopes of the dam must be removed and any resulting voids filled compacted cohesive soil.

Please revise your submittal in accordance with the above comments and note that any repairs/modifications cannot begin until the design is approved. It should also be noted that our files for this dam do not include an operation, maintenance, and inspection manual or an emergency action plan. Please prepare an operation, maintenance, and inspection manual and an

emergency action plan in accordance with OAC Rule1501:21-21-04. Guidelines for the preparation of these documents are included with this report.

If you or your consultant should have any questions or would like to schedule a meeting to discuss your design or any comments noted in this review, please contact Doug Evans at (614) 265-6780.

Sincerely,

Boris E. Slogar

Boris E. Slogar, P.E.
Repair Program Manager
Dam Safety Engineering Program
Division of Water

BES/wde

Enclosures

Ohio Department of Natural Resources
1949-1999
50th Anniversary

Bob Taft • *Governor*

Samuel W. Speck • *Director*

Division of Water

James R. Morris • Chief

August 11, 2000

ms consultants, inc.
c/o Mr. Donald A. Sever, P.E.
4150 Belden Village Street, N.W.
Suite 300
Canton, OH 44718

RE: Sippo Creek Reservoir Dam
File Number: 0614-012

Dear Mr. Sever,

One copy of a design submittal for the repairs/modifications to Sippo Creek Reservoir Dam was received by the Dam Safety Engineering Program on August 1, 2000. The submittal consisted of plans and specifications for abutment repair, installing a sidewalk and concrete parapet on the upstream slope of the dam, and tree and stump removal. The design submittal is under review and you will be notified of approval or will receive comments pertaining to required or recommended revisions within thirty days.

If you should have any questions, please contact Doug Evans at (614) 265-6780.

Sincerely,

Boris E. Slogar

Boris E. Slogar, P.E.
Program Manager
Dam Safety Engineering Program
Division of Water

BES/wde

cc: Doug Evans, DOW, Project Engineer
Jim Benekos, City of Massillon, Owner Representative

Anniversary 50th
Ohio Department of Natural Resources
1949-1999

Bob Taft • *Governor*

Samuel W. Speck • *Director*

Division of Water

James R. Morris • Chief

August 3, 2000

Mr. Donald A. Sever, P.E.
4150 Belden Village Street, N.W.
Canton, OH 44718

RE: Sippo Creek Reservoir Dam
File Number: 0614-012

Dear Mr. Sever,

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Sincerely,

Boris E. Slogar

Boris E. Slogar, P.E.
Program Manager
Dam Safety Engineering Program
Division of Water

BES/wde

cc: Doug Evans, DOW, Project Engineer
Jim Benekos, City of Massillon, Owner Representative

ms consultants, inc.
engineers, architects, planners

4150 Belden Village Street, N.W.
Suite 300
Canton, Ohio 44718
(330) 492-6350
FAX: (330) 492-6092
www.msconsultants.com

July 31, 2000

Ms. Tina Lombardi, P.E.
Ohio Department of Natural Resources
Division of Water, Engineering Group
1939 Fountain Square, Bldg. E-3
Columbus, OH 43224-1336

RE: Sippo Reservoir Improvements
City of Massillon, Stark County, Ohio

Dear Ms. Lombardi:

Enclosed please find three (3) sets of plans for the proposed improvements on the Sippo Reservoir dam. The project includes the installation of a six foot wide concrete sidewalk and concrete parapet varying in height from one feet to three feet high on the upstream side of the existing dam. Other work includes the removal of existing trees / shrubs from the embankment and regrading after the stumps are removed. Minor cosmetic repair of the existing stone abutment will be performed by replacing and resetting a few missing stones.

The City of Massillon is the owner of the dam and intends to advertise this project within the next month. The current dredging project is on schedule and should be completed early fall. Therefore, it is our understanding that this project will be completed by the end of this year.

If you have any questions, please feel free to contact us.

Sincerely,

Donald A. Sever, P.E.
Project Engineer

Cc: Jim Benekos, City of Massillon
Dick Fawcett
06216.206

0613-005 STARK

0614-012 STARK

To: Jim Morris
Dick Bartz
Mark Ogden

From: Andy Ware

Boris

MASSILLON INDEPENDENT

[from Internet Page 2/1/00]

City will borrow funds for reservoir project

By R. J. Villella, staff writer

After lengthy discussion, City Council members reached a consensus at Monday night's committee sessions to borrow the funds to allow the Sippo Reservoir dredging project to get started this year.

The cost of the work is estimated at $690,000. Council members want to borrow about $500,000 and use Recreation Department funds or other city money to pay the remainder.

The proposal must be approved by council

The reservoir work is not in this year's capital budget, and Mayor Francis Cicchinelli said the only way to do the project this year is to borrow the funds.

Sippo Reservoir was constructed in 1886 for the Massillon Water Co. as a water supply for the city, but now is purely a park setting.

There are two major problems the project must address.

First, the Ohio Department of Natural Resources (ODNR) sent a letter to the city in the early 1990s stating the reservoir dam must be brought into compliance with state standards.

Jim Benekos, city engineer, said ODNR wants the dam raised about three feet so there is no "catastrophic failure" in the future. It is estimated it will cost about $50,000 to increase the dam's height.

The second problem, the one most noticed by park users, is the silt buildup.

The water level of the six-acre reservoir has slowly decreased over the years until it is only six inches deep in some spots. This allows weeds to grow and causes fish to die from lack of oxygen.

The reservoir also is the collection point for a wide drainage system which includes portions of Perry and Jackson townships. The drainage area, almost 15 square miles, includes the Lake Cable area and parts of Jackson Township all the way north to Strausser Road Northwest. New development in the drainage area has added to the silting problem.

"This is not a problem the people of Massillon have caused," Cicchinelli said. "But they will be picking up the tab. The bottom line is that everyone wants the reservoir cleaned up. The question is how to pay for it."

Council and the recreation board have been trying to come up with the most cost effective plan to handle the problems at the reservoir for about two years.

Various ideas were discussed: filling in the reservoir; draining it and using a bulldozer to push the silt out; pumping the silt downstream; or trucking it out. But there are few locations capable of handling the estimated 36,000 to 40,000 cubic yards of sediment.

In the end, it was decided the best course of action is to use ahydraulic dredging system to pump the silt to a property located near the intersection of Hankins Road and Valerie Avenue where a drainage area will be built. A wall will be constructed of "geotechnical tubes," made of porous fabric which will allow the water to drain while retaining the silt.

May 27, 1999

Mr. Jim Seikel, Director
City of Massillon, Parks and Recreation
195 Oak Avenue
Massillon, OH 44646

RE: Sippo Creek Reservoir Dam
Stark County, Perry Township

Dear Mr. Seikel:

On April 28, 1999, this office received one copy of a preliminary design report for repairs and modifications to Sippo Creek Reservoir Dam from Donald A. Sever, P.E., ms consultants, inc. The cover letter submitted with the design report requested a permit application from our office for the City of Massillon to complete in order for the Division of Water to approve the plans and specifications.

Several alternatives for bringing the dam into compliance with Ohio's dam safety laws were discussed. The report listed the most economical and environmentally accepted method is to raise the embankment by 3 feet. As long as the normal pool level is not increased by raising the elevation of the principal spillway, then increasing the top of dam elevation by 3 feet does not constitute an impoundment enlargement, and a construction permit is not required by our office. However, the plans and specifications for the repairs and modifications to the dam must be submitted by Mr. Sever to the Division of Water for review and approval in accordance with Ohio Administrative Code Rule 1501:21-3-02.

The Dam Safety Engineering Program has completed their review of the preliminary design report and recommend that it be approved. Please note that three copies of the final plans and specifications, prepared by a professional engineer, must be submitted to this office and approved before construction can begin.

Please refer to the Ohio Administrative Code Rules 1501:21-5-05 and 1501:21-5-06 for specific guidance in preparing the final design plans and specifications.

Please contact Tina Lombardi at (614) 265-6634 if you have any questions.

Sincerely,

Boris E. Slogar

Boris E. Slogar, P.E.
Program Manager
Dam Safety Engineering Program
Division of Water

BES:tml

cc: Donald A. Sever, P.E., ms consultants, inc.
Tina Lombardi, E.I., Dam Safety Engineering Program

OHIO
Department of Natural Resources

George V. Voinovich • *Governor*
Donald C. Anderson • *Director*

April 29, 1999

Mr. Donald A. Sever, P.E.
MS Consultants, Inc
333 East Federal Street
Youngstown, Ohio 44503

RE: Sippo Reservoir Dam
The City of Massillon, Stark County

Dear Mr. Sever:

One copy of a preliminary design submittal for the modifications to Sippo Reservoir Dam was received by the Division of Water Dam Safety Engineering Program on April 28, 1999. The submittal consisted of hydrologic and hydraulic study. The preliminary design submittal is under review and you will be notified of approval or disapproval within thirty days.

If you should have any questions, please contact me at (614) 265-6634.

Sincerely,

Tina Lombardi

Tina Lombardi, E.I.
Project Engineer
Dam Safety Engineering Program
Division of Water

ms consultants, inc.
engineers, architects, planners

333 East Federal Street
Youngstown, Ohio 44503
(330) 744-5321
FAX: (330) 744-5256
www.msconsultants.com

April 21, 1999

0614-012
~~0613-005~~

Ohio Department of Natural Resources
Division of Water
Engineering Group
1939 Fountain Square, Bldg. E-3
Columbus, OH 43224-1336

RECEIVED
APR 28 1999

Attn: Mr. Mark Ogden, P.E.
Program Manager

Re: Sippo Reservoir
Stark County, Ohio

Dear Mr. Ogden:

We have been contracted by The City of Massillon to perform a hydraulic and hydrologic study for Sippo Reservoir. This report was completed in January 1998, and a copy is attached for your review.

The City has extended our contract to perform engineering plans for raising the elevation of the embankment 3 feet to contain the Probable Maximum Flood. We are forwarding you a copy of the report for your concurrence on our findings. We also are requesting a permit application that the City will need to complete for your approval of the plans and specifications for the project.

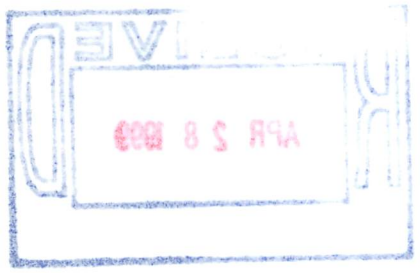
Please call is you have any questions.

Sincerely,

Donald A. Sever (mp)

Donald A. Sever, P.E.
Project Manager

Enclosure
:mp
cc: Richard Fawcett
Jim Benekos, City of Massillon
File: 06261.206
T:\MSWORD\06\06261\206\LETTERS\OGDEN1.WPD


APR 2 8 1999

Lombardi

10/7/96: Jim Berekos (city engineer) called and ask if they could get an extention on their 5 year dead line (which is 2/97). I said that would be no problem as long as our office was aware of them actively trying to implement the repairs. Their first step is to get the funds allocated for an H+H and a geotech study. I asked that they send us letters keeping us a breast of the process.

* Jim Berekos
City of Massilon Engineer
330-830-1722

Still contact in 1999.

NAME: SIPPO CREEK RESERVOIR DAM

RESERVOIR:

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

OWNER INFORMATION

OWNER: City of Massillon
OWNER TYPE: PUBLIC, LOCAL
ADDRESS1: Parks & Recreation
PARCEL NO:
ADDRESS2: 195 Oak Avenue, SE
ADDRESS3:
CITY: Massillon STATE: OH ZIP: 44646
CONTACT PERSON: Jim Seikel, Director TELEPHONE: 330/832-1621

new address & contact person

LOCATION INFORMATION

COUNTY: STARK
LATITUDE Deg: 40 Min: 48 Sec: 18
TOWNSHIP: PERRY
LONGITUDE Deg: 81 Min: 30 Sec: 30
STREAM: SIPPO CREEK
NEAREST AFFECTED COMMUNITY: MASSILON
COMMUNITY'S DISTANCE FROM DAM (miles): 0.00
USGS QUAD: MASSILLON
USGS BASIN NO: 05040001

DESIGN/CONSTRUCTION INFORMATION

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

STRUCTURE INFORMATION

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

EMBANKMENT DATA

LENGTH (ft)	215	UPSTREAM SLOPE	2H:1V
MAX. HEIGHT (ft)	18.9	DOWNSTREAM SLOPE	2H:1V
TOP WIDTH (ft)	6	VOLUME OF FILL (cu.yds.)	

SPILLWAY & OUTLET WORKS DATA
LAKE DRAIN: 24-IN-DIA. GATE VALVE
PRINCIPAL: 36-FT WEIR

EMERGENCY: NONE
MAXIMUM TOTAL SPILLWAY DISCHARGE (cfs): 753
DESIGN FLOOD: PMF FLOOD CAPACITY: N/A

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): 12/19/91 INSPECTOR: BAP
PHASE I:
PRIOR INSPECTIONS:
OTHER SITE VISITS:

OPERATION INFORMATION/REMARKS:

EMERGENCY ACTION PLAN: NO
NPDP INCIDENT ID:
ANNUAL FEE: $ EXEMPT
LAST DATA ENTRY: 9/24/96

Phone Memo 9/24/96
Sippo Creek 0614-012 DHL

I spoke with Mr. Jim Seikel today regarding the Dec. 19, 1991 inspection report for this dam. Mr. Seikel informed me that he was new to the position of Parks & Rec. Dir., & that to his knowledge, none of the major repairs/~~improvements~~ called for in the report had been carried out. Mr. Seikel also informed me that they want to repair the dam, but ~~that I know~~ funds have been allocated for this purpose in the near future. Mr. Seikel stated that he plans on trying to allocate the funds as soon as ~~he can.~~ is possible.

I informed Mr. Seikel that the City of Massillon has until Feb. 1997 to ~~complete~~ implement the repairs ~~before the Div. of Water~~

I also informed him that we have the authority to pursue the issue if the repairs

Phone Memo Con't
Sippo Creek 0614-012

implemented
are not ~~completed~~ on time, but that we do want to work with the City of Massillon.

Mr. Seikel wanted to know what he could do since he was certain that the funds were not immed. avail. I told him that the Div. of Water would like to have some documentation (in writing) of when & how they intend to accomplish the repairs in the future. Mr. Seikel told me that he would provide this info. & he asked for a list of engineers in his area.

NAME: SIPPO CREEK RESERVOIR DAM
RESERVOIR:

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

OWNER INFORMATION

OWNER: City of Massillon
OWNER TYPE: PUBLIC, LOCAL
ADDRESS1: Massilon Municipal Building
PARCEL NO:
ADDRESS2: 1 James Duncan Plaza
ADDRESS3:
CITY: Massilon
STATE: OH
ZIP: 44646
CONTACT PERSON: Bill Hamit
TELEPHONE:

LOCATION INFORMATION

COUNTY: STARK
LATITUDE Deg: 40 Min: 48 Sec: 18
TOWNSHIP: PERRY
LONGITUDE Deg: 81 Min: 30 Sec: 30
STREAM: SIPPO CREEK
NEAREST AFFECTED COMMUNITY: MASSILON
COMMUNITY'S DISTANCE FROM DAM (miles): 0.00
USGS QUAD: MASSILLON
USGS BASIN NO: 05040001

DESIGN/CONSTRUCTION INFORMATION

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

STRUCTURE INFORMATION

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

EMBANKMENT DATA

LENGTH (ft)	215	UPSTREAM SLOPE	2H:1V
MAX. HEIGHT (ft)	18.9	DOWNSTREAM SLOPE	2H:1V
TOP WIDTH (ft)	6	VOLUME OF FILL (cu.yds.)	

SPILLWAY & OUTLET WORKS DATA
LAKE DRAIN: 24-IN-DIA. GATE VALVE
PRINCIPAL: 36-FT WEIR

EMERGENCY: NONE
MAXIMUM TOTAL SPILLWAY DISCHARGE (cfs): 753
DESIGN FLOOD: PMF
FLOOD CAPACITY: N/A

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): 12/19/91
INSPECTOR: BAP
PHASE I:
PRIOR INSPECTIONS:
OTHER SITE VISITS:

OPERATION INFORMATION/REMARKS:

EMERGENCY ACTION PLAN: N/A
ANNUAL FEE: $ EXEMPT
LAST DATA ENTRY: 2/26/92

TELEPHONE RECORD

INCOMING CALL FROM: Bob Strauss, City of Massilon

OUTGOING CALL TO : <(216) 830-1791 ext 1703>

SUBJECT : Sippo Lake Reservoir Dam

DATE : 3-4-92

TIME : 9⁰⁰ am

NOTES Called to question repair items on report. The list of minor repairs they were already addressing. The hydraulic adequacy of the dam needs investigated and Mr Strauss implied he would proceed along those lines.

BCP

OHIO
Department of Natural Resources

George V. Voinovich • *Governor*
Frances S. Buchholzer • *Director*

February 28, 1992

Mr. Bill Hamit
Massilon Municipal Building
One James Duncan Plaza
Massilon, Ohio 44646

RE: Sippo Lake Reservoir Dam
Stark County
File Number: 0613-012

Dear Mr. Hamit:

Enclosed is a copy of the report of the December 19, 1991 inspection of the above referenced dam. My staff conducted this inspection under the provisions of Section 1521.062 of the Ohio Revised Code (ORC) to evaluate the condition of the dam and its appurtenances. I have also enclosed a copy of the ORC and the Ohio Administrative Code (OAC) governing dams, an operation and maintenance manual and guidelines for preparing an emergency action plan.

Observations made during the inspection indicate that a professional engineer must be retained to perform a hydrologic study to determine the required spillway size in accordance with OAC Rule 1501:21-13-02 and prepare plans and specifications as necessary to increase the discharge/storage capacity. The engineer should also investigate the structural integrity of the principal spillway. The Division of Water must approve any plans for modifications or repairs to the dam. Following approval of the engineered plans, all necessary repairs must be implemented by the owner under the supervision of a professional engineer. The report also lists items requiring maintenance, minor repair and monitoring.

As noted in the inspection report, division engineers have not investigated the structural stability of the embankment and spillway and the hydraulic adequacy of the dam to pass the required design flood safely. Problems in any of these areas could lead to dam failure. To ensure the safety of this dam and the protection of downstream areas in accordance with Ohio's Dam Safety Laws, you should have a professional engineer make an in-depth safety evaluation and initiate timely repairs.

Thank you for your cooperation in our inspection efforts. Please contact Beth Pratt at (614)265-6751 if you have any questions.

Sincerely,

George E Mills

George E. Mills, P.E.
Administrator
Inspection & Engineering Assistance
Division of Water

GEM:bj

enclosures

ENGINEER'S INSPECTION REPORT

(Pursuant to Ohio Revised Code Section 1521.062)

OHIO DEPARTMENT OF NATURAL RESOURCES-DIVISION., OF WATER-DAM SAFETY & WATER ENGINEERING SECTION

Fountain Square, Bldg. E-3, Columbus, OH 43224, (614) 265-6731

DAM NAME Sippo Lake Reservoir Dam **COUNTY** Stark **DATE OF INSPECTION** 12-19-91

OHIO FILE NO. 0613-012 **CLASS** I **Emergency Action Plan on file** [] (Yes) [X] (No)

OWNER NAME City of Massillon **OWNER PHONE** (216)830-1700

ADDRESS One James Duncan Plaza **CITY** Massilon **STATE** Ohio **ZIP CODE** 44646

CONTACT NAME Bill Hamit **CONTACT PHONE(home)** _____ **(office)** _____

DRAINAGE AREA 9566 (acres) 14.9 (sq. mi.) **MAX. CAPACITY** 82.5 ac. ft. **SURFACE AREA** 34 ac. **HT.** 18.9 ft.

PRINCIPAL SPILLWAY 36-ft.-wide rock weir; breadth 3 ft.

EMERGENCY SPILLWAY none **LAKE DRAIN** 2 ft. CIP

INSPECTION PARTY Beth Pratt, E.I.T., and Dean Stoll, E.I.T., Project Engineers

OTHERS PRESENT _____

DIRECTIONS: MARK AN * FOR CONDITIONS FOUND AND UNDERLINE WORDS THAT APPLY, GIVE LOCATION AND EXTENT WITH NUMBER REFERENCE; i.e., (25) ALL ALONG SLOPE, OR SHOW ON SKETCH.

FIELD CONDITIONS OBSERVED

POOL LEVEL 1-2 inches above normal pool **WEATHER** Temperatures in low 20's and sunny.

GROUND MOISTURE CONDITION: DRY ___ **WET** ___ **SNOWCOVER** 2 inches

OTHER _____

UPSTREAM SLOPE **PROBLEMS NOTED:** [](0)NONE [*](1)RIPRAP - NONE, TOO SMALL, SPARSE, DISPLACED, WEATHERED [*](2)WAVE EROSION [](3)CRACKS-WITH DISPLACEMENT [](4)RODENT BURROWS [](5)APPEARS TOO STEEP [*](6)DEPRESSIONS OR BULGES [](7)SLIDES [*](8)TREES, BRUSH [*](9)OTHER Surface erosion was noted along the exterior of the left upstream sidewall of the spillway. The eroded area was about 15 feet wide and contained no vegetation.

COMMENTS: (2)A 1-to 2-foot-vertical scarp was noted along the right half of the upstream slope at pool level. (6)The eroded area noted adjacent to the left upstream sidewall was about 2 feet lower in elevation than the remainder of the slope. (8)Trees and brush lined the upstream slope.

CREST **PROBLEMS NOTED:** [](10)NONE [](11)RUTS OR PUDDLES [*](12)EROSION [](13)CRACKS-WITH DISPLACEMENT [](14)TREES, BRUSH [](15)NOT WIDE ENOUGH [*](16)LOW AREA [](17)MISALIGNMENT [](18)INADEQUATE SURFACE DRAINAGE [](19)OTHER _____

COMMENTS: (12)Surface erosion was noted adjacent to both of the spillway walls. The eroded area to the right of the spillway was about 4 feet wide and the area to the left was about 15 feet wide. Both areas were void of ground vegetation. (16)The crest varied about 3.6 feet in elevation. The lowest area was adjacent to the left spillway wall, immediately upstream of a 4-foot-long brick wall that had been built parallel to the crest.

DOWNSTREAM SLOPE **PROBLEMS NOTED:** [](20)NONE [*](21)TREES, BRUSH [*](22)EROSION OR GULLIES [](23) CRACKS-WITH DISPLACEMENT [](24)RODENT BURROWS [](25)APPEARS TOO STEEP [](26)DEPRESSION OR BULGES [](27)SLIDES [](28)SOFT AREAS [*](29)FOOT OR VEHICLE PATHS [*](30)OTHER Steps had been formed into the downstream slope about 6 feet to the left of the spillway.

COMMENTS: (21)Large trees and brush were noted on the slope. (22 & 29)Erosion gullies followed along the exterior of the spillway sidewalls. The gullies were similar in size, averaging about 1.5 feet deep and 2 feet wide. The area surrounding the gullies was void of vegetation and contained exposed tree roots. Foot paths led along the exterior of both sidewalls and along the area that contained the steps.

SEEPAGE PROBLEMS NOTED: [*](31)NONE [](32)SATURATED EMBANKMENT AREA [](33)SEEPAGE AT/NEAR RIGHT ABUTMENT [](34)SEEPAGE AT/NEAR LEFT ABUTMENT [](35)SEEPAGE AREA AT TOE [](36)SEEPAGE ADJACENT TO OUTLET [](37)SEEPAGE INCREASED/MUDDY [](38)EMBANKMENT DRAINS NONE/DRY/OBSTRUCTED; Flow rates: R _____ L _____
[](39)OTHER _____
COMMENTS: _____

LAKE DRAIN PROBLEMS NOTED: [](40)NONE [*](41)NO INLET/OUTLET FOUND [*](42)POOR OPERATING ACCESS [](43)INOPERABLE [*](44)UPSTREAM OR DOWNSTREAM STRUCTURE DETERIORATED [*](45)OUTLET NOT OPERATED DURING INSPECTION; Interior Inspected ___ Yes *___ No [](46)CONDUIT DETERIORATED OR COLLAPSED [](47)JOINTS DISPLACED [](48)VALVE LEAKAGE
[*](49)OTHER An 8-inch-diameter pipe bypassed the valve. No discharge could be detected through the system.
COMMENTS: (41)The inlet was submerged and could not be inspected. (42)The operating apparatus was located in the middle of the downstream channel. Access to the valve during high flows would be prohibited. (44)Surface rust was noted on the exterior of the valve casing and the outlet pipe. (45)The outlet area was covered with dense brush and was also located in the center of the downstream channel. The location of the outlet prevented access to the outlet for inspection.

PRINCIPAL SPILLWAY PROBLEMS NOTED: [](50)NONE [](51)INLET OBSTRUCTED; Adequate Trashrack ___Yes ___No [*](52)CORROSION/DETERIORATION [](53)UNDERMINING [](54)CONDUIT CORROSION/DETERIORATION [](55)OUTLET UNDERMINING [](56)INADEQUATE STILLING BASIN
[](57)OTHER _____
COMMENTS: (52)The spillway was built with large cut-rock blocks. Several of the blocks were missing along the top and the base of the walls. Voids, about 1 foot long had been created by the missing blocks at the wall/weir intersection. About 1/4- to 1/2-inch-wide cracks followed the mortar joints to the weir elevation. No deterioration of the weir blocks or joints was visible through the 1 to 2 inch depth of water over the weir. The downstream face of the spillway and the outlet basin could not be inspected due to the flow over the weir.

EMERGENCY SPILLWAY PROBLEMS NOTED: [](58)NONE [](59)FLOW OBSTRUCTED [](60)POOR VEGETAL COVER [](61)POOR ALIGNMENT [](62)EROSION
[](63)OTHER _____
COMMENTS: _____

MONITORING EXISTING INSTRUMENTATION FOUND [*](64)NONE [](65)STAFF GAGE [](66)PIEZOMETERS [](67)SEEPAGE WEIRS/FLUMES [](68)SURVEY MONUMENTS [](69)OTHER _____
MONITORING OF INSTRUMENTATION: ___Yes ___No PERIODIC INSPECTIONS BY: [](70)OWNER [](71)ENGINEER _____
COMMENTS: _____

MISCELLANEOUS AREAS

[*](72)DOWNSTREAM AREA A heavily populated residential area is located less than 1 mile downstream of the dam.
[*](73)POOL & SHORELINE The pool is surrounded by park grounds owned by the City of Massilon.
[*](74)WATERSHED The watershed is mostly urbanized and contains several significant lakes.
[](75)OTHER _____

OVERALL CONDITIONS REMARKS: Overall, the condition of the dam is questionable. It appeared that very little regular maintenance has been performed on the embankment and the principal spillway, causing their condition to deteriorate.

ITEMS REQUIRING ACTION BY THE OWNER TO IMPROVE THE SAFETY OF THE DAM

MAINTENANCE - MINOR REPAIR - MONITORING

[*](76)CLEAR TREES, BRUSH FROM: the upstream and downstream slopes.

[*](77)ESTABLISH PROPER VEGETATION ON: the entire embankment as needed.

[](78)INITIATE RODENT CONTROL PROGRAM AND BACKFILL EXISTING HOLE(S): _____

[*](79)REPAIR EROSION/UNDERMINING: noted on the crest and the downstream slope.

[](80)PROVIDE ADDITIONAL RIPRAP: _____

[](81)PROVIDE/REPAIR TRASHRACK: _____

[](82)REPAIR CONCRETE DETERIORATION: _____

[*](83)GRADE CREST TO A UNIFORM ELEVATION DRAINED TOWARDS THE UPSTREAM SLOPE: to prevent ponding water on the crest.

[*](84)LUBRICATE AND OPERATE OUTLET GATES THROUGH FULL CYCLE: to ensure operablity when required.

[*](85)MONITOR: the downstream area for any wetness that could indicate seepage through cracks or voids in the spillway walls.

[*](86)DEVELOP AND SUBMIT AN EMERGENCY ACTION PLAN: in accordance with OAC Rule 1501:21-15-06.

[*](87)MONITOR: The upstream slope for signs of continued erosion or instability that could indicate the need to provide slope protection.

[](88)OTHER: _____

ENGINEERING - EMPLOY AN ENGINEER EXPERIENCED IN DESIGN AND CONSTRUCTION OF DAMS TO: (PER OHIO REVISED CODE SECTION 1521.062 AND OHIO ADMINISTRATIVE CODE (OAC) RULE 1501:21-21-03, PLANS & SPECIFICATIONS MUST BE APPROVED BY ODNR, DIVISION OF WATER PRIOR TO CONSTRUCTION.)

[*](89)PERFORM AN INSPECTION OF: the structural integrity of the principal spillway.

[*](90)PERFORM A HYDROLOGIC STUDY TO DETERMINE THE REQUIRED SPILLWAY SIZE AND PREPARE PLANS AND SPECIFICATIONS AS NECESSARY TO INCREASE THE DISCHARGE-STORAGE CAPACITY: to safely pass the Probable Maximum Flood (PMF) which is the design flood for a Class I structure, in accordance with OAC Rule 1501:21-13-02.

[](91)PERFORM A GEOTECHNICAL INVESTIGATION TO EVALUATE THE STABILITY OF THE DAM: _____

[*](92)PREPARE PLANS AND SPECIFICATIONS FOR THE REHABILITATION OF: the spillway system as deemed necessary from the items 89 and 90.

[](93)OTHER: _____

[](94)OTHER: _____

ALL ENGINEERED PLANS FOR IMPROVEMENTS TO THE DAM MUST BE IMPLEMENTED BY THE OWNER WITHIN FIVE YEARS UNDER THE SUPERVISION OF A REGISTERED PROFESSIONAL ENGINEER IN ACCORDANCE WITH THE PROVISIONS OF OAC RULE 1501:21-21-03.

The structural stability of the embankment and spillway and the hydraulic adequacy of the dam to pass the required design flood safely have not been investigated as a part of this inspection. Problems in any of these areas could lead to dam failure. To ensure the safety of this dam and the protection of downstream areas in accordance with Ohio's Dam Safety Laws, you should have a professional engineer make an in-depth safety evaluation of this structure and initiate timely repairs.

OTHER RECOMMENDATIONS OR COMMENTS

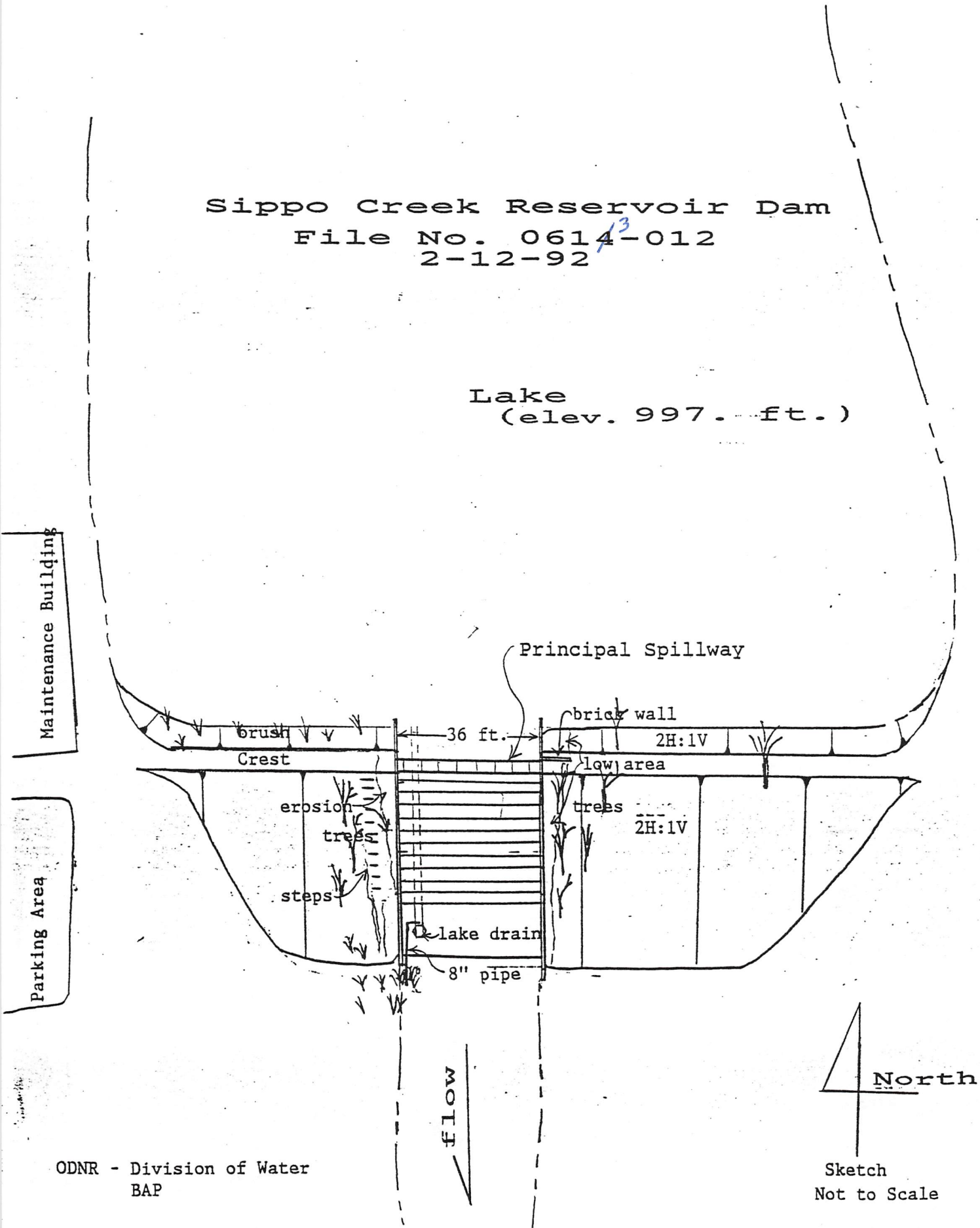
This dam has been upgraded to a Class I structure because of the potential hazard downstream of the dam. Based on previous studies of dams with smaller drainage areas and similar discharge/storage capacities, this spillway system is severely inadequate to safely pass the design flood. Necessary measures must be implemented to bring the structure into compliance with the Ohio Administrative Code.

ENGINEER'S SIGNATURE Beth A. Pratt

SKETCH ATTACHED Yes X No ____

DATE 2-27-92

Sippo Creek Reservoir Dam
File No. 0614-012
2-12-92



ODNR - Division of Water
BAP

Sketch
Not to Scale

0613-005

NAME: SIPPO CREEK RESERVOIR DAM
RESERVOIR:

FILE NO: 0614-012
NATIONAL #: N/A
PERMIT NO: EXEMPT
CLASSIFICATION: I

OWNER INFORMATION

OWNER: City of Massillon
ADDRESS1: Massilon Municipal Building
ADDRESS2: 1 James Duncan Plaza
ADDRESS3:
CITY: Massilon STATE: OH ZIP: 44646
CONTACT PERSON: Bill Hamit TELEPHONE:

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

STRUCTURE INFORMATION

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

EMBANKMENT DATA

LENGTH (ft)	215	UPSTREAM SLOPE	2H:1V
MAX. HEIGHT (ft)	18.9	DOWNSTREAM SLOPE	2H:1V
TOP WIDTH (ft)	6	VOLUME OF FILL (cu.yds.)	

SPILLWAY & OUTLET WORKS DATA
LAKE DRAIN: 24-IN-DIA. GATE VALVE
PRINCIPAL: 36-FT WEIR

EMERGENCY: NONE
MAXIMUM TOTAL SPILLWAY DISCHARGE (cfs): 753
DESIGN FLOOD: PMF FLOOD CAPACITY: N/A

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): 12/19/91 INSPECTOR: BP
PHASE I:
PRIOR INSPECTIONS:
OTHER SITE VISITS:

OPERATION INFORMATION/REMARKS:

EMERGENCY ACTION PLAN: N/A
ANNUAL FEE: $ EXEMPT LAST DATA ENTRY: 2/26/92

NAME: SIPPO CREEK [illegible] RESERVOIR DAM	FILE NO. [illegible]-012
	NATIONAL #: N/A
	PERMIT NO: EXEMPT
	CLASSIFICATION: I

OWNER INFORMATION

OWNER: City of Massillon	OWNER TYPE: PUBLIC LOCAL
ADDRESS1: Massillon Municipal Building	PARCEL NO:
ADDRESS2: [illegible] James Duncan [illegible]
ADDRESS3:
CITY: Massillon	STATE: OH ZIP: [illegible]
CONTACT PERSON: Bill Hunt	TELEPHONE:

LOCATION INFORMATION

COUNTY: STARK	LATITUDE Deg: 40 Min: 48 Sec: [illegible]
TOWNSHIP: PERRY	LONGITUDE Deg: 81 Min: 20 Sec: [illegible]

STREAM: SIPPO CREEK
NEAREST AFFECTED COMMUNITY: MASSILLON
COMMUNITY'S DISTANCE FROM DAM (miles): [illegible]
USGS QUAD: MASSILLON USGS BASIN NO: [illegible]

DESIGN/CONSTRUCTION INFORMATION

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

STRUCTURAL INFORMATION

PURPOSE OF DAM: RECREATION, PRIVATE
TYPE OF IMPOUNDMENT: DAM AND SPILLWAY
TYPE OF STRUCTURE:
DRAINAGE AREA (sq miles): 14.50 or (acres): [illegible]

EMBANKMENT DATA

LENGTH (ft) : 15		UPSTREAM SLOPE	: [illegible]
MAX. HEIGHT (ft) : 18.0		DOWNSTREAM SLOPE	: [illegible]
TOP WIDTH (ft) : 6		VOLUME OF FILL (cu.yds)	:

SPILLWAY & OUTLET WORKS DATA
LAKE DRAIN: 24-IN-DIA. GATE VALVE
PRINCIPAL: 36-FT WEIR

EMERGENCY: NONE
MAXIMUM TOTAL SPILLWAY DISCHARGE (cfs): [illegible]
DESIGN FLOOD: PMF FLOOD CAPACITY: N/A

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 :	1000.5	34.0	[illegible]

INSPECTION INFORMATION

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

OPERATION INFORMATION, REMARKS:

EMERGENCY ACTION PLAN: N/A
ANNUAL FEE: $ EXEMPT LAST DATA ENTRY: 2/28/92

2-24-92

Please update Thanks, BAP

0613-0005

NAME: SIPPO CREEK RESERVOIR DAM
RESERVOIR:

FILE NO: ~~0614-012~~
NATIONAL #: N/A
PERMIT NO: EXEMPT
CLASSIFICATION: ~~EXEMPT~~ I

OWNER INFORMATION

OWNER: City of Massillon
OWNER TYPE: PUBLIC, LOCAL
ADDRESS1: massilon Municipal Building
PARCEL NO:
ADDRESS2: 1 James Duncan Plaza
ADDRESS3:
CITY: Massilon STATE: OH ZIP: 44646
CONTACT PERSON: Bill Hamit TELEPHONE:

LOCATION INFORMATION

COUNTY: STARK
LATITUDE Deg: 40 Min: 48 Sec: 18
TOWNSHIP: PERRY
LONGITUDE Deg: 81 Min: 30 Sec: 30
STREAM: SIPPO CREEK
NEAREST AFFECTED COMMUNITY: massilon
COMMUNITY'S DISTANCE FROM DAM (miles): 0 miles
USGS QUAD: MASSILLON
USGS BASIN NO: 05040001

DESIGN/CONSTRUCTION INFORMATION

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

STRUCTURE INFORMATION

PURPOSE OF DAM: RECREATION, PRIVATE
TYPE OF IMPOUNDMENT: DAM AND SPILLWAY
TYPE OF STRUCTURE:
DRAINAGE AREA (sq.miles): 14.9 or (acres): 9566

EMBANKMENT DATA
LENGTH (ft) : ~~350~~ 215
MAX. HEIGHT (ft): ~~10.0~~ 18.9
TOP WIDTH (ft) : 6'
UPSTREAM SLOPE : 2:1
DOWNSTREAM SLOPE : 2:1
VOLUME OF FILL (cu.yds.):

SPILLWAY & OUTLET WORKS DATA
LAKE DRAIN: 24" dia. gate valve
PRINCIPAL: 36 ft wide weir w/ 3ft breadth

C.S. = $\frac{20\,ft}{3300\,ft}$ = .006

EMERGENCY: none
MAXIMUM TOTAL SPILLWAY DISCHARGE (cfs): 753
DESIGN FLOOD: ~~N/A~~ PMF
FLOOD CAPACITY: N/A

DAM & RESERVOIR DATA

	ELEVATION(ft-MSL)	AREA(acres)	STORAGE(acre-feet)
FOUNDATION (CUTOFF) :			
STREAMBED :	981.7		
PRINCIPAL SPILLWAY :	~~997.0~~ 997.0	4.~~0~~ 4	21.7 ~~9.0~~
EMERGENCY SPILLWAY :			
TOP OF DAM :	1000.6	34.0	82.5

INSPECTION INFORMATION

LAST INSPECTION (mon/day/yr): 12-19-91
INSPECTOR: BP
PHASE I:
PRIOR INSPECTIONS:
OTHER SITE VISITS:

OPERATION INFORMATION/REMARKS:

Chapman portion of dam probably > 10' I told Mr. Fry we would come out & inventory the dam. I will call him later next week.

EMERGENCY ACTION PLAN: N/A
ANNUAL FEE: $ EXEMPT
LAST DATA ENTRY: 2/01/91

NAME: SIPPO CREEK RESERVOIR DAM

FILE NO:
NATIONAL #: N/A
PERMIT NO: EXEMPT
CLASSIFICATION: EXEMPT

RESERVOIR:

OWNER INFORMATION

OWNER: City of Massillon
OWNER TYPE: PUBLIC, LOCAL
PARCEL NO:
ADDRESS1:
ADDRESS2:
ADDRESS3:
CITY: Massillon
STATE:
ZIP:
CONTACT PERSON:
TELEPHONE:

LOCATION INFORMATION

COUNTY: STARK
LATITUDE Deg: 40 Min: 48 Sec: 10
TOWNSHIP: PERRY
LONGITUDE Deg: 81 Min: 30 Sec: 30
STREAM: SIPPO CREEK
NEAREST AFFECTED COMMUNITY:
COMMUNITY'S DISTANCE FROM DAM (miles):
USGS QUAD: MASSILLON
USGS BASIN NO: 05040001

DESIGN/CONSTRUCTION INFORMATION

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

STRUCTURE INFORMATION

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

EMBANKMENT DATA
LENGTH (ft): UPSTREAM SLOPE:
MAX. HEIGHT (ft): DOWNSTREAM SLOPE:
TOP WIDTH (ft): VOLUME OF FILL (cu.yds):

SPILLWAY & OUTLET WORKS DATA
LAKE DRAIN:
PRINCIPAL SPILLWAY:

EMERGENCY SPILLWAY:
MAXIMUM TOTAL SPILLWAY DISCHARGE (cfs):
DESIGN FLOOD: N/A
FLOOD CAPACITY: N/A

DAM & RESERVOIR DATA

	ELEVATION(FT-MSL)	AREA(acres)	STORAGE(acre-feet)
FOUNDATION/CUTOFF			
STREAMBED			
PRINCIPAL SPILLWAY	967.0	4.3	
EMERGENCY SPILLWAY			
TOP OF DAM			

INSPECTION INFORMATION

LAST INSPECTION (mon/day/yr):
INSPECTOR:
PHASE I:
PRIOR INSPECTIONS:
OTHER:

OPERATION INFORMATION/REMARKS:

EMERGENCY ACTION PLAN: N/A
ANNUAL FEE: EXEMPT
LAST DATA ENTRY: 2/01/91

DA

quad 0613

9842	11490,	
6557	9842	average = 1644.3
3285/2	1648.	
1642.5		

	3660	5941	8209	
quad 0613	1382	3660	5941	avg = 2275.7
	2278	2281	2268	

quad 0614	8718	9215	9712	
	8219	8718	9215	
	499	497	497	avg = 497.7

(1644.3 + 2275.7 + 497.7) 1.4233 = 6287.7 acres

Sippo Lake Dam (0613-005) 1998. acres

Lake Cable Dam (0613-013) ≈ 1280 acres

total Drainage Area ≈ 9565.7 acres

9566 acres

14.9 sq mi

NAME: LAKE CABLE DA..

RESERVOIR:

FILE NO: 0613-013
NATIONAL #: OH00236
PERMIT NO: N/A
CLASSIFICATION: II

OWNER INFORMATION

OWNER: Lake Cable Recreation Assn., Inc. OWNER TYPE: PRIVATE, ASSN.
ADDRESS1: 5725 Fulton Drive, NW PARCEL NO:
ADDRESS2:
ADDRESS3:
CITY: Canton STATE: OH ZIP: 44718
CONTACT PERSON: TELEPHONE: 216/499-2608

LOCATION INFORMATION

COUNTY: STARK LATITUDE Deg: 40 Min: 51 Sec: 36
TOWNSHIP: JACKSON LONGITUDE Deg: 81 Min: 27 Sec: 12
STREAM: TRIBUTARY TO SIPPO CREEK
NEAREST AFFECTED COMMUNITY:
COMMUNITY'S DISTANCE FROM DAM (miles):
USGS QUAD: CANTON WEST USGS BASIN NO: 05040001

DESIGN/CONSTRUCTION INFORMATION

DESIGNED BY:
CONSTRUCTED BY:
COMPLETED: 1926 PLANS AVAILABLE: AT:
FAILURE/INCIDENT/BREACH:

STRUCTURE INFORMATION

PURPOSE OF DAM: RECREATION, PRIVATE
TYPE OF IMPOUNDMENT: DAM AND SPILLWAY
TYPE OF STRUCTURE: EARTHFILL
DRAINAGE AREA (sq.miles): 2 sq mi. or (acres):

EMBANKMENT DATA

LENGTH (ft)	1000	UPSTREAM SLOPE	
MAX. HEIGHT (ft)	17.0	DOWNSTREAM SLOPE	
TOP WIDTH (ft)	500	VOLUME OF FILL (cu.yds.)	341000

SPILLWAY & OUTLET WORKS DATA
LAKE DRAIN:
PRINCIPAL: 36-IN PIPE

EMERGENCY:
MAXIMUM TOTAL SPILLWAY DISCHARGE (cfs):
DESIGN FLOOD: 0.50 PMF FLOOD CAPACITY:

DAM & RESERVOIR DATA

	ELEVATION(ft-MSL)	AREA(acres)	STORAGE(acre-feet)
FOUNDATION (CUTOFF):			
STREAMBED	1080.0		
PRINCIPAL SPILLWAY	1095.0	163.0	760.0
EMERGENCY SPILLWAY			
TOP OF DAM	1097.0	170.0	963.0

INSPECTION INFORMATION

LAST INSPECTION (mon/day/yr): 5/29/74 INSPECTOR:
PHASE I:
PRIOR INSPECTIONS:
OTHER SITE VISITS:

OPERATION INFORMATION/REMARKS:

EMERGENCY ACTION PLAN:
ANNUAL FEE: $ 47.00 LAST DATA ENTRY: 6/07/90

Classification Checklist

Name: Sippo Lake Reservoir Dam Engineer: BAP

County: Stark Date: 12-30-91

File Number: 0614-012

EXEMPT

Height as measured = _____ feet.
Measure from the natural streambed or lowest ground elevation at the outside (downstream) limit of dam to the elevation of the top of the dam (low point on crest)
Storage as measured = _____ acre-feet
Measure from inside toe to top of dam

- ☐ ≤ 6' - Exempt (do not complete remainder of form)
- ☐ ≤ 15 ac-ft - Exempt
- ☐ 6' < ht < 10' - Exempt if vol ≤ 50 ac-ft

HEIGHT

Height as measured = 18.9 feet.
Measure from low point along crest to streambed at d/s toe.

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

Height Class: IV

STORAGE

Storage volume at top of dam = _____ acre-feet.

- ☐ >5000 acre-feet - Class I
- ☐ > 500 acre-feet - Class II
- ☒ > 50 acre-feet - Class III
- ☐ < 50 acre-feet - Class IV

Storage Volume Class: III

HAZARD

Include future Development

CLASS I

- ☒ Loss of human life (plausible circumstances can be envisioned when loss of life could occur)
- ☐ Hazard to health (water supply, water and wastewater treatment, release of pollutants)
- ☐ Structural damage to homes (one or more)
- ☐ Structural damage to:
  - ☐ industrial, commerical, or business structures (includes barns of value)
  - ☐ major public utilities (gas, electric, telephone, pipelines)

CLASS II

- ☐ Flood water damage to:
  - ☐ homes (no loss of life envisioned)
  - ☐ industrial, business or commercial structures (includes barns of value)
- ☐ Damage To:
  - ☐ State & interstate highways or only access to residential areas
  - ☐ railroads
  - ☐ sanitary sewers

CLASS III

- ☐ Damage To:
  - ☐ property (erosion)
  - ☐ low value non-residential structures
  - ☐ local roads (county & township)
  - ☐ agricultura crops & livestock

CLASS IV

- ☐ Losses restricted mainly to the dam

Hazard Class: I

CLASS

Exempt	☐
Height	IV
Storage	III
Hazard	I

Final: I

Area vs Elevation

Sippo Creek Reservoir Dam

0614-012

Top of Dam (elev. 1000.0 ft)

Normal Pool (elev. 994.0 ft)

Elevation (ft)

1020
1015
1010
1005
1000
995
990
985
980

0 20 40 60 80 100

Area (acres)

AQUABEE
MADE IN USA

DRAWING PAPER NO. 1200-10
TRACING PAPER NO. 1227-10
CROSS SECTION-10X10 TO 1 INCH

Reservoir

Sippo Lake Dam 0614-012

$C.S. = \frac{20ft}{3300ft} = .006$

NP 8023

(997 ft) 8033

/10/ ÷3 (1.423) = 4.7 acres

8041

8033

(8 ÷3)(1.423) = 3.8 acres

8041

8051

/10/ 4.7 acres average = 4.4 acres

1000.0 ft

8030

8052

(/22/ ÷3) 1.423 10.4 acres

1010.0 ft on quad 614

8052

8110

(/58/ ÷3) 1.423

3701 } on quad 613

3760

(/59/ ÷3) 1.423 = 30 acres

27.5 acres + 30 acres = 57.5 acres

1020.0

8165 8200 8237

8200 8237 8271

/35/ /37/ /34/ (avg 35.3) 1.423 = 50.3 acres

4457 5592 6461

5592 5731 6597

/135/ /139/ /136/ (avg 136.7) 1.423 = 194.5 acres

50.3 + 194.5 = 244.8 acres

Notes from H&H investigation

~2000, [illegible]

File No. 0014-012
Stark County

Notes from H&H investigation

~2000, KRB

File No. 0614-012
Stark County

USVOL.XLS

TO BE USED IF UPSTREAM TOE IS NOT KNOWN: (USVOL.XLS)

File Name: Sippo Creek Reservoir Dam

File Number: 0614-012

Engineer: bap

Date: 2/24/92

**Embankment Data:

Upstream Slope: 2

Downstream Slope: 2

Top Width (ft.): 6

Total Berm Width (ft.) (u/s +d/s): 0

**Channel Data:

Channel Slope: 0.006

**Elevation - Area - Storage Data:

	Elevation (ft.-MSL)	Area (acres)	Storage Vol. (ac.-ft.)
Principal Spillway	997	4.4	21.7
Emergency Spillway	997	4.4	21.7
Top of Dam	1000.6	34	82.5

Downstream Toe : 981.7

Upstream Toe : 982.2

Height of Dam (ft.): 18.9

*** Note : [ ] =calculated values

DON SEWER

* · No map w/ DA delineated — TOTAL BA LOOKS OK
* · Basin Slope - not sure how Basin Slope (Avg B.S.) was determined — MAKES LESS CONSERV.

EST. OFF ONE CROSS-SECTION THROUGH! *

OLD HEC-1 RUNS →

* · no clear disch capacities @ upper dams noted — LOOK O.K.
* · IT CARD OF 2 IS CONSIDERED (NEEDED FOR MUSK.)
· CN APPEARS O.K. ⇒ NOT BIG FACTOR IN OVERALL PMF
* · APPEARS AREAS ABOVE N.P. ARE TOO BIG

CLASS. → I BEC. OF HOMES D/S
↳ REDUCE DESIGN FLOOD w/ CRITICAL FLOOD

THE Q_{PK} IS REASONABLE, NO TIE TO RETURN INT.

OVERALL → w/ 3' WALL

$Q = C L H^{3/2}$ $Q = 1831$

$H = \cancel{8.6}\ 6.6$

$L = 36$

$C = 3$

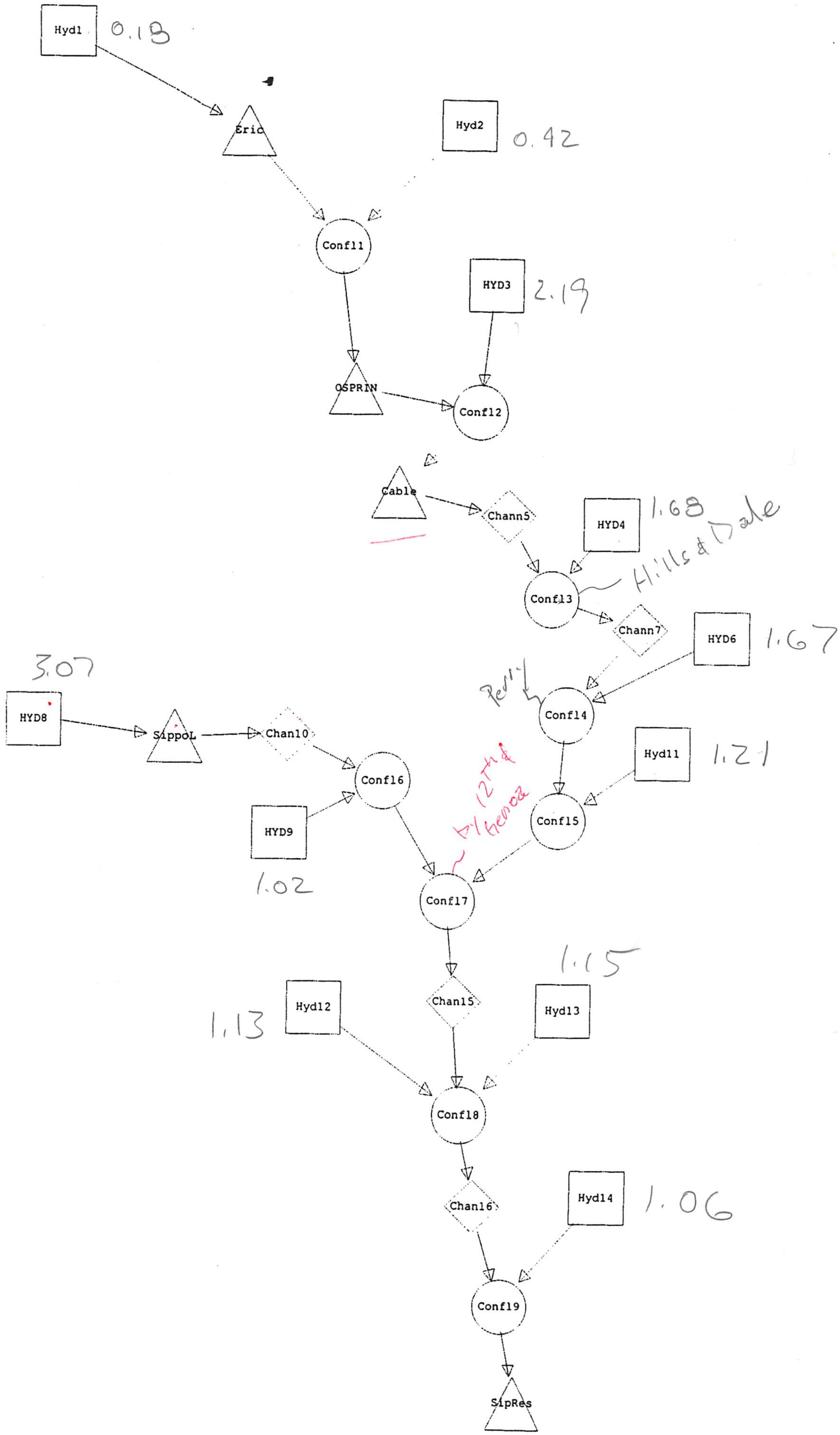
w/ 5' WALL

$Q = 2723$ $H = 8.6$ $L = 36$ $C = 3$

E. SIPPO BA 17.8

100-YR ~~2000~~ 1980 cfs

500-YR 2650



Hyd1
0.18
Eric
Hyd2
0.42
Conf11
HYD3
2.19
OSPRIN
Conf12
Cable
Chann5
HYD4
1.68
Hills & Dale
Conf13
Chann7
HYD6
1.67
3.07
HYD8
SippoL
Chan10
Conf14
Conf16
Hyd11
1.21
Conf15
HYD9
1.02
Conf17
1.15
Hyd12
Chan15
Hyd13
1.13
Conf18
Chan16
Hyd14
1.06
Conf19
SipRes

```
IDSippo Lake

ID
ID Reveiw of HEC-1 File with ODNR records for upstream basins
*DIAGRAM
IT    60  1JAN94        0     300
IO     5
JR  PREC        1     0.5    0.25     0.1
KK  Hyd1
KM          Inflow to Lake Eric

KO     0        0        0        0      22
BA  0.18
* 0.03
PB  34.5
IN    60  1JAN94        0
PI  0.05     0.06    0.05     0.06    0.05     0.06     0.07     0.07
 0.07     0.06
PI  0.07     0.06    0.09     0.08    0.09     0.08     0.09     0.08
 0.12     0.12
PI  0.12     0.11    0.12     0.12    0.17     0.17     0.19     0.19
 0.21     0.22
PI  0.39     0.43    0.49     0.56    0.66     0.77     1.34      2.3
 6.31     9.96
PI   2.6     1.62    0.36     0.31    0.29     0.26     0.25     0.23
 0.15     0.14
PI  0.15     0.15    0.14     0.15     0.1     0.09      0.1      0.1
  0.1      0.1
PI  0.07     0.08    0.07     0.08    0.07     0.08     0.05     0.06
 0.06     0.06
PI  0.06     0.06
LS     0       74        0
UD  0.44
* ?
KK  Eric    CNAME       1C
KM          Route Hydrograph Through Lake Eric

KO     0        0        0        0      22
RS     1     ELEV  1116.5        0
SA   3.7      3.9      4.2      6.2      8.1
SE1116.5     1118     1120     1125     1130
SQ     0        3       17       40       69      600     1130
SE1116.5     1117     1118     1119     1120   1121.5     1121
* ST 1120 400
KK  Hyd2
KM

KO     0        0        0        0      22
```

```
BA  0.42
* 0.82
PB  34.5
LS     0       75        0
UD  0.65
KKConfl1    CNAME  OSPRIN
KM

KO     0        0        0        0       22
HC     2
KKOSPRIN    CNAME  Confl1
KM          Route Combined Hydrograph Through Lake OSprings

KO     0        0        0        0       22
RS     1     ELEV     1106        0
SA     0       27       30       40       44
SE1104.2     1106  1108.7     1110  1112.9
SQ     0       56      184      303     1239     3930
SE  1106     1107     1108  1108.7     1109     1110
* 19.5'L Sharp Weir
* ST 1108.7 1800
KK  HYD3
KM          Hydrograph to Lake Cable

KO     0        0        0        0       22
BA  2.19
* 2.5, Also seeHammontree Report (total of 2.35 above Cable)
LS     0       70        0
UD  1.26
KKConfl2    CNAME   Cable
KM

KO     0        0        0        0       22
HC     2
KK Cable    CNAME  Confl2
KM          Route Combined Hydrograph Through Lake Cable

KO     0        0        0        0       22
RS     1     ELEV  1097.4        0
* n.p. o.k.
SA     0      220      296    316.7      405      500
SE  1080   1097.4   1099.5     1100     1103     1104
* areas o.k.
SQ     0      6.5       14     70.5    242.2    261.8    346.6   1298.6 10
961.4
SE1096.4     1097   1097.4     1098     1099   1099.1   1099.5     1100
 1102
* SQ 313 @ TOD
```

```
* ST 1099.5 1000
KKChann5   CNAME      4C
KM         Route Channel 5 from Lake Cable to Hills & Dales Road

KO      0       0       0       0      22
RM      9  0.2985  0.4966
* 2500' d/s of Cable @ constriction
KK  HYD4
KM         Subbasin 4 Hydrograph

KO      0       0       0       0      22
BA   1.68
LS      0      68       0
UD   1.28
KKConfl3   CNAME  Chann7
KM         Add Hydrographs From Channel 5 and Subbasin 4

KO      0       0       0       0      22
HC      2
KKChann7   CNAME  Confl3
KM         Route Channel From Hills & Dale Road & Perry Road

KO      0       0       0       0      22
RM      3  0.2239   0.145
* 1000' u/s of Perry Road @ constriction
KK  HYD6
KM         Hydrograph From Drainage Area 6

KO      0       0       0       0      22
BA   1.67
LS      0      69       0
UD   1.55
KKConfl4   CNAME      6R
KM         Add Hydrograph 6 and Channel 7

KO      0       0       0       0      22
HC      2
KK Hyd11
KM         Hydrograph From Subbasin 11

KO      0       0       0       0      22
BA   1.21
LS      0      67       0
UD   1.29
KKConfl5   CNAME      7R
KM         Add Subbasin 11 and Confluence 4 Hydrographs

KO      0       0       0       0      22
```

```
HC      2
KK  HYD8
KM          Hydrograph to Lake Sippo

KO      0         0         0         0       22
BA   3.07
*   3.1
LS      0       75         0
* 1992 H, CN 74
UD   1.56
* 1992 Hammontree, Tc 1.0, Tlag 0.6
KKSippoL    CNAME       8C
KM          Route Hydrograph 8 Through Sippo Lake

KO      0         0         0         0       22
RS      1     ELEV     1027         0
* np o.k.
SA      0       88      106      126                                  @ 1031
* o.k                                                                 H=4
SE   1022     1027   1029.3     1036                                  C=3   Q=792
SQ      0      346     1375     4210     7145    12300    16345      @
* 33'L concrete weir  Q= CLH^3/2                                      Q=
SE   1027   1029.3   1030.3     1031   1032.3     1033     1035
* ST 1029.3 445
KKChan10    CNAME       9C
KM          Route Outflow From Lake Sippo Through Channel 10

KO      0         0         0         0       22
RM      6    0.2194    0.4105
* 1000' u/s of Genoa Rd, Appears good
KK  HYD9
KM          Hydrograph for Subbasin 9

KO      0         0         0         0       22
BA   1.02
LS      0       67         0
UD   1.51
KKConfl6    CNAME      10R
KM          Add Subbasin 9 and Channel 10 Hydrographs

KO      0         0         0         0       22
HC      2
KKConfl7    CNAME   Chan15
KM          Add Hydrographs From Sippo Creek and Lake Sippo Tributar
y
KO      0         0         0         0       22
HC      2
KKChan15    CNAME   Confl7
```

```
KM          Channel Below Confluence Sippo Creek and Tributary

KO      0         0         0         0       22
RM      5    0.456    0.131
* 250' u/s of jackson Road, appears representative
KK Hyd13
KM          Hydrograph From Subbasin 13

KO      0         0         0         0       22
BA   1.15
LS      0        75         0
UD   0.72
KK Hyd12
KM          Hydrograph From Subbasin 12

KO      0         0         0         0       22
BA   1.13
LS      0        74         0
UD    1.1
KKConfl8    CNAME  Chan16
KM          Confluence of Channel 15 and Subbasins 12 and 13

KO      0         0         0         0       22
HC      3
KKChan16    CNAME  Confl8
KM          Channel Between Reservoir and Subbasins 12 and 13

KO      0         0         0         0       22
RM      5    0.305    0.009
* 1700' u/s of Hankins, a little constr.
KK Hyd14
KM          Hydrograph for Subbasin 14

KO      0         0         0         0       22
BA   1.06
LS      0        80         0
UD   0.78
KKConfl9    CNAME  Confl9
KM          Hydrograph From Channel 16 and Subbasin 14

KO      0         0         0         0       22
HC      2
KKConfl9    CNAME  Confl9
KO      0         0         0         0       22
RNConfl9
* his data file ends here, following is copied from his output
KK SipRes
RS 1 ELEV 997
```

```
SA 0 4.4 34 40 75 100 105
SE 983 997 1000.6 1004 1010 1015 1016
* remeasure of area indicates TOD and above are overestimated
SQ 0 1150 2330 4130 5620 13000 19700 27300 35700 44800
SQ 49600 54400
* 36'L weir
SE 997 1000.6 1001.6 1002.6 1004 1006 1008 1010 1012 1014
SE 1015 1016
* ST 1000.6 215
ZZ
ZZ
```

```
IDSippo Lake
ID
ID Reveiw of HEC-1 File with ODNR records for upstream basins
*DIAGRAM
IT    60  1JAN94       0     300
IO     5
JR  PREC       1     0.5    0.25     0.1
KK  Hyd1
KM         Inflow to Lake Eric
KO     0       0       0       0      22
BA  0.18
* 0.03
PB  34.5
IN    60  1JAN94       0
PI  0.05    0.06    0.05    0.06    0.05    0.06    0.07    0.07    0.07    0.06
PI  0.07    0.06    0.09    0.08    0.09    0.08    0.09    0.08    0.12    0.12
PI  0.12    0.11    0.12    0.12    0.17    0.17    0.19    0.19    0.21    0.22
PI  0.39    0.43    0.49    0.56    0.66    0.77    1.34     2.3    6.31    9.96
PI   2.6    1.62    0.36    0.31    0.29    0.26    0.25    0.23    0.15    0.14
PI  0.15    0.15    0.14    0.15     0.1    0.09     0.1     0.1     0.1     0.1
PI  0.07    0.08    0.07    0.08    0.07    0.08    0.05    0.06    0.06    0.06
PI  0.06    0.06
LS     0      74       0
UD  0.44
* ?
KK  Eric   CNAME      1C
KM         Route Hydrograph Through Lake Eric
KO     0       0       0       0      22
RS     1    ELEV  1116.5       0
SA   3.7     3.9     4.2     6.2     8.1
SE1116.5    1118    1120    1125    1130
SQ     0       3      17      40      69     600    1130
SE1116.5    1117    1118    1119    1120  1121.5    1121
* ST 1120 400
KK  Hyd2
KM
KO     0       0       0       0      22
BA  0.42
* 0.82
PB  34.5
LS     0      75       0
UD  0.65
KKConfl1   CNAME  OSPRIN
KM
KO     0       0       0       0      22
HC     2
KKOSPRIN   CNAME  Confl1
KM         Route Combined Hydrograph Through Lake OSprings
KO     0       0       0       0      22
RS     1    ELEV    1106       0
SA     0      27      30      40      44
SE1104.2    1106  1108.7    1110  1112.9
SQ     0      56     184     303    1239    3930
SE  1106    1107    1108  1108.7    1109    1110
* 19.5'L Sharp Weir
* ST 1108.7 1800
KK  HYD3
KM         Hydrograph to Lake Cable
KO     0       0       0       0      22
```

```
BA  2.19
* 2.5, Also seeHammontree Report (total of 2.35 above Cable)
LS     0      70       0
UD  1.26
KKConfl2   CNAME   Cable
KM
KO     0       0       0       0      22
HC     2
KK Cable   CNAME  Confl2
KM         Route Combined Hydrograph Through Lake Cable
KO     0       0       0       0      22
RS     1    ELEV  1097.4       0
* n.p. o.k.
SA     0     220     296   316.7     405     500
SE  1080  1097.4  1099.5    1100    1103    1104
* areas o.k.
SQ     0     6.5      14    70.5   242.2   261.8   346.6  1298.6 10961.4
SE1096.4    1097  1097.4    1098    1099  1099.1  1099.5    1100    1102
* SQ 313 @ TOD
* ST 1099.5 1000
KKChann5   CNAME      4C
KM         Route Channel 5 from Lake Cable to Hills & Dales Road
KO     0       0       0       0      22
RM     9  0.2985  0.4966
* 2500' d/s of Cable @ constriction
KK  HYD4
KM         Subbasin 4 Hydrograph
KO     0       0       0       0      22
BA  1.68
LS     0      68       0
UD  1.28
KKConfl3   CNAME  Chann7
KM         Add Hydrographs From Channel 5 and Subbasin 4
KO     0       0       0       0      22
HC     2
KKChann7   CNAME  Confl3
KM         Route Channel From Hills & Dale Road & Perry Road
KO     0       0       0       0      22
RM     3  0.2239   0.145
* 1000' u/s of Perry Road @ constriction
KK  HYD6
KM         Hydrograph From Drainage Area 6
KO     0       0       0       0      22
BA  1.67
LS     0      69       0
UD  1.55
KKConfl4   CNAME      6R
KM         Add Hydrograph 6 and Channel 7
KO     0       0       0       0      22
HC     2
KK Hyd11
KM         Hydrograph From Subbasin 11
KO     0       0       0       0      22
BA  1.21
LS     0      67       0
UD  1.29
KKConfl5   CNAME      7R
KM         Add Subbasin 11 and Confluence 4 Hydrographs
KO     0       0       0       0      22
HC     2
```

```
KK •HYD8
KM         Hydrograph to Lake Sippo
KO     0       0       0       0      22
BA  3.07
*  3.1
LS     0      75       0
* 1992 H, CN 74
UD  1.56
* 1992 Hammontree, Tc 1.0, Tlag 0.6
KKSippoL   CNAME      8C
KM         Route Hydrograph 8 Through Sippo Lake
KO     0       0       0       0      22
RS     1    ELEV    1027       0
* np o.k.
SA     0      88     106     126
* o.k
SE  1022    1027  1029.3    1036
SQ     0     346    1375    4210    7145   12300   16345
* 33'L concrete weir
SE  1027  1029.3  1030.3    1031  1032.3    1033    1035
* ST 1029.3 445
KKChan10   CNAME      9C
KM         Route Outflow From Lake Sippo Through Channel 10
KO     0       0       0       0      22
RM     6  0.2194  0.4105
* 1000' u/s of Genoa Rd, Appears good
KK  HYD9
KM         Hydrograph for Subbasin 9
KO     0       0       0       0      22
BA  1.02
LS     0      67       0
UD  1.51
KKConfl6   CNAME     10R
KM         Add Subbasin 9 and Channel 10 Hydrographs
KO     0       0       0       0      22
HC     2
KKConfl7   CNAME  Chan15
KM         Add Hydrographs From Sippo Creek and Lake Sippo Tributary
KO     0       0       0       0      22
HC     2
KKChan15   CNAME  Confl7
KM         Channel Below Confluence Sippo Creek and Tributary
KO     0       0       0       0      22
RM     5   0.456   0.131
* 250' u/s of jackson Road, appears representative
KK Hyd13
KM         Hydrograph From Subbasin 13
KO     0       0       0       0      22
BA  1.15
LS     0      75       0
UD  0.72
KK Hyd12
KM         Hydrograph From Subbasin 12
KO     0       0       0       0      22
BA  1.13
LS     0      74       0
UD   1.1
KKConfl8   CNAME  Chan16
KM         Confluence of Channel 15 and Subbasins 12 and 13
KO     0       0       0       0      22
```

```
HC •   3
KKChan16   CNAME  Confl8
KM         Channel Between Reservoir and Subbasins 12 and 13
KO     0       0       0       0      22
RM     5   0.305   0.009
* 1700' u/s of Hankins, a little constr.
KK Hyd14
KM         Hydrograph for Subbasin 14
KO     0       0       0       0      22
BA  1.06
LS     0      80       0
UD  0.78
KKConfl9   CNAME  Confl9
KM         Hydrograph From Channel 16 and Subbasin 14
KO     0       0       0       0      22
HC     2
KKConfl9   CNAME  Confl9
KO     0       0       0       0      22
RNConfl9
* his data file ends here, following is copied from his output
KK SipRes
RS 1 ELEV 997
SA 0 4.4 34 40 75 100 105
SE 983 997 1000.6 1004 1010 1015 1016
* remeasure of area indicates TOD and above are overestimated
SQ 0 1150 2330 4130 5620 13000 19700 27300 35700 44800
SQ 49600 54400
* 36'L weir
SE 997 1000.6 1001.6 1002.6 1004 1006 1008 1010 1012 1014
SE 1015 1016
* ST 1000.6 215
ZZ
ZZ
→
```

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            SEPTEMBER 1990             *
*             VERSION 4.0               *
*                                       *
*  RUN DATE  12/11/2000  TIME  13:06:19 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X       XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
          LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 *** FREE ***
                    *DIAGRAM
              1     ID   Sippo reservoir
              2     ID   December 2000
              3     ID
              4     ID
              5     ID   Doug and Keith
              6     IT     10       0       0     300
              7     IN     60
              8     IO      5       0
              9     JR   FLOW       1

             10     KK   Hyd1
             11     BA   0.18
             12     PB   34.5
             13     PI   0.05    0.06    0.05    0.06    0.05    0.06    0.07    0.07    0.07    0.06
             14     PI   0.07    0.06    0.09    0.08    0.09    0.08    0.09    0.08    0.12    0.12
             15     PI   0.12    0.11    0.12    0.12    0.17    0.17    0.19    0.19    0.21    0.22
             16     PI   0.39    0.43    0.49    0.56    0.66    0.77    1.34    2.30    6.31    9.96
             17     PI   2.60    1.62    0.36    0.31    0.29    0.26    0.25    0.23    0.15    0.14
             18     PI   0.15    0.15    0.14    0.15    0.10    0.09    0.10    0.10    0.10    0.10
```

```
   19          PI    0.07    0.08    0.07    0.08    0.07    0.08    0.05    0.06    0.06    0.06
   20          PI    0.06    0.06
   21          LS       0      74
   22          UD    0.44

   23          KK    Eric
   24          RS       1    ELEV  1116.5
   25          SA     3.7     3.9     4.2     6.2     8.1
   26          SE  1116.5    1118    1120    1125    1130
   27          SQ       0       3      17      40      69     600    1130
   28          SE  1116.5    1117    1118    1119    1120   1121.  1121.5
   29          ST    1120
               * 1121.5 1121

   30          KK    HYD2
   31          BA    0.42
   32          LS       0      75
   33          UD    0.65

   34          KK    Conf1
   35          HC       2

   36          KK    Ospr
   37          RS       1    ELEV    1106
   38          SA       0      27      30      40      44
   39          SE  1104.2   1106.  1108.7    1110  1112.9
   40          SQ       0      60     180     300    1240    3930
   41          SE    1106    1107    1108  1108.7    1109    1110
   42          ST  1108.7
```



```
  LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   43          KK    HYD3
   44          BA    2.19
   45          LS       0      70
   46          UD    2.26

   47          KK   Conf2
   48          HC       2

   49          KK   Cable
   50          RS       1    ELEV  1097.4
   51          SA       0     220     296   316.7     405     500
   52          SE    1080  1097.4  1099.5    1100    1103    1104
   53          SQ       0       7      14      71     242     262     347
   54          SE  1096.4    1097  1097.4    1098    1099  1099.1  1099.5
   55          ST  1099.5    1000     2.8     1.5

   56          KK   Chan5
   57          RD
   58          RC    0.06    0.05    0.06    8800   0.024    1085
   59          RX       0     100     300     465     494     500     530     800    1000
   60          RY    1085    1079    1077    1076    1069    1069    1076    1077    1080

   61          KK    HYD4
   62          BA    1.68
   63          LS       0      68
   64          UD    1.28
```

```
   65          KK    Conf3
   66          HC       2

   67          KK    Chan7
   68          RD
   69          RC    0.06    0.05    0.06    5900  0.0017    1080
   70          RX       0     100     350     460     490     500     550     700    1000
   71          RY    1080    1065    1052    1045    1033    1033    1045    1052    1075

   72          KK    HYD6
   73          BA    1.67
   74          LS       0      69
   75          UD    1.55

   76          KK    Conf4
   77          HC       2

   78          KK    HYD11
   79          BA    1.21
   80          LS       0      67
   81          UD    1.29
```



```
  LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10


   82          KK    Conf5
   83          HC       2

   84          KK    HYD8
   85          BA    3.07
   86          LS       0      75
   87          UD    1.56

   88          KK    SippoLake
   89          RS       1    ELEV    1027
   90          SA       0      88     106     126
   91          SE    1022    1027  1029.3    1036
   92          SQ       0     350    1380    4210    7150   12300   16350
   93          SE    1027  1029.3  1030.3    1031  1032.3    1033    1035
   94          ST  1029.3

   95          KK  Chan10
   96          RD
   97          RC    0.06    0.05    0.06    4100   0.003    1032
   98          RX       0     190     485     495     505     515     820     900    1000
   99          RY    1032    1024    1022    1017    1017    1022    1024    1027    1032

  100          KK    HYD9
  101          BA    1.02
  102          LS       0      67
  103          UD    1.51

  104          KK    Conf6
  105          HC       2

  106          KK    Conf7
  107          HC       2
```

```
 108          KK  Chan15
 109          RD
 110          RC    0.06    0.05    0.06    8800   0.001    1060
 111          RX       0     300     470     493     507     520     630     750    1000
 112          RY    1060    1026    1023    1017    1017    1020    1022    1037    1038

 113          KK   HYD13
 114          BA    1.15
 115          LS       0      75
 116          UD    0.72

 117          KK   HYD12
 118          BA    1.13
 119          LS       0      74
 120          UD     1.1
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 121          KK   Conf8
 122          HC       3

 123          KK  Chan16
 124          RD
 125          RC    0.06    0.05    0.06    7500   0.001    1055
 126          RX       0     220     350     470     493     505     590     700     800
 127          RY    1032    1030    1012    1012    1006    1006    1026    1034    1055

 128          KK     HYD14
 129          BA    1.06
 130          LS       0      80
 131          UD    0.78

 132          KK  Conf19
 133          HC       2

 134          KK  SipRes
 135          RS       1    ELEV     997
 136          SA       0     4.4      34      40      75     100     105
 137          SE     983     997  1000.6    1004    1010    1015    1016
 138          SQ       0    1150    2330    4130    5620   13000   19700   27300   35700   44800
 139          SQ   49600   54400
 140          SE     997  1000.6  1001.6  1002.6    1004    1006    1008    1010    1012    1014
 141          SE    1015    1016
 142          ST  1000.6
 143          ZZ
```

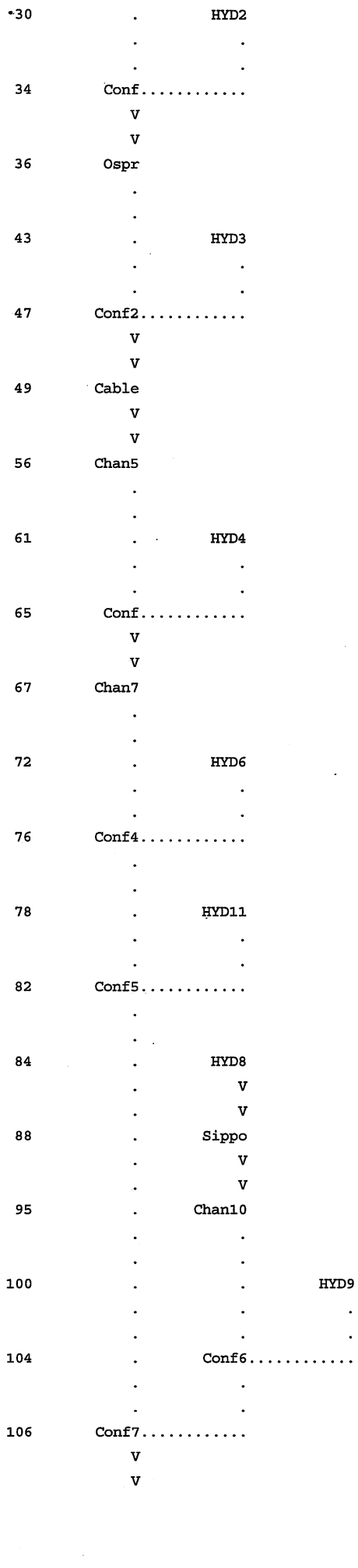
1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   10       Hyd1
              V
              V
   23       Eric
              .
              .
```


30 HYD2
34 Conf.....
36 Ospr
43 HYD3
47 Conf2.....
49 Cable
56 Chan5
61 HYD4
65 Conf.....
67 Chan7
72 HYD6
76 Conf4.....
78 HYD11
82 Conf5.....
84 HYD8
88 Sippo
95 Chan10
100 HYD9
104 Conf6.....
106 Conf7.....

```
108      Chan15
              .
              .
113           .       HYD13
              .           .
              .           .
117           .           .       HYD12
              .           .           .
              .           .           .
121       Conf8.......................
              V
              V
123      Chan16
              .
              .
128           .         HYD
              .           .
              .           .
132      Conf19............
              V
              V
134      SipRes

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                 *****************************************
*                                       *                 *                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                 *    U.S. ARMY CORPS OF ENGINEERS       *
*            SEPTEMBER 1990             *                 *    HYDROLOGIC ENGINEERING CENTER      *
*             VERSION 4.0               *                 *          609 SECOND STREET            *
*                                       *                 *       DAVIS, CALIFORNIA 95616         *
*  RUN DATE  12/11/2000  TIME  13:06:19 *                 *           (916) 756-1104              *
*                                       *                 *                                       *
*****************************************                 *****************************************
```

Sippo reservoir
December 2000

Doug and Keith

```
  8 IO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                      NMIN          10  MINUTES IN COMPUTATION INTERVAL
                     IDATE       1    0  STARTING DATE
                     ITIME         0000  STARTING TIME
                        NQ          300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE       3    0  ENDING DATE
                    NDTIME         0150  ENDING TIME
                    ICENT           19  CENTURY MARK

                  COMPUTATION INTERVAL      .17 HOURS
                       TOTAL TIME BASE   49.83 HOURS
```

```
      ENGLISH UNITS
           DRAINAGE AREA          SQUARE MILES
           PRECIPITATION DEPTH    INCHES
           LENGTH, ELEVATION      FEET
           FLOW                   CUBIC FEET PER SECOND
           STORAGE VOLUME         ACRE-FEET
           SURFACE AREA           ACRES
           TEMPERATURE            DEGREES FAHRENHEIT

  JP          MULTI-PLAN OPTION
                    NPLAN           1  NUMBER OF PLANS

  JR          MULTI-RATIO OPTION
                  RATIOS OF RUNOFF
                 1.00
***** WARNING *****   DEPTH ITERATION DID NOT CONVERGE AFTER 20 TRILES
***** WARNING *****   DEPTH ITERATION DID NOT CONVERGE AFTER 20 TRILES
***** WARNING *****   DEPTH ITERATION DID NOT CONVERGE AFTER 20 TRILES
***** WARNING *****   DEPTH ITERATION DID NOT CONVERGE AFTER 20 TRILES
***** WARNING *****   DEPTH ITERATION DID NOT CONVERGE AFTER 20 TRILES
***** WARNING *****   DEPTH ITERATION DID NOT CONVERGE AFTER 20 TRILES
***** WARNING *****   DEPTH ITERATION DID NOT CONVERGE AFTER 20 TRILES
***** WARNING *****   DEPTH ITERATION DID NOT CONVERGE AFTER 20 TRILES
1

           PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                            FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                           TIME TO PEAK IN HOURS


                                                         RATIOS APPLIED TO FLOWS
OPERATION       STATION    AREA    PLAN           RATIO 1
                                                     1.00

HYDROGRAPH AT
+                 Hyd1       .18      1   FLOW       1150.
                                          TIME       40.00

ROUTED TO
+                 Eric       .18      1   FLOW       1140.
                                          TIME       40.17

                                     ** PEAK STAGES IN FEET **
                                      1   STAGE    1121.51
                                          TIME       40.17

HYDROGRAPH AT
+                 HYD2       .42      1   FLOW       2522.
                                          TIME       40.17

 2 COMBINED AT
+                 Conf       .60      1   FLOW       3662.
                                          TIME       40.17

ROUTED TO
+                 Ospr       .60      1   FLOW       3560.
                                          TIME       40.33

                                     ** PEAK STAGES IN FEET **
```

			1	STAGE	1109.86
				TIME	40.33
HYDROGRAPH AT					
+	HYD3	2.19	1	FLOW	7961.
				TIME	41.67
2 COMBINED AT					
+	Conf2	2.79	1	FLOW	9448.
				TIME	40.83
ROUTED TO					
+	Cable	2.79	1	FLOW	8724.
				TIME	42.00

** PEAK STAGES IN FEET **

			1	STAGE	1101.51
				TIME	42.00
ROUTED TO					
+	Chan5	2.79	1	FLOW	8732.
				TIME	42.17
HYDROGRAPH AT					
+	HYD4	1.68	1	FLOW	7973.
				TIME	40.67
2 COMBINED AT					
+	Conf	4.47	1	FLOW	15752.
				TIME	40.83
ROUTED TO					
+	Chan7	4.47	1	FLOW	14314.
				TIME	41.50
HYDROGRAPH AT					
+	HYD6	1.67	1	FLOW	7312.
				TIME	41.00
2 COMBINED AT					
+	Conf4	6.14	1	FLOW	21060.
				TIME	41.33
HYDROGRAPH AT					
+	HYD11	1.21	1	FLOW	5701.
				TIME	40.67
2 COMBINED AT					
+	Conf5	7.35	1	FLOW	25924.
				TIME	41.17
HYDROGRAPH AT					
+	HYD8	3.07	1	FLOW	13647.
				TIME	41.00
ROUTED TO					
+	Sippo	3.07	1	FLOW	13001.
				TIME	41.33

** PEAK STAGES IN FEET **

			1	STAGE	1033.35
				TIME	41.33
ROUTED TO					
+	Chan10	3.07	1	FLOW	12976.
				TIME	41.50
HYDROGRAPH AT					
+	HYD9	1.02	1	FLOW	4483.
				TIME	40.83
2 COMBINED AT					
+	Conf6	4.09	1	FLOW	17117.
				TIME	41.17
2 COMBINED AT					
+	Conf7	11.44	1	FLOW	43042.
				TIME	41.17
ROUTED TO					
+	Chan15	11.44	1	FLOW	41243.
				TIME	41.67
HYDROGRAPH AT					
+	HYD13	1.15	1	FLOW	6715.
				TIME	40.17
HYDROGRAPH AT					
+	HYD12	1.13	1	FLOW	5789.
				TIME	40.50
3 COMBINED AT					
+	Conf8	13.72	1	FLOW	47421.
				TIME	41.50
ROUTED TO					
+	Chan16	13.72	1	FLOW	45868.
				TIME	41.83
HYDROGRAPH AT					
+	HYD	1.06	1	FLOW	6134.
				TIME	40.33
2 COMBINED AT					
+	Conf19	14.78	1	FLOW	48072.
				TIME	41.67
ROUTED TO					
+	SipRes	14.78	1	FLOW	47514.
				TIME	42.00
			** PEAK STAGES IN FEET **		
			1	STAGE	1014.57
				TIME	42.00

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

						INTERPOLATED TO COMPUTATION INTERVAL			
ISTAQ	ELEMENT	DT	PEAK	TIME TO	VOLUME	DT	PEAK	TIME TO	VOLUME

		PEAK				PEAK			
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .00									
Chan5	MANE	10.00	8732.17	2530.00	24.62	10.00	8732.17	2530.00	24.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3729E+04 EXCESS= .0000E+00 OUTFLOW= .3669E+04 BASIN STORAGE= .2002E+02 PERCENT ERROR= 1.1

FOR PLAN = 1 RATIO= .00									
Chan7	MANE	10.00	14314.00	2490.00	26.15	10.00	14314.00	2490.00	26.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6282E+04 EXCESS= .0000E+00 OUTFLOW= .6243E+04 BASIN STORAGE= .4389E+02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00									
Chan10	MANE	10.00	12976.31	2490.00	28.85	10.00	12976.31	2490.00	28.85

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4745E+04 EXCESS= .0000E+00 OUTFLOW= .4728E+04 BASIN STORAGE= .2145E+02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00									
Chan15	MANE	10.00	41243.26	2500.00	27.45	10.00	41243.26	2500.00	27.45

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1702E+05 EXCESS= .0000E+00 OUTFLOW= .1677E+05 BASIN STORAGE= .2265E+03 PERCENT ERROR= .2

FOR PLAN = 1 RATIO= .00									
Chan16	MANE	10.00	45868.25	2510.00	27.57	10.00	45868.25	2510.00	27.57

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2048E+05 EXCESS= .0000E+00 OUTFLOW= .2020E+05 BASIN STORAGE= .2043E+03 PERCENT ERROR= .4

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION Eric
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1116.50	1120.00	1120.00
STORAGE	0.	14.	14.
OUTFLOW	0.	69.	69.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1121.51	1.51	21.	1140.	6.50	40.17	.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION Ospr
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1106.00	1108.70	1108.70

STORAGE	16.	93.	93.
OUTFLOW	0.	300.	300.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1109.86	1.16	133.	3560.	5.33	40.33	.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION Cable
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1097.40	1099.50	1099.50
STORAGE	1276.	1816.	1816.
OUTFLOW	14.	347.	347.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1101.51	2.01	2478.	8724.	11.00	42.00	.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION Sippo
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1027.00	1029.30	1029.30
STORAGE	147.	369.	369.
OUTFLOW	0.	350.	350.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1033.35	4.05	822.	13001.	14.67	41.33	.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION SipRes
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	997.00	1000.60	1000.60
STORAGE	21.	81.	81.
OUTFLOW	0.	1150.	1150.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1014.57	13.97	940.	47514.	16.50	42.00	.00

*** NORMAL END OF HEC-1 ***

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: Jim Seikel, 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:
CONSTRUCTED BY:
COMPLETED: PLANS AVAILABLE: NO AT:
FAILURE/INCIDENT/BREACH:

STRUCTURE INFORMATION

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

EMBANKMENT DATA
LENGTH (ft) : 215
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-IN-DIAMETER GATE VALVE
PRINCIPAL: 36-FT-WIDE WEIR

EMERGENCY: NONE
MAXIMUM TOTAL SPILLWAY DISCHARGE (cfs): 753
DESIGN FLOOD: PMF FLOOD CAPACITY: N/A

DAM & RESERVOIR DATA

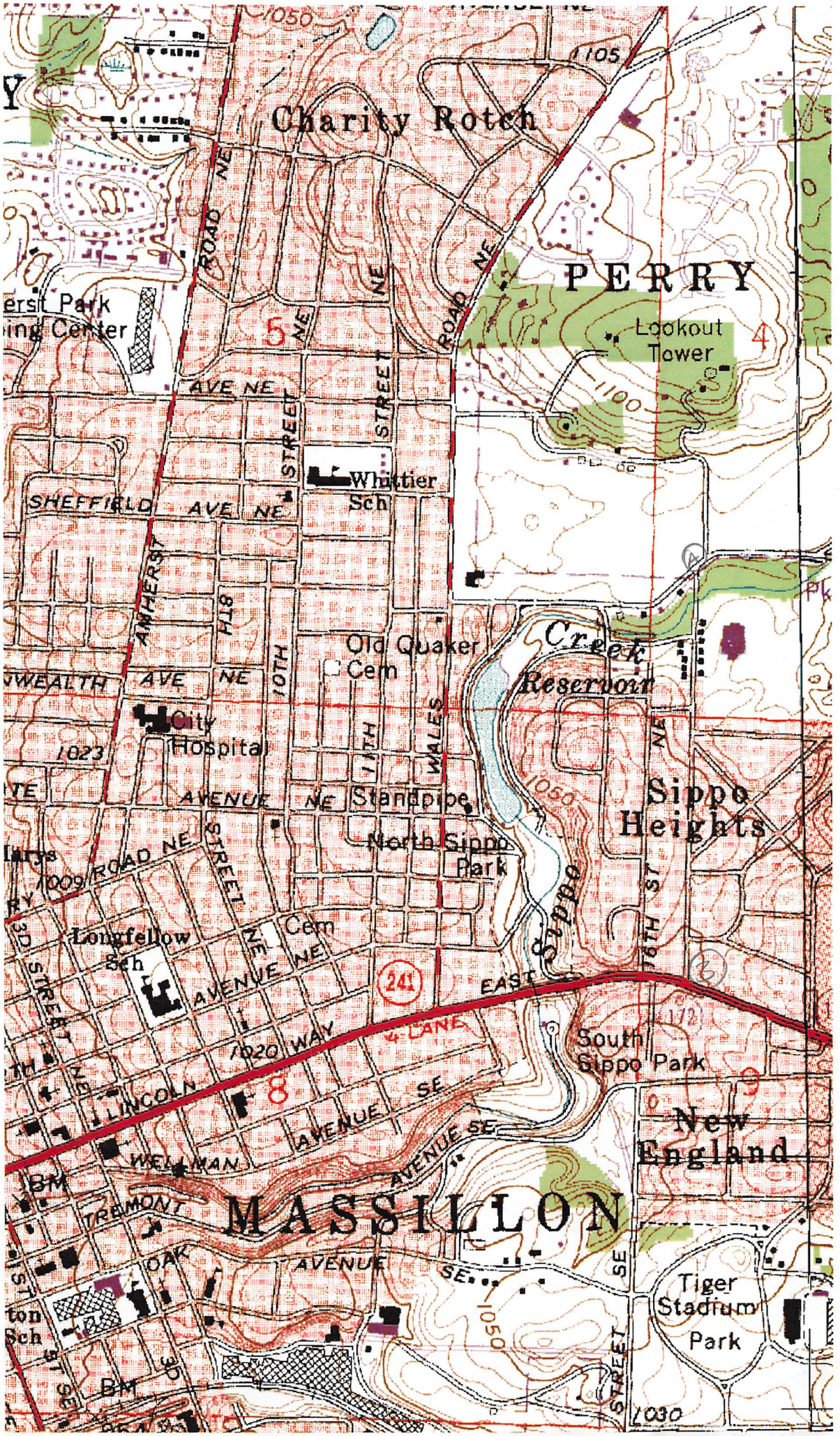
	ELEVATION(ft-MSL)	AREA(acres)	STORAGE(acre-feet)
FOUNDATION (CUTOFF):			
STREAMBED :	981.7		
PRINCIPAL SPILLWAY :	997.0	4.4	21.7
EMERGENCY SPILLWAY :			
TOP OF DAM :	1000.6	34.0	82.5

INSPECTION INFORMATION

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

OPERATION INFORMATION/REMARKS:

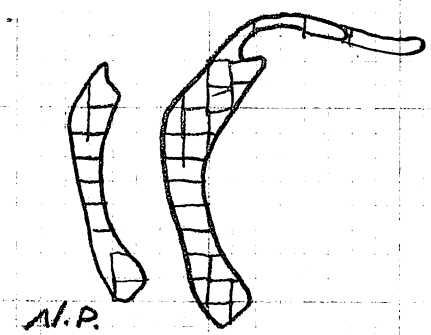
EMERGENCY ACTION PLAN: NO FORMAT: NPDP INCIDENT ID:
ANNUAL FEE: $ EXEMPT LAST DATA ENTRY: 9/24/96



3100FT. A→B

3.1 IN A→B

∴ 1 IN = 1000 FT



EACH SQUARE IS $\frac{1}{8}$" = 0.125 IN SQU

∴ 125 FT * 125 FT = 15625

@ N.P. 997 $\quad \frac{11.5 * 15625}{43560} = 4.1 \text{ AC}$

@ 1000 $\quad \frac{24.5 * 15625}{43560} = 8.8 \text{ AC}$

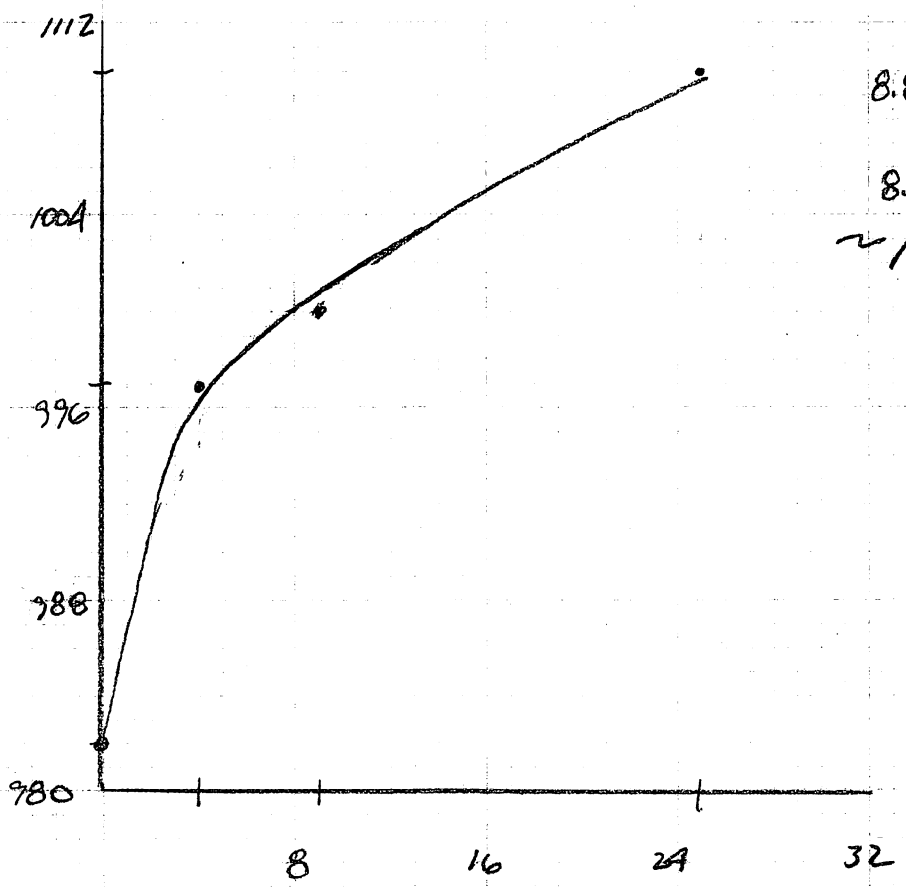
@ 1010

$$\frac{63 * 15625 + 100 * 1000}{43560} = 25 \text{ AC}$$

100' * 1000'
ON NEXT PAGE

U/S TO ℄ @ 982

33
30
63



$$8.8 + \left(\frac{0.6}{10}\right) * (25 - 8.8)$$

(0.06) (16.2)

8.8 + 1

≈ 10

DAM INVENTORY SHEET

NAME: LAKE O'SPRINGS DAM
RESERVOIR:

FILE NO: 0613-014
NATIONAL #: OH00237
PERMIT NO: N/A
CLASSIFICATION:EXEMPT

OWNER INFORMATION

OWNER: Lake O'Springs, Inc. OWNER TYPE: PRIVATE
ADDRESS1: 6350 Lake O'Springs Avenue, NW PARCEL NO:
ADDRESS2:
ADDRESS3:
CITY: Canton STATE: OH ZIP+4:44718
CONTACT PERSON: Bill Thomas TELEPHONE: 330/499-3726

LOCATION INFORMATION

COUNTY: STARK LATITUDE Deg: 40 Min: 52 Sec: 18
TOWNSHIP: JACKSON LONGITUDE Deg: 81 Min: 27 Sec: 20
STREAM: TRIBUTARY TO SIPPO CREEK
NEAREST AFFECTED COMMUNITY: PERRY HEIGHTS
COMMUNITY'S DISTANCE FROM DAM (miles):
USGS QUAD: CANTON WEST USGS BASIN NO: 05040001

DESIGN/CONSTRUCTION INFORMATION

DESIGNED BY:
CONSTRUCTED BY:
COMPLETED: 1948 PLANS AVAILABLE: AT:
FAILURE/INCIDENT/BREACH:

STRUCTURE INFORMATION

PURPOSE OF DAM: RECREATION, PRIVATE
TYPE OF IMPOUNDMENT: DAM AND SPILLWAY
TYPE OF STRUCTURE: EARTHFILL
DRAINAGE AREA (sq.miles): .82 or (acres): 522

EMBANKMENT DATA

LENGTH (ft)	1800	UPSTREAM SLOPE	2H:1V
MAX. HEIGHT (ft)	5.5	DOWNSTREAM SLOPE	5H:1V
TOP WIDTH (ft)	10	VOLUME OF FILL (cu.yds.)	13000

SPILLWAY & OUTLET WORKS DATA
LAKE DRAIN:
PRINCIPAL: 19.5-FT WIDE SHARP-CRESTED WEIR

EMERGENCY:
MAXIMUM TOTAL SPILLWAY DISCHARGE (cfs):
DESIGN FLOOD: 0.50 PMF FLOOD CAPACITY:

DAM & RESERVOIR DATA

	ELEVATION(ft-MSL)	AREA(acres)	STORAGE(acre-feet)
FOUNDATION (CUTOFF)			
STREAMBED	1103.2		
PRINCIPAL SPILLWAY	1106.0	27.0	7.5
EMERGENCY SPILLWAY			
TOP OF DAM	1108.7	30.0	84.5

INSPECTION INFORMATION

LAST INSPECTION (mon/day/yr): 8/28/91 INSPECTOR: AST
PHASE I:
PRIOR INSPECTIONS: 5/29/74
OTHER SITE VISITS:

OPERATION INFORMATION/REMARKS:

EMERGENCY ACTION PLAN: FORMAT: NPDP INCIDENT ID:
ANNUAL FEE: $ EXEMPT LAST DATA ENTRY: 9/12/91

DAM INVENTORY SHEET

NAME: LAKE ERIC DAM
FILE NO: 0613-020
NATIONAL #:
RESERVOIR:
PERMIT NO: N/A
CLASSIFICATION:UNCLASS

OWNER INFORMATION

OWNER: G. & B. Ericksen
OWNER TYPE: PRIVATE
ADDRESS1: 5858 Clermont, N.W.
PARCEL NO:
ADDRESS2:
ADDRESS3:
CITY: Canton
STATE: OH
ZIP+4:44718
CONTACT PERSON:
TELEPHONE:

LOCATION INFORMATION

COUNTY: STARK
LATITUDE Deg: 40 Min: 52 Sec: 30
TOWNSHIP: JACKSON
LONGITUDE Deg: 81 Min: 27 Sec: 24
STREAM: TRIBUTARY TO SIPPO CREEK
NEAREST AFFECTED COMMUNITY:
COMMUNITY'S DISTANCE FROM DAM (miles):
USGS QUAD: CANTON WEST
USGS BASIN NO: 05040001

DESIGN/CONSTRUCTION INFORMATION

DESIGNED BY:
CONSTRUCTED BY:
COMPLETED: PLANS AVAILABLE: AT:
FAILURE/INCIDENT/BREACH:

STRUCTURE INFORMATION

PURPOSE OF DAM: RECREATION, PRIVATE
TYPE OF IMPOUNDMENT: DAM AND SPILLWAY
TYPE OF STRUCTURE: EARTHFILL
DRAINAGE AREA (sq.miles): .03 or (acres): 16

EMBANKMENT DATA

LENGTH (ft)	: 400	UPSTREAM SLOPE	:
MAX. HEIGHT (ft)	: 12.0	DOWNSTREAM SLOPE	: 2H:1V
TOP WIDTH (ft)	:	VOLUME OF FILL (cu.yds.)	:

SPILLWAY & OUTLET WORKS DATA
LAKE DRAIN:
PRINCIPAL: 3-FT WIDE CONCRETE CHUTE

EMERGENCY:
MAXIMUM TOTAL SPILLWAY DISCHARGE (cfs):
DESIGN FLOOD: FLOOD CAPACITY:

DAM & RESERVOIR DATA

	ELEVATION(ft-MSL)	AREA(acres)	STORAGE(acre-feet)
FOUNDATION (CUTOFF)	:		
STREAMBED	: 1108.0		
PRINCIPAL SPILLWAY	: 1116.5	: 3.7	: 10.5
EMERGENCY SPILLWAY	:	:	:
TOP OF DAM	: 1120.0	: 4.2	: 22.3

INSPECTION INFORMATION

LAST INSPECTION (mon/day/yr): 5/29/74
INSPECTOR:
PHASE I:
PRIOR INSPECTIONS:
OTHER SITE VISITS:

OPERATION INFORMATION/REMARKS:

SHOWN AS LAKE SLAGLE ON THE USGS MAP

EMERGENCY ACTION PLAN:
FORMAT:
NPDP INCIDENT ID:
ANNUAL FEE: $ EXEMPT
LAST DATA ENTRY: 12/19/89