

A photograph of a dam with a walkway and a waterfall. The dam is made of concrete and has a metal railing on top. Water is flowing over the dam, creating a waterfall. The background is a dense forest of green trees under a blue sky with some clouds. The foreground shows a concrete walkway with a metal railing.

Dams & Dam Safety

Presenters:

Rich Graham, P.E.

Steve Roznowski, P.E.



Agenda

- Introduction
- Overview of Dams in Michigan
- Regulatory Framework
- Inspections
- Operation
- Repairs/Maintenance
- Key Issues & Challenges
- Recommendations



Lake Bel Air Dam – Hillsdale County

Introduction

- What Classifies as a Dam?
 - Artificial Barrier
 - Embankments and Appurtenant Works
 - Impounds or Diverts Water or Other Liquid
- Purpose & Role of Dams:
 - Recreation
 - Water Control
 - Generate Electricity
 - Water Supply
 - Irrigation



Grand Coulee Dam – Spokane, Washington
Courtesy of Popular Mechanics

Overview - National

- Over 91,000 dams in the US
 - 56% privately owned
 - 20% local municipality
 - 4.8% State
 - 4.7% Federal
 - Remaining dams are divided between a variety of owners
- Average age 57 years
- 81% of high-hazard dams have EAP
- \$5,100 - Average dam safety budget per regulated high hazard potential dam
- 3% of dams are a source of hydroelectric energy
- 2021 ASCE U.S. Report Card Dam Infrastructure Rating: D



Flook Dam – Washtenaw County

Overview - Michigan

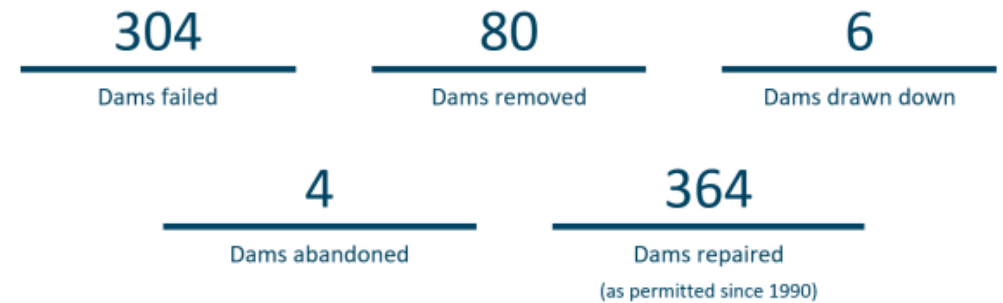
- 2,600 dams in the state of Michigan
 - 1,060 regulated by State of Michigan (Part 307 & 315)
 - 825 Part 315 Dams
 - 235 Part 307 Dams
 - 730 privately owned
 - 330 publicly owned
 - 90 hydroelectric dams regulated by FERC
 - 1,450 unregulated



Edenville Dam – Midland Daily News

Overview - Michigan

- 290 dams are over 100 years old
- 12% of dams have a “high” or “significant” hazard rating
- 67% of dams have reached their intended 50-year design life



2021 Michigan Dam Safety Task Force Report

Regulatory Framework for Dams in Michigan



Association of State Dam Safety Officials (ASDSO)



Federal Energy Regulatory Commission (FERC)



MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

EGLE

Michigan Dam Safety Task Force

EGLE

Part 307

Lake Level Control Inspection

Lake Levels

Part 315

Dam Inspection

Emergency Action Plan

Who is ASDSO?

Association of State Dam Safety Officials

- ASDSO's Mission is to Improve the Condition and Safety of Dams Through Education, Support for State Dam Safety Programs, and Fostering a Unified Dam Safety Community.
- National Organization Established in 1984
- Hosts Annual National Conference
 - September 17th to 21st, 2023- Palm Springs, CA
- Members Include:
 - Federal and State Agencies
 - Private Owners
 - Contractors
 - Consultants
 - Academic



Support state dam safety programs

Develop a cohesive and engaged community committed to the ASDSO mission.

Advance and expand the technical expertise of dam and levee safety practitioners

Promote innovative approaches to funding dam rehabilitation at the state and federal level

Increase public awareness of the role of dams in society, the risks they present and the importance of dam safety and preparedness

Advocate for laws, policies and government programs that serve to improve the safety of dams and reduce the risk to the public

Strengthen and support a coordinated effort to improve the safety of levees



Tyler Dam— Washtenaw County

Federal Energy Regulatory Commission (FERC)

- Regulate interstate transmission of electricity, natural gas, oil, hydropower projects, and natural gas terminals.
- Oversee over 2,500 dams used for hydropower
 - Compliance of hydroelectric dams with Federal Power Act of 1920, FERC regulations, and terms and conditions of hydroelectric dams licenses or exemptions
 - Regulates both construction and operational phase of dam projects and dam inspections
 - Hydropower dams must have an approved FERC license to produce electricity



Sunset Lake Dam– Kalamazoo County

Michigan Dam Safety Task Force

- 21 Appointed Members
- Formed on August 31, 2020
- Provide Michigan perspective in order to build upon the recommendations contained in the Association of State Dam Safety Officials (ASDSO) report.
- 15 working group meetings and one public comment session
- Final Report Released February 12th, 2021
 - 86 different recommendations across eight (8) topics:
 - Funding for Dam Maintenance, Repair, and Removal
 - Legislation and Authority
 - Improving Dam Safety
 - Compliance and Enforcement
 - Emergency Response
 - Program Management, Funding, and Budgeting
 - Safety and Security at Dams
 - Outreach and Awareness

Regulatory Framework for Dams in Michigan



Association of State Dam Safety Officials (ASDSO)



Federal Energy Regulatory Commission (FERC)



MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

EGLE

Michigan Dam Safety Task Force

EGLE

Part 307

Lake Level Control Inspection

Lake Levels

Part 315

Dam Inspection

Emergency Action Plan



Lake Somerset – Hillsdale County

Part 307 - Inland Lakes Introduction

- NREPA Part 307 — Inland Lake Levels (MCL 324.30701 et seq.)
- Outlines a process for a circuit court to set a binding “normal” lake level on an inland lake in Michigan
- What is a “normal” lake level? – the level a lake should be under normal circumstances, as established by a circuit court order under Part 307
 - Heavy rain, drought, or other unusual circumstances may cause this level to vary
 - May be seasonal, meaning a single lake has a different “normal” level for summer and winter
- Managed by Delegated Authority
- Inspections required every 3 years



Lake Contos– Gladwin County

Part 315 – Dam Safety Introduction

NREPA Part 315 — Dam Safety (MCL 281.1301 et seq.)

- Defines “Dam” as follows: –
 - “...an artificial barrier, including dikes, embankments, and appurtenant works, that impounds, diverts, or is designed to impound or divert water or a combination of water and any other liquid or material in the water; that is or will be when complete 6 feet or more in height; and that has or will have an impounding capacity at design flood elevation of 5 surface acres or more...”



Secord Dam – Gladwin County

Part 315 – Dam Safety EGLE

EGLE has regulatory oversight and is responsible for:

- Inspection of state-owned dams and dams owned by local units of government
- Review dam construction or reconstruction plans
- Review safety reports, including inspection reports, prepared by professional engineers and submitted by private or municipal dam owners
- Perform compliance activities as necessary to enforce the law
- Respond to dam safety emergencies



Baw Beese Lake Dam – Hillsdale County

Part 315 – Dam Safety Hazard Rating and Inspection

- High - Failure may cause serious damage to inhabited homes, main highways, or railroads, or where environmental degradation would be significant, or where danger to individuals exists with the potential for loss of life.
- Significant - Failure may cause damage limited to isolated inhabited homes, agricultural buildings, structures, secondary highways, short line railroads, or public utilities, where environmental degradation may be significant, or where danger to individuals exists
- Low - Failure may cause damage limited to agriculture, uninhabited buildings, structures, or township or county roads, where environmental degradation would be minimal, and where danger to individuals is slight or nonexistent.



Saline River Dam– Washtenaw County

Inspection

Part 307: Lake Level Control Structures

- Every 3 years

Part 315: Dams

- High Hazard – Every 3 years
- Significant Hazard – Every 4 years
- Low Hazard – Every 5 years



MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
 WATER RESOURCES DIVISION
DAM INSPECTION REPORT

This form is to be used for inspection reports required by Part 307, Inland Lake Levels, for those dams that do not meet the size criteria as defined by Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Dams six (6) feet or more in height, as defined by Part 315, and impounding five (5) acres or more at the design flood elevation, must meet the inspection report format as outlined in Section 31518 of Part 315.

A person failing to comply, or falsely representing dam conditions, is guilty of misconduct in office.

Dam Name: _____ County: _____

Dam ID: _____ Name of Waterbody: _____

Date of Inspection: _____ Level this date: _____

Section: _____ Town: _____ Range: _____

Date elevation set by Court: _____ Legal level: _____

Drawdown level: _____ High water make elevation: _____

EARTH EMBANKMENTS (LOOKING DOWNSTREAM)

Left Embankment: _____ ft. Right Embankment: _____ ft. Total Length: _____ ft.

	UPSTREAM	CROWN	DOWNSTREAM
VEGETATIVE COVER			
EROSION			
SEEPAGE			
SLIDES, SLUMPS, & CRACKS			
ANIMAL BURROWS			
WAVE ACTION PROTECTION			
REMARKS*			

Inspection – Part 307

- Conducted by a Licensed Professional Engineer
- Evaluation of Dam’s Structural Condition
- Legal Lake Level
- Hazard potential classification
- Make recommendations as necessary to meet safety standards
- Assign an overall condition assessment

Inspection – Part 315

- Conducted by a Licensed Professional Engineer
- Owner & operator information
- Hazard potential classification
- Purpose of the dam
- Evaluation of dam's structural condition
- Evaluation of dam's spillway capacity
- Identification of any deficiencies
- Make recommendations as necessary to meet safety standards
- Prioritization of recommendations to address deficiencies
- Assign an overall condition assessment
- Reference to past inspection reports
- Evaluation of current maintenance plan
- Assessment operating equipment
- Photographs of dam, downstream channel, and deficiencies cited

Broucek Dam Inspection Report

Dam Identification No.: 2371
Hazard Potential: Low
Section 11, T.04S-R.03E
Manchester Township, Washtenaw County, Michigan
Tributary to River Raisin
Per Part 315, Act 451 of 1994



Prepared for:

Eddie and Sheryl Harmon
38422 Webb Drive
Westland, MI 48185
(734) 487-5555
sheryl@ncservo.com

Prepared by:

Spicer Group, Inc.
125 Helle Boulevard #2
Dundee, Michigan 48131
(734) 823-3308

Inspected by:

Richard V. Graham III P.E. #62039

A circular professional engineer seal for the State of Michigan. The seal contains the text: "STATE OF MICHIGAN", "RICHARD VADE GRAHAM, III", "PROFESSIONAL ENGINEER", "No. 6201062039". There is a signature over the seal.

Date of Inspection: March 22, 2022
Date of Report: May 25, 2022



Lake LeeAnn North Dam – Hillsdale County

Inspection Methodologies

- Visual Inspection on Site
- Office Research into Historical Files and Documents
- Underwater ROV
- GoPro Camera
- ArcGIS Mapping

Dam Inspection



Dam Inspection



Horseshoe Lake Dam– Washtenaw County

Operation

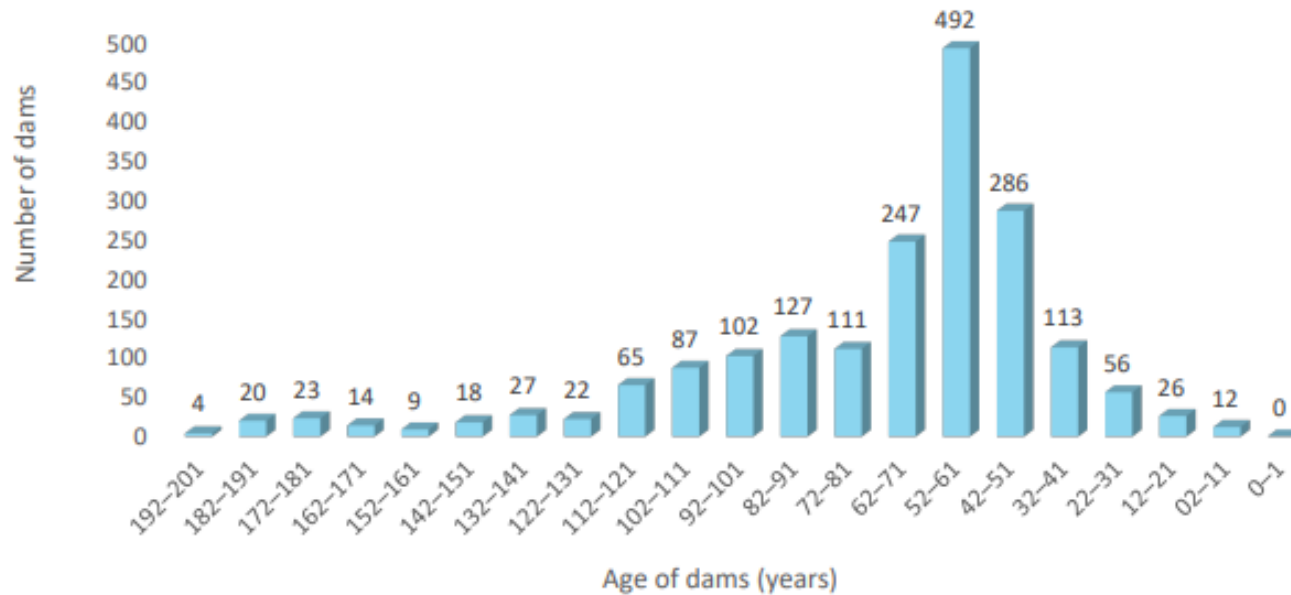
- Each lake level control structure and dam is operated and maintained differently
- Some structures do not need to be operated
- Some structures need to be operated multiple times per day



Repairs/Maintenance

- Maintenance requirements also greatly vary based upon the type, use, and location of the structure
- Recommended repairs and maintenance is identified in the Inspection Report and in the Operation and Maintenance Plan

EXHIBIT 1. Michigan Dams by Age



Note: Per data from EGLE, which only has records on 1,861 of the approximately 2,600 dams in Michigan.

Key Issues & Challenges

- Aging infrastructure



Cedar Lake Dam – Alcona County

Key Issues & Challenges

- Lack of Maintenance



Pleasant Lake Dam – Hillsdale County

Key Issues & Challenges

- Changing weather patterns



Tecumseh Dam – Lenawee County

Key Issues & Challenges

- Limited Funding



Susin Lake Dam – Oakland County

Key Issues & Challenges

- Increased Development



Sanford Dam – CBS News, TC Vortex via Reuters

Key Issues & Challenges

- Dam Failure Risks
 - Property Damage
 - Loss of Life
 - Environmental Damage



Flook Dam – Washtenaw County

Recommendations

- County Officials Assistance & Support
 - Public Outreach
 - Education
 - Funding
 - Dam safety awareness seminars
- Regular inspections, maintenance, upgrades
- Conversion of Private Dams to Part 307



Ribeck Mead and Tuner Dam – Hillsdale County

Part 307 - Inland Lakes Benefits

- Convert existing lake level control structure to public infrastructure
- Repair/upgrade/maintain a lake level control structure on an existing lake
- Establish a special assessment district to pay for repairs, upgrades, and maintenance
- Enhance a lake's recreational value and to maintain property values
- Part 307 Authorized Reasons (MCL 324.30701(h))
 - Provide most benefit to public
 - Best protect the public, health, safety, and welfare
 - Preserve the natural resources of the State
 - Best preserve and protect property values

Private Dams to County Ownership

1.) Motion by County Board of Commissioners OR Property Owner Petition

2.) Lake Level Study & Special Assessment District

3.) File Lake Level Petition in Circuit Court and Provide Notice

4.) Circuit Court Hearing

5.) Project Planning, Separate Special Assessment Hearing, and Approval of Roll

6.) Continuing Maintenance of Lake Level Infrastructure





Iron Mill Pond – Washtenaw County

Take Aways

- Inspect your Dams!
- Dams are Aging
- Planning for Changing Regulations
- Planning for Capital Improvements
- Part 307 for Unmanaged Private Dams
- Public Outreach Regarding Dams and Dam Safety

Questions?

Rich Graham, P.E.

(248) 495-2927

RichG@spicergroup.com

Steve Roznowski, P.E.

(989) 415-3317

SteveR@spicergroup.com