--SAWMILL POND DAM --

PHASE I

INSPECTION / EVALUATION REPORT

Dam Name:	SAWMILL POND DAM
National ID No.:	MA00098
Owner:	TOWN OF BROOKFIELD, MA
Town:	BROOKFIELD, MA
Consultant:	LENARD ENGINEERING, INC.
Date of Inspection:	JULY 20, 2021

EXECUTIVE SUMMARY

Representatives of Lenard Engineering, Inc. visually inspected Sawmill Pond Dam, Brookfield, MA on July 20, 2021. The Sawmill Pond Dam is currently classified as an **Intermediate** size structure with a **Significant (Class II)** hazard classification. In general, Saw Mill Pond Dam was found to be in FAIR condition with the following deficiencies:

- The low level outlet gate requires manual lifting by a hoist or equipment. Lifting the gate would require someone to attach a hoist to the gate in the water. During an emergency in flood conditions, this may not be feasible;
- Right upstream stone masonry wall is missing stones at its base and is leaning outward toward the impoundment;
- Missing cap stones along the left stone masonry wall;
- Minor debris within spillway opening.

The following modifications to the dam were completed in 2015 in response to the DCR Dam Safety Order dated December 1, 2011:

- Bank and slope stabilization of the downstream dam embankment and the downstream channel slopes;
- Replaced two catch basins on the upstream side of Lake Road with two new catch basins. Installed two new catch basins on the downstream side of Lake Road; Redirected street drainage to downstream side of the dam;
- Extended the bridge's concrete end posts on both the left and right downstream side;
- Replaced guardrail with new guardrail on the downstream side;
- Installed new bituminous concrete curbing on both the upstream and downstream sides of the road.

In addition, the roadway asphalt surface has been replaced since the last inspection in 2016.

Lenard Engineering, Inc. recommends the following actions be taken to address the deficiencies observed or found at the dam during this inspection and evaluation. These recommendations may require design by a professional engineer and construction by a contractor experienced in dam repair. A Chapter 253 permit may be required.

- Regularly mow the dam embankments;
- Fill low spots, ruts, sinkholes, areas of erosion, and runoff with suitable fill. Reseed areas of thin vegetation with grassy cover;
- Remove debris from all outlets and downstream channels;
- Replace cap stones along left stone masonry wall;
- Evaluate the condition of the low level outlet and repair/replace the low level outlet and controls as necessary;
- Repair/replace right upstream stone masonry wall.
- Install public safety fences and signs as described in Section 2.5.

Dam Evaluation Summary Detail Sheet

1. NID ID:	**MA00098**	**4. Inspection Date:**	**July 20, 2021**
2. Dam Name:	**Sawmill Pond Dam**	**5. Last Insp. Date:**	**March 1, 2016**
3. Dam Location:	**Brookfield, MA**	**6. Next Inspection:**	**July 20, 2026**
7. Inspector:	**Douglas W. Bush, P.E.**		
8. Consultant:	**Lenard Engineering, Inc.**		
9. Hazard Code:	**Significant**	**9a. Is Hazard Code Change Requested?:**	**No**
10. Insp. Frequency:	**5 Years**	**11. Overall Physical Condition of Dam:**	**FAIR**
12. Spillway Capacity (% SDF)	**>100% SDF w/ no actions by Caretaker**		

E1. Design Methodology:	**2**	**E7. Low-Level Discharge Capacity:**	**2**
E2. Level of Maintenance:	**2**	**E8. Low-Level Outlet Physical Condition:**	**1**
E3. Emergency Action Plan:	**5**	**E9. Spillway Design Flood Capacity:**	**5**
E4. Embankment Seepage:	**5**	**E10. Overall Physical Condition of the Dam:**	**3**
E5. Embankment Condition:	**4**	**E11. Estimated Repair Cost:**	**$59,000**
E6. Concrete Condition:	**4**		

Evaluation Description

E1: DESIGN METHODOLOGY
1. Unknown Design – no design records available
2. No design or post-design analyses
3. No analyses, but dam features appear suitable
4. Design or post design analysis show dam meets most criteria
5. State of the art design – design records available & dam meets all criteria

E2: LEVEL OF MAINTENANCE
1. Dam in disrepair, no evidence of maintenance, no O&M manual
2. Dam in poor level of upkeep, very little maintenance, no O&M manual
3. Dam in fair level of upkeep, some maintenance and standard procedures
4. Adequate level of maintenance and standard procedures
5. Dam well maintained, detailed maintenance plan that is executed

E3: EMERGENCY ACTION PLAN
1. No plan or idea of what to do in the event of an emergency
2. Some idea but no written plan
3. No formal plan but well thought out
4. Available written plan that needs updating
5. Detailed, updated written plan available and filed with MADCR, annual training

E4: SEEPAGE (Embankments, Foundations, & Abutments)
1. Severe piping and/or seepage with no monitoring
2. Evidence of monitored piping and seepage
3. No piping but uncontrolled seepage
4. Minor seepage or high volumes of seepage with filtered collection
5. No seepage or minor seepage with filtered collection

E5: EMBANKMENT CONDITION (See Note 1)
1. Severe erosion and/or large trees
2. Significant erosion or significant woody vegetation
3. Brush and exposed embankment soils, or moderate erosion
4. Unmaintained grass, rodent activity and maintainable erosion
5. Well maintained healthy uniform grass cover

E6: CONCRETE CONDITION (See Note 2)
1. Major cracks, misalignment, discontinuities causing leaks, seepage or stability concerns
2. Cracks with misalignment inclusive of transverse cracks with no misalignment but with potential for significant structural degradation
3. Significant longitudinal cracking and minor transverse cracking
4. Spalling and minor surface cracking
5. No apparent deficiencies

E7: LOW-LEVEL OUTLET DISCHARGE CAPACITY
1. No low level outlet, no provisions (e.g. pumps, siphons) for emptying pond
2. No operable outlet, plans for emptying pond, but no equipment
3. Outlet with insufficient drawdown capacity, pumping equipment available
4. Operable gate with sufficient drawdown capacity
5. Operable gate with capacity greater than necessary

E8: LOW-LEVEL OUTLET PHYSICAL CONDITION
1. Outlet inoperative needs replacement, non-existent or inaccessible
2. Outlet inoperative needs repair
3. Outlet operable but needs repair
4. Outlet operable but needs maintenance
5. Outlet and operator operable and well maintained

E9: SPILLWAY DESIGN FLOOD CAPACITY
1. 0 - 50% of the SDF or unknown
2. 50-90% of the SDF
3. 90 - 100% of the SDF
4. >100% of the SDF with actions required by caretaker (e.g. open outlet)
5. >100% of the SDF with no actions required by caretaker

E10: OVERALL PHYSICAL CONDITION OF DAM
1. UNSAFE – Major structural, operational, and maintenance deficiencies exist under normal operating conditions
2. POOR - Significant structural, operation and maintenance deficiencies are clearly recognized under normal loading conditions
3. FAIR - Significant operational and maintenance deficiencies, no structural deficiencies. Potential deficiencies exist under unusual loading conditions that may realistically occur. Can be used when uncertainties exist as to critical parameters
4. SATISFACTORY - Minor operational and maintenance deficiencies. Infrequent hydrologic events would probably result In deficiencies.
5. GOOD - No existing or potential deficiencies recognized. Safe performance is expected under all loading including SDF

E11: ESTIMATED REPAIR COST

Estimation of the total cost to address all identified structural, operational, maintenance deficiencies. Cost shall be developed utilizing standard estimating guides and procedures

Changes/Deviations to Database Information since Last Inspection

PREFACE

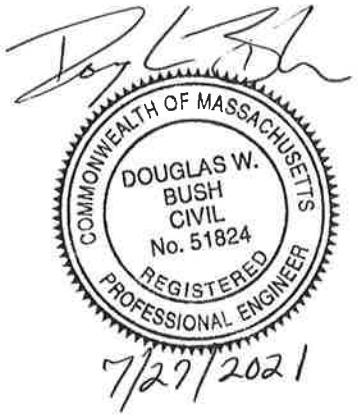
The assessment of the general condition of the dam reported herein was based upon available data and visual inspections. Detailed investigations and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations were beyond the scope of this report unless reported otherwise.

In reviewing this report, it should be realized that the reported condition of the dam was based on observations of field conditions at the time of inspection, along with data available to the inspection team.

It is critical to note that the condition of the dam depends on numerous and constantly changing internal and external conditions and is evolutionary in nature. It would be incorrect to assume that the reported condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Douglas W. Bush, P.E.
Massachusetts License No.: 51824
License Type: Civil

Civil Engineer
Lenard Engineering, Inc.



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SECTION 1

1.0 DESCRIPTION OF PROJECT

1.1 General

1.1.1 Authority

The Town of Brookfield retained Lenard Engineering, Inc. to perform a visual inspection and develop a report of conditions for the dam at the Sawmill Pond along the Trout Brook in Brookfield, Worcester County, Massachusetts. This inspection and report were performed in accordance with MGL Chapter 253, Sections 44-50 of the Massachusetts General Laws as amended by Chapter 330 of the Acts of 2002.

1.1.2 Purpose of Work

The purpose of this investigation was to inspect and evaluate the present condition of the dam and appurtenant structures in accordance with 302 CMR10.07 to provide information that will assist in both prioritizing dam repair needs and planning/conducting maintenance and operation.

The investigation was divided into four parts: 1) obtain and review available reports, investigations, and data previously submitted to the owner pertaining to the dam and appurtenant structures; 2) perform a visual inspection of the site; 3) evaluate the status of an emergency action plan for the site and, 4) prepare and submit a final report presenting the evaluation of the structure, including recommendations and remedial actions, and opinion of probable costs.

1.1.3 Definitions

To provide the reader with a better understanding of the report, definitions of commonly used terms associated with dams are provided in Appendix D. Many of these terms may be included in this report. The terms are presented under common categories associated with dams which include: 1) orientation; 2) dam components; 3) size classification; 4) hazard classification; and

1.2 Description of Project

1.2.1 Location

Sawmill Pond Dam is located in the Town of Brookfield in Worcester County, Massachusetts approximately 1.08 miles directly south of the town center. The dam is located at latitude 42.19842 North and longitude -72.10202 West (WGS 84 datum) as determined from Google Earth. Latitude and longitude are given for the intersection of the dam structure crest centerline and the primary spillway where the primary spillway abuts the dam. From the center of Brookfield, head south on State Route 148S toward Lower River Street. Take a left onto Lake Road and follow Lake Road to the intersection of Lake Road and Rice Corner Road. Parking is available on the downstream side, left of the spillway channel. The location of Sawmill Pond Dam is shown in Figure 1. An aerial photograph of the dam is provided as Figure 2.

1.2.2 Owner/Caretaker

See Table 1.1 for current owner and caretaker data (names and contact information).

1.2.3 Purpose of the Dam

Sawmill Pond Dam was originally built to supply power for a local mill. The impoundment is currently used for recreational and fire protection purposes.

1.2.4 Description of the Dam and Appurtenances

The following describes the dam and its appurtenant structures. Right and left abutments are those on respective sides of an observer looking downstream. Sawmill Pond Dam consists of three major components; the upstream and downstream embankments, the primary spillway and a 24 inch CMP low level outlet (See Figure 4).

The length of the dam including spillway is approximately 170 feet. The tallest part of the structure is at the concrete spillway structure. The structural height of the dam is approximately 11 feet. The maximum controllable water surface (hydraulic height) is approximately 6 feet.

The crest of the dam is approximately 40 feet wide total including Lake Road to the right and left, of the concrete spillway, respectively. Lake Road is located on the embankment crest with an approximate width of 30 feet with earthen shoulders accounting for the remaining crest width. Guardrails are located along the upstream and downstream shoulders. A dry hydrant is located on the upstream earthen portion of the crest to the left of the spillway. An unpaved gravel parking area/pull-off is located to the left of the bridge crossing on the downstream side of the crest.

The upstream embankment is supported by a vertical stone masonry wall to the left and right of the spillway. The downstream earthen dam embankments are sloped at approximately 14H:1V left and right of the spillway. The dam embankments meet the Trout Brook channel both left and right of the spillway. The channel slopes are protected with a layer of 18 inch blast rock down to the Trout Brook stream bed. The left downstream channel slope is sloped at approximately 2H:1V and the right downstream channel slope is sloped at approximately 2.5H:1V.

The spillway is located approximately 50 feet from the right abutment and consists of a 22.5 foot long concrete ogee weir slightly upstream of the dam embankment. Discharge from the spillway is conveyed under the bridge crossing onto a concrete spillway apron. The concrete apron extends through the entire width of the bridge where flows are discharged into Trout Brook.

The spillway was constructed with an integral low-level outlet, consisting of a 24-inch corrugated metal pipe (CMP) that protrudes through the ogee weir. The low level outlet is reportedly controlled via a gate located on the upstream side of the ogee weir within the pond. The low level outlet gate reportedly can be lifted with a piece of equipment, such as a backhoe.

1.2.5 Operations and Maintenance

No formal Operations or Maintenance Manual exist. The Town of Brookfield Highway Department is responsible for the maintenance of the dam.

1.2.6 DCR Size Classification

Sawmill Pond Dam has a height of dam of approximately 11 feet and a maximum storage capacity of 71 acre-feet. Refer to Appendix D for definitions of height of dam and storage. Therefore, in accordance with Department of Conservation and Recreation Office of Dam Safety classification, under Commonwealth of Massachusetts dam safety rules and regulations stated in 302 CMR 10.00 as amended by Chapter 330 of the Acts of 2002, Sawmill Pond Dam is an Intermediate size structure.

1.2.7 DCR Hazard Potential Classification

Sawmill Pond Dam is located where a potential breach may affect Lake Road which lies directly on top of the dam. Flow would continue along the Trout Brook where it would enter into the Quaboag River and Quaboag River Wildlife Management Area where the water level would rise prior to flowing under Fiskdale Road. It appears that a failure of the dam at maximum pool may cause loss of life and damage to home(s), industrial or commercial facilities, secondary highway(s) or railroad(s), or cause the interruption of the use or service of relatively important facilities.. Therefore, in accordance with Department of Conservation and Recreation classification procedures, under Commonwealth of Massachusetts dam safety rules and regulations stated in 302 CMR 10.00 as amended by Chapter 330 of the Acts of 2002, Sawmill Pond Dam should be classified as a Significant (Class II) hazard potential dam. The Hazard Potential Classification recommendation is consistent with the Hazard Potential Classification on record with the Office of Dam Safety for Sawmill Pond Dam.

1.3 Pertinent Engineering Data

1.3.1 Drainage Area

The drainage area for Sawmill Pond Dam is approximately 3.78 square miles and is contained in the communities of Brookfield and Sturbridge. The topography consists primarily of steep, hilly terrain, swamps, and residential neighborhoods at the northeast and southeast quadrant of the watershed. The drainage area was delineated and measured using available MassGIS mapping in AutoCAD and USGS Massachusetts StreamStats Interactive Map. The dam's drainage area is presented in Figure 3.

1.3.2 Reservoir

See Table 1.1 for data about normal, maximum, and spillway design flood (SDF) pools. These data were taken from previous inspection reports and information on file at the Office of Dam Safety. Saw Mill Pond has an estimated average depth of 2 to 3 feet.

1.3.3 Discharges at the Dam Site

No records were made available at the time of inspection.

1.3.4 General Elevations (feet), See Figure 4

A.	Top of Dam	615.15± ft
B.	Spillway Design Flood Pool	Unknown
C.	Normal Pool	611.18± ft
D.	Spillway Crest	611.18± ft
E.	Upstream Water at Time of Inspection	611.48± ft
F.	Downstream Water at Time of Inspection	605.00± ft
G.	Streambed at Toe of Dam	Trout Brook, 604.80± ft
H.	Low Point along Toe of Dam	Trout Brook, 604.80± ft

1.3.5 Primary Spillway (feet), See Figure 4

A.	Type	Uncontrolled ogee-crest
B.	Weir Length	22.5± ft
C.	Weir Crest Elevation	611.18± ft
D.	Upstream Channel	Unknown
E.	Downstream Channel	604.80± ft
F.	Downstream Channel Bottom Elevation	604.80± ft

1.3.6 Design and Construction Records and History

The original design and construction information for the dam was not available. However, a copy of two sets of plans were referenced entitled "Proposed Bridge" completed by Fay. Spofford & Thorndike dated October 1939 and "Proposed 1955 Flood Repairs" by Utility Engineers, Inc. dated May 1956. These plans show the original proposed design of the bridge structure and original proposed spillway apron design prior to flood repairs made in 1956. The 1955 flood caused significant damage to the original stone paving apron under the bridge. It appears the stone apron was completely washed out and the flood waters created a large scour hole which undermined the existing bridge abutments. In 1956 the scour hole was repaired. The following apparent repairs were made:

- Pressure grout with intrusion mortar underneath the bridge abutments;
- Placement of gravel borrow between the bridge abutments for support placement of a 12" thick, steel reinforced concrete slab with a 12 inch thick cutoff on the downstream side;
- A concrete paved channel at the downstream end of the newly placed concrete slab.

A copy of the construction plans is included in Appendix C.

The following modifications to the dam were completed on the dam in 2015 in response to the DCR Dam Safety Order dated December 1, 2011:

- Bank and slope stabilization of the downstream dam embankment and the downstream channel slopes;
- Replaced two catch basins on the upstream side of Lake Road with two new catch basins. Installed two new catch basins on the downstream side of Lake Road; Redirected street drainage to downstream side of the dam;
- Extended the bridge's concrete end posts on both the left and right downstream side;

- Replaced guardrail with new guardrail on the downstream side;
- Installed new bituminous concrete curbing on both the upstream and downstream sides of the road

A copy of the record drawing is included in Appendix C.

1.3.7 Operating Records

No records are available from the Owner.

1.4 Summary Data Table

1.1 Summary Data Table

Required Phase I Report Data	Data Provided by the Inspecting Engineer
National ID #	MA00098
Dam Name	Sawmill Pond Dam
Dam Name (Alternate)	NA
River Name	Trout Brook
Impoundment Name	Rice Pond/Sawmill Pond
Hazard Class	Significant
Size Class	Intermediate
Dam Type	Earthen
Dam Purpose	Recreational
Structural Height of Dam (feet)	11
Hydraulic Height of Dam (feet)	5.75
Drainage Area (sq. mi.)	3.78
Reservoir Surface Area (acres)	0.02
Normal Impoundment Volume (acre-feet)	23.42
Max Impoundment Volume ((top of dam) acre-feet)	70.79
SDF Impoundment Volume* (acre-feet)	Unknown. No H&H
Spillway Type	Concrete ogee overflow
Spillway Length (feet)	22.5
Freeboard at Normal Pool (feet)	4.25
Principal Spillway Capacity* (cfs)	689.7
Auxiliary Spillway Capacity* (cfs)	NA
Low-Level Outlet Capacity* (cfs)	47
Spillway Design Flood* (flow rate - cfs)	100-Year/497 (StreamStats 2021)
Winter Drawdown (feet below normal pool)	NA
Drawdown Impoundment Vol. (acre-feet)	NA
Latitude	42.19842
Longitude	72.10202
City/Town	Brookfield
County Name	Worcester
Public Road on Crest	Lake Road
Public Bridge over Spillway	Lake Road
EAP Date (if applicable)	11/25/2019
Owner Name	Town of Brookfield
Owner Address	56 Mill Street
Owner Town	Brookfield, MA 01506
Owner Phone	508-867-8357
Owner Emergency Phone	911
Owner Type	Municipality or Political subdivision
Caretaker Name	Highway Department
Caretaker Address	56 Mill Street
Caretaker Town	Brookfield, MA 01506
Caretaker Phone	508-867-8357
Caretaker Emergency Phone	911
Date of Field Inspection	7/20/2021
Consultant Firm Name	Lenard Engineering, Inc.
Inspecting Engineer	Douglas W. Bush, P.E.
Engineer Phone Number	508-721-7600

SECTION 2

2.0 INSPECTION

2.1 Visual Inspection

Sawmill Pond Dam was inspected on July 20, 2021. At the time of the inspection, the weather was sunny with temperatures in the 80's. It should be noted that up to the date of this inspection, a total of approximately 8.98 inches of rainfall had occurred for the entire month of July. Photographs to document the current conditions of the dam were taken during the inspection and are included in Appendix A. The level of the impoundment was approximately 611.48 feet approximately 0.3 feet above the normal water level. Underwater areas were not inspected. A copy of the inspection checklist is included in Appendix B. Right and left abutments are those on respective sides of an observer looking downstream.

2.1.1 General Findings

In general, Sawmill Pond Dam was found to be in Fair condition primarily due to the uncertainty of the condition of the low level outlet pipe and controls as well as the inability to access the controls in a timely manner with minimal equipment. The specific concerns are identified in more detail in the sections below:

2.1.2 Dam

- **Abutments**
  Lake Road passes directly over the top of the dam and through the left and right abutments. Abutment contact appeared to be satisfactory. No large trees are located within the 20 foot threshold required by DCR. See Photographs 1 and 2.

- **Upstream Face**
  A small sunken area with a rotted stump was observed on the upstream side of the right dam crest directly behind the stone masonry wall. The sunken area was in close proximity to an old CMP drain pipe that drained through the masonry wall and back into the pond. It is unknown if the area was related in any way to the old drain line below. See Photographs 4.

  The right upstream stone masonry wall was missing stones at its base and along its cap and is leaning outward toward the impoundment. See Photograph 3.

  The left upstream stone masonry wall was missing cap stones in some locations but overall appears to be in good condition. See Photograph 5.

- **Crest**
  The crest of the road was in good condition with minor cracks. The asphalt had been replaced since the last inspection. See Photograph 6.

  The earthen shoulders were relatively well vegetated with some minor bare areas that should be reseeded as needed.

- **Downstream Face**
  The channel slopes were armored with 18" blast rock and the dam/road embankment was vegetated with grass. A gravel parking area is located on the downstream earthen embankment left of the spillway channel. See Photographs 7 and 8.

- **Drains**
  Weep holes were observed at the base of the bridge abutments that also serve as the spillway training walls. See Photograph 9.

  Four catch basins on Lake Road (2 on each side of the bridge) drain to the downstream side of the dam and through the left and right channel slopes. Sediment from the discharge flows has settled at the flared end sections which has allowed for vegetation to grow. See Photographs 10 and 11.

- **Instrumentation**
  None were observed

- **Access Roads and Gates**
  There are no gates or dedicated access roads associated with this dam.

2.1.3 Appurtenant Structures

- Primary Spillway

  Some minor cracking was observed in the right concrete training walls/bridge abutment along the upstream side. See Photograph 14.

  The left spillway training wall was chipped on its upstream side. See Photograph 13.

  Minor debris was observed stuck on the spillway crest prior to the bridge. See Photograph 12.

- Low-Level Outlets

  There is no visible control structure associated with the low level outlet pipe. Reportedly, there is a gate on the upstream end of the low level outlet pipe that can be lifted with a piece of equipment, such as a backhoe. The condition of the gate is unknown.

2.1.4 Downstream Area

The immediate downstream area enters the Trout Brook. Further downstream is wooded where flows eventually enter the Quabaog River. There was some vegetative growth within the downstream channel. See Photograph 15.

2.1.5 Reservoir Area

The axis of the impoundment is oriented northwest / southeast. The surrounding topography consists primarily of steep, hilly terrain, swamps, and residential neighborhoods at the northeast

and southeast quadrant of the watershed. Sawmill Pond is a public pond used for recreation. An aerial photograph is shown in Figure 2. See Photograph 16.

2.2 Caretaker Interview

An interview of the caretaker was not completed for this inspection report. Comments from the previous inspection report remain valid and will be used within this report.

2.3 Operation and Maintenance Procedures

No formal Operations or Maintenance Manual exist for this dam.

2.3.1 Operational Procedures

The Town of Brookfield Highway Department typically performs maintenance activities on the dam on an annual basis or as required.

2.3.2 Maintenance of Dam and Operating Facilities

The Town of Brookfield Highway Department typically performs maintenance activities on the dam on an annual basis or as required.

2.4 Emergency Warning System

An Emergency Action Plan was developed by Lenard Engineering, Inc. in November of 2019. The plan evaluated the extent of flooding due to a partial dam failure at Sawmill Pond Dam using the DSS-Wise Lite software. A copy of the inundation mapping is included in Appendix C

Copies of the latest EAP were submitted to the appropriate state and local emergency management agencies, and fire and police departments for the potentially impacted downstream communities.

2.5 Awareness of Potential Dam Related Safety Hazards at, near, and on Dams

Sawmill Pond dam is located on Rice Road and has infrequent visitors with primarily only fishing that takes place. The roadway is protected via guardrails on both the upstream and downstream sides of the dam for the entire length of the dam. However, due to the availability of off the road parking and room to stand behind the guardrail along the upstream side, we would expect the occasional visitor. We noted the following potential safety hazards at, near, and on the dam:

- There are potential fall hazards at the spillway and along the entire upstream side of the dam;
- There are no warning signs, buoys or barriers by the spillway to warn potential boaters/kayakers.

We recommend installing the following public safety upgrades:

- Add fencing along the top of the spillways upstream training walls;
- Add warning sign or signs on the upstream side at the primary spillway and along the upstream stone masonry wall describing the fall hazards to all visitors.

Implementation of any recommendations may require local, state, or federal permits as well as securing property rights if subject areas are not owned by the dam owner. Securing such permits and/or land rights is the sole responsibility of the dam owner.

The dam owner is reminded that the Dam Safety Regulations *302 CMR Section 10.13: Liability (1)*, states: *The owner shall be responsible and liable for damage to property of others or injury to persons, including but not limited to, loss of life resulting from the operation, failure of or mis-operation of a dam.*

2.6 Hydrologic/Hydraulic Data

Lenard Engineering has performed a hydrologic/hydraulic (H&H) analysis in 2013 for the dam as part of the Chapter 253 permit – Part A. The dam is classified by the DCR as being an Intermediate sized structure with a Significant hazard potential. Based on the size and hazard classification of this structure, the spillway design flood (SDF) is defined in 302 CMR 10:14 (6) as the 100-year return frequency storm. The 100-year peak flow was determined using the TR-55 method. The precipitation input was determined from SCS maps 24-hour duration, thus a 6.5-inch rainfall event.

The primary ogee spillway is cast-in-place concrete with approximate dimensions of 22.5 feet wide by 3.9 feet high. The spillway invert and the top of the spillway training wall is at elevation 611.18 and 615.08 (NGVD) respectfully. The dam crest Lake Road (a public roadway) ranges from elevation 615 to 616. For purposes of the existing analysis, the dam crest was modeled as a secondary spillway weir.

The maximum 100-year storm (SDF) peak flows exiting at the existing spillway is 310.65 cfs. The spillway capacity with no restrictions is 689.7 cfs

A. Spillway Design Flood (SDF)	100-year
B. SDF Peak Inflow	310.65 cfs
C. Spillway Capacity	689.7 cfs

The maximum flow that the spillway can convey without overtopping is 689.7 CFS. This capacity represents 222% of the SDF. Therefore, the dam would not overtop during the SDF event.

2.7 Structural and Seepage Stability

2.7.1 Embankment Structural Stability

A detailed stability analysis of the embankment has not been performed. Based upon the visual examination and dam geometry, the embankment is considered stable at this time.

2.7.2 Structural Stability of Non-Embankment Structures

A structural stability analysis of the spillway has not been performed. The visual inspection of the spillway indicated that the structural stability is satisfactory with no visible signs of instability, movement or erosion.

2.7.3 Seepage Stability

There is no instrumentation installed at the dam to measure seepage. A detailed seepage analysis of the embankments has not been performed**.** The visual inspection of the dam indicated that the seepage stability is satisfactory at this time.

SECTION 3

3.0 ASSESSMENTS AND RECOMMENDATIONS

3.1 Assessments

In general, the overall condition of Sawmill Pond Dam is Fair. The dam was found to have the following deficiencies:

1. The low level outlet gate requires manual lifting by a hoist or equipment. Lifting the gate would require someone to attach a hoist to the gate in the water. During an emergency in flood conditions, this may not be feasible;
2. Right upstream stone masonry wall is missing stones at its base and is leaning outward toward the impoundment;
3. Missing cap stones along the left stone masonry wall;
4. Minor debris within spillway opening.

Previously identified deficiencies and major recommendations from prior inspection reports are summarized in the table below. The table also presents condition or resolution of the deficiencies and recommendations.

Previously Identified Deficiency	***Resolution or Current Condition***
The low level outlet gate requires manual lifting by a hoist or equipment. Lifting the gate would require someone to attach a hoist to the gate in the water. During an emergency in flood conditions, this may not be feasible	Unresolved
Missing portion of the low-level outlet pipe	Unresolved
Sinkhole on the crest of the dam behind the right upstream masonry wall where a road drainage CMP has collapsed	Unresolved. Does not appear to be internal problem due to pipe degradation.
Right upstream stone masonry wall is missing stones at its base and is leaning outward toward the impoundment	Unresolved
Minor brush growing behind and through both upstream stone masonry walls	Unresolved
Several sinkholes located around guardrail supports on the upstream side to the left of the spillway	Resolved. No sinkholes were observed
Deteriorated downstream steel bridge beam	Unresolved

The following recommendations and remedial measures generally describe the recommended approach to address current deficiencies at the dam. Prior to undertaking recommended maintenance, repairs, or remedial measures, the applicability of environmental permits needs to be determined for activities that may occur within resource areas under the jurisdiction of local conservation commissions, MADEP, or other regulatory agencies.

3.2 Studies and Analyses

The following studies or analyses are recommended to evaluate concerns and comply with current regulations:

A. Evaluate the condition of the low level outlet pipe and associated controls.

3.3 Recurrent Maintenance Recommendations

The activities present below should be undertaken on a regular basis or yearly basis by the owner/caretaker. Typically these activities do not require an engineering design. It is recommended that the owner/caretaker perform the following modifications and repairs to improve the safety, maintenance, and operation of the dam including:

A. Regularly mow the dam embankments;

B. Fill low spots, ruts, sinkholes, areas of erosion, and runoff with suitable fill. Reseed areas of thin vegetation with grassy cover;

C. Remove debris from all outlets and downstream channels;

D. Continue to remove brush and woody vegetation within 20 feet of the dam area, including downstream toe;

E. Remove vegetation from the upstream stone masonry walls;

F. Apply herbicide to stumps or use other suitable means to discourage re-growth;

G. Monitor dam for seepage and leakage;

H. Monitor condition of the bridge superstructure though the state bridge inspection program;

I. Have the dam inspected as required by the Commonwealth of Massachusetts.

3.4 Minor Repair Recommendations

The following recommendations will improve the overall condition of the dam but do not alter the current design of the dam. The recommendations may require design by a professional engineer and construction by a contractor experienced in dam construction or repair.

A. Continue to maintain and clear dam of trees within 20 feet of the dam; do not remove stumps, apply herbicide; monitor stumps for decay and properly fill when voids are created;

B. Replace cap stones along left stone masonry wall;

C. Install public safety fences and signs as described in Section 2.5.

3.5 Remedial Modifications Recommendations

This section recommends modifications to the dam which alter the current configuration or design of the dam that are necessary to meet stability, seepage or safety concerns as well as comply with current state requirements. Remedial measures usually require the design services

of a Licensed Professional Engineer. Additionally these projects usually undergo a permitting process.

A. Repair/replace the low level outlet with an accessible operator;

B. Repair/replace right upstream stone masonry wall.

3.6 Alternatives

The following alternatives are presented based upon a conceptual review of the concerns. Additional studies and or considerations may indicate that the options presented below are not suitable for the conditions specific to this dam and dam site.

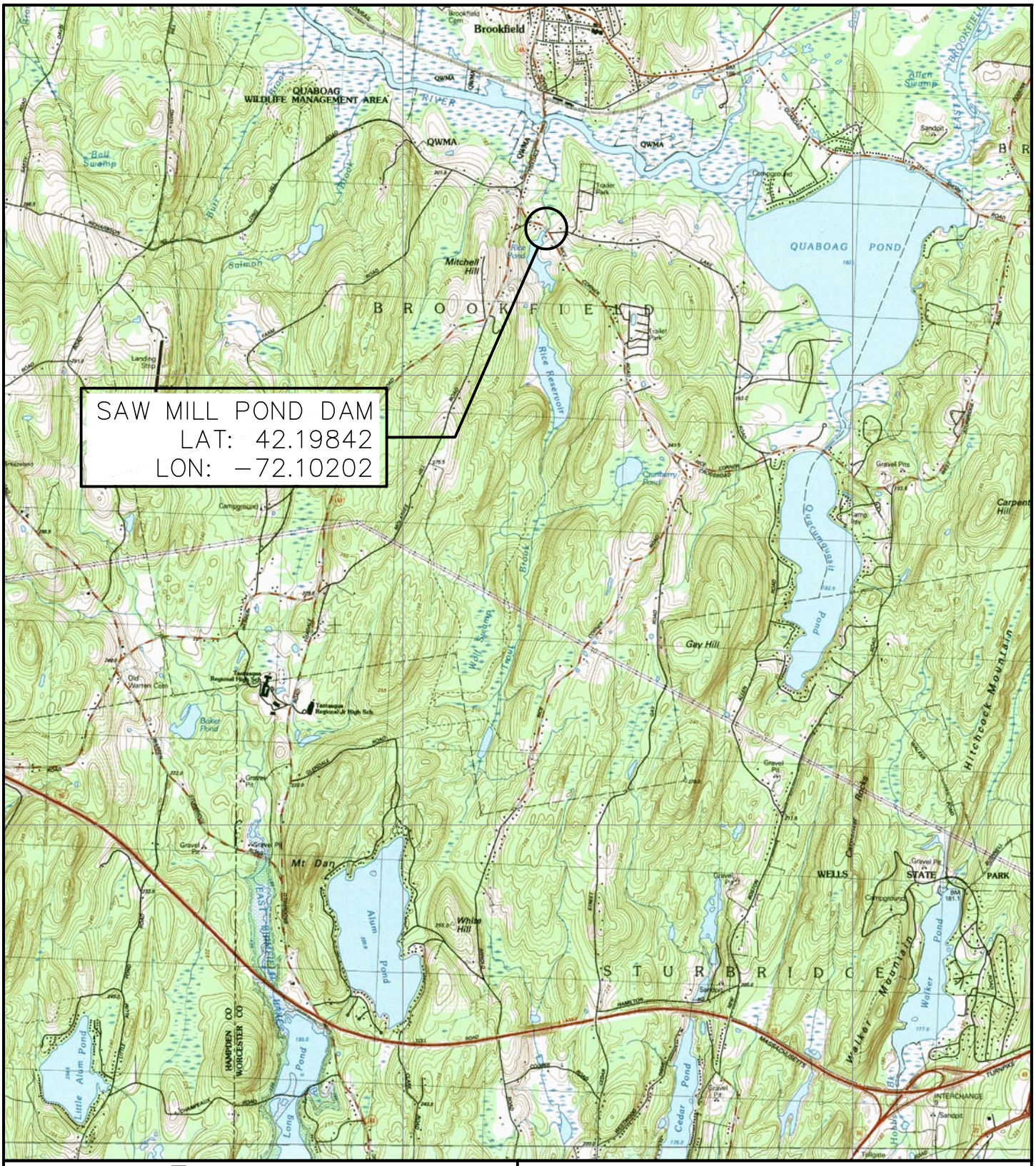
A. None

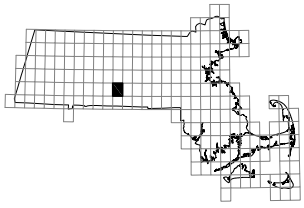
3.7 Opinion of Probable Construction Costs

The following conceptual opinions of probably cost have been developed for the recommendations and remedial measures noted above. The costs shown herein are based on a limited investigation and are provided for general information only. This should not be considered an engineer's estimate, as construction costs may be less or considerably more than indicated.

Item	Opinion of Probable Cost
Recurrent Maintenance	$2,000 per year
Studies and Analysis	
Evaluate low level outlet	$4,000
Repairs	
Install new LLO and operator	$40,000
Repair right upstream wall	$15,000
TOTAL	$59,000 (not including recurrent maintenance)

FIGURES





Source:
USGS TOPOGRAPHIC MAP
EAST BROOKFIELD, MA
QUADRANGLE

Lenard Engineering, Inc.
Auburn, MA

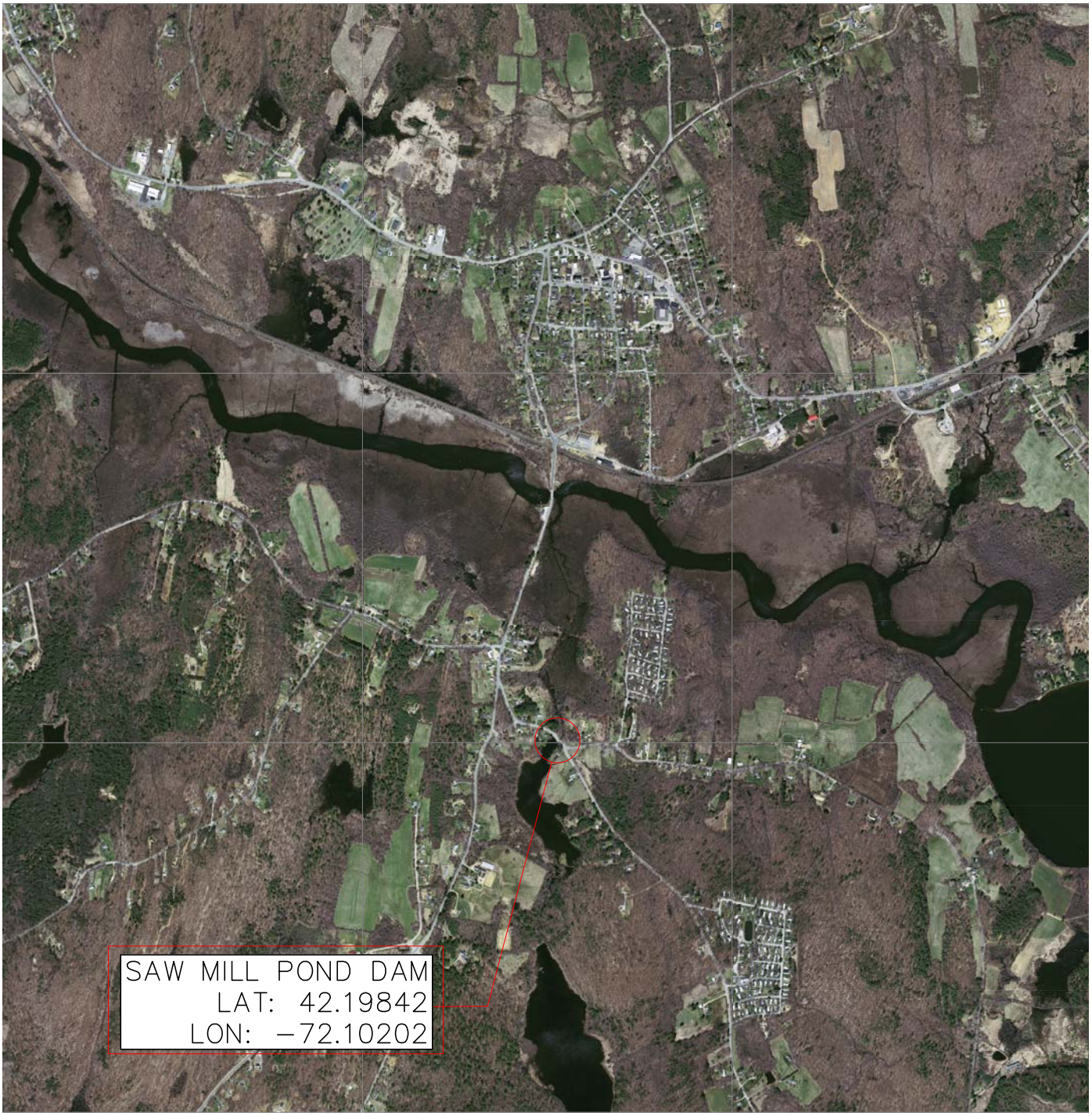
FIGURE 1 - LOCUS PLAN

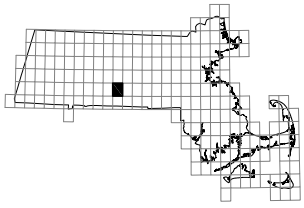
State ID# 3-14-45-1 NID# MA00098

SAW MILL POND DAM

BROOKFIELD, MA

Scale 1"= 4000'





Source:
USGS TOPOGRAPHIC MAP
EAST BROOKFIELD, MA
QUADRANGLE

Lenard Engineering, Inc.
Auburn, MA

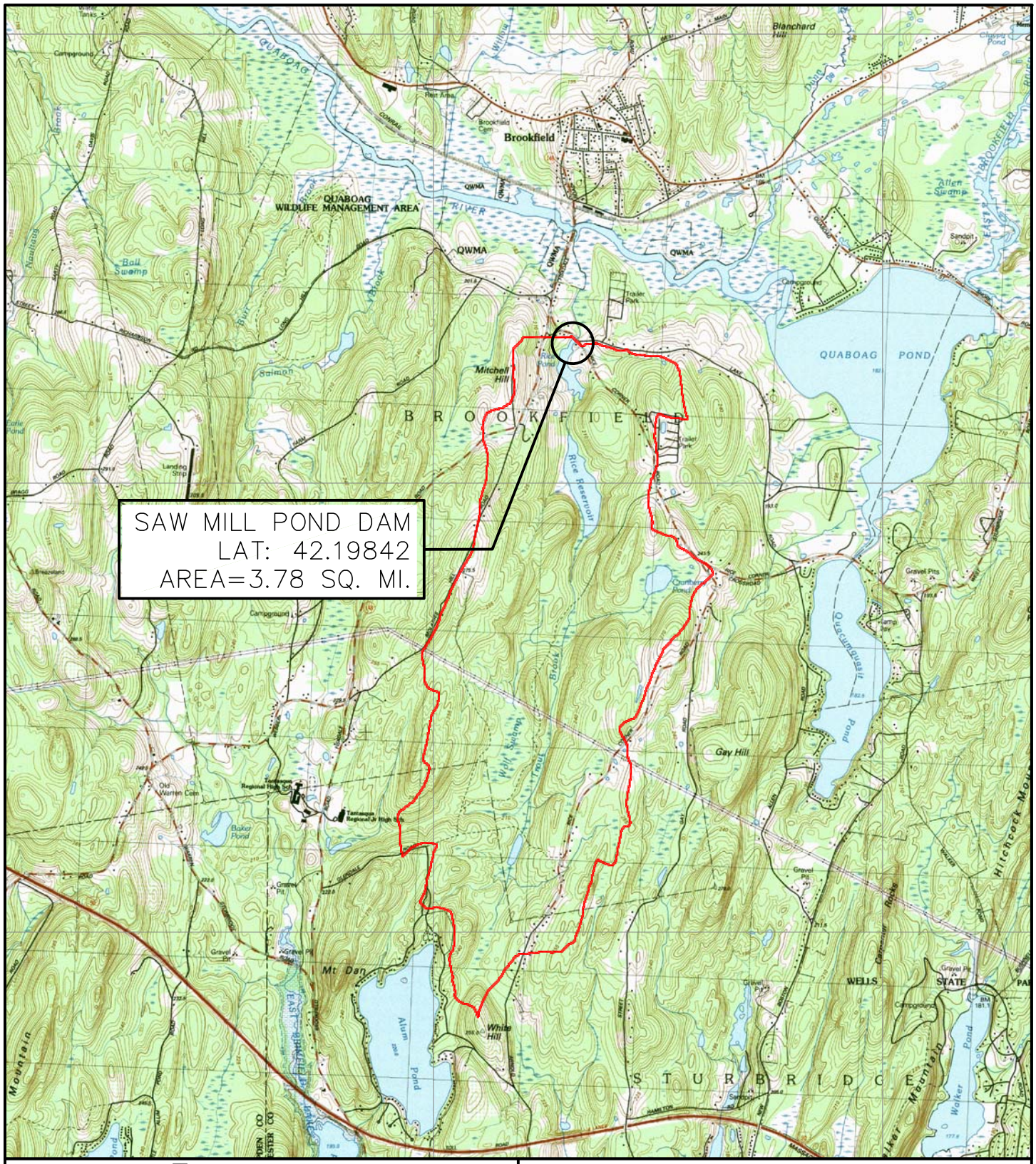
FIGURE 2 - AERIAL PLAN

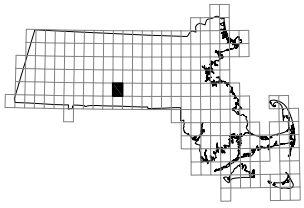
State ID# 3-14-45-1 NID# MA00098

SAW MILL POND DAM

BROOKFIELD, MA

Scale 1"= 2000'





Source:
USGS TOPOGRAPHIC MAP
EAST BROOKFIELD, MA
QUADRANGLE

Lenard Engineering, Inc.
Auburn, MA

FIGURE 3 - DRAINAGE AREA

State ID# 3-14-45-1 NID# MA00098

SAW MILL POND DAM

BROOKFIELD, MA

Scale 1"= 4000'

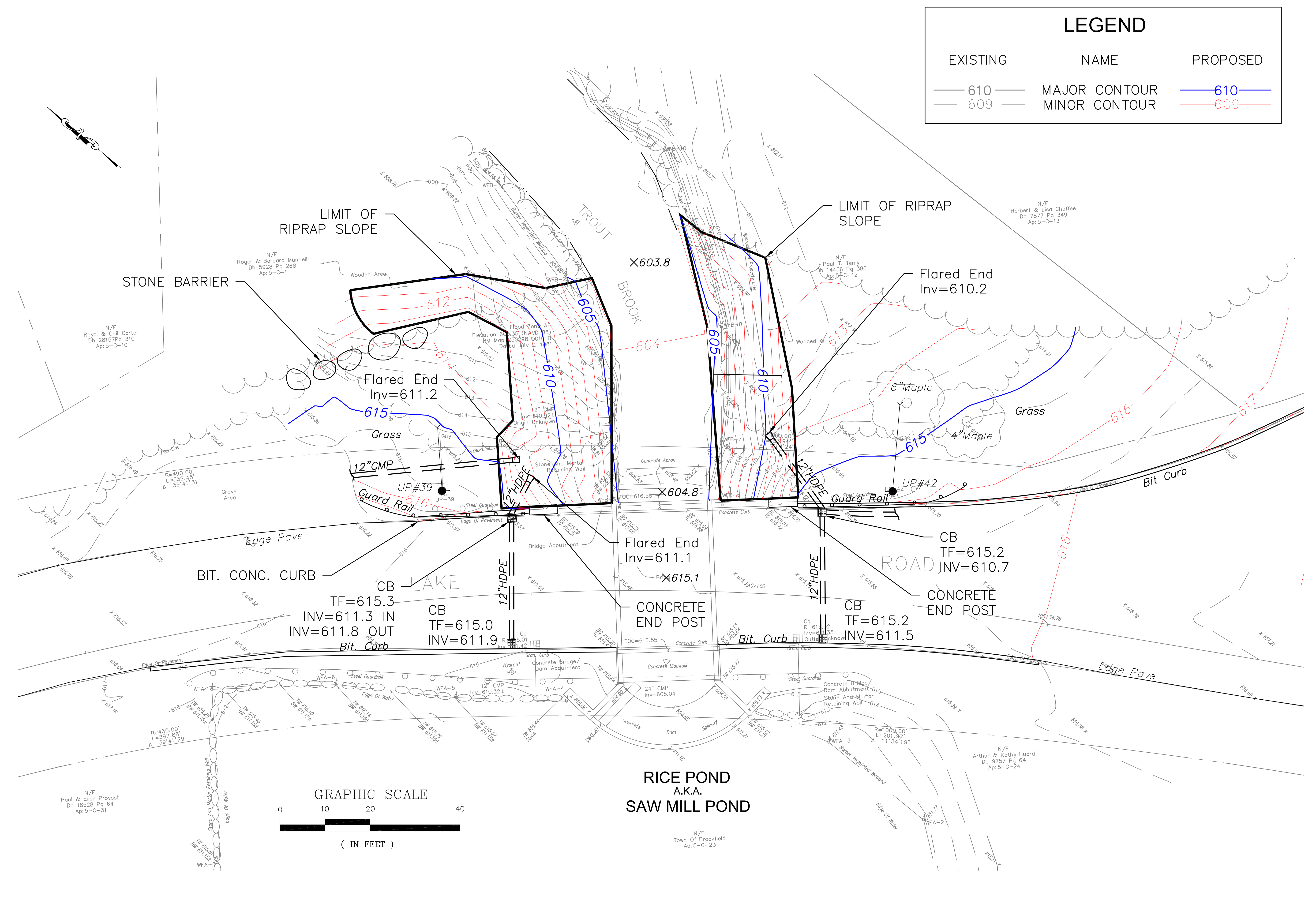

LEGEND
EXISTING
NAME
PROPOSED
610
609
MAJOR CONTOUR
MINOR CONTOUR
610
609
LIMIT OF RIPRAP SLOPE
STONE BARRIER
LIMIT OF RIPRAP SLOPE
Flared End Inv=610.2
Flared End Inv=611.2
Flared End Inv=611.1
TROUT BROOK
X603.8
X604.8
X615.1
12"CMP
UP#39
UP#42
Guard Rail
12"HDPE
Grass
6"Maple
4"Maple
CB TF=615.2 INV=610.7
CONCRETE END POST
CB TF=615.2 INV=611.5
CB TF=615.0 INV=611.9
CB TF=615.3 INV=611.3 IN INV=611.8 OUT
BIT. CONC. CURB
Bit. Curb
Edge Pave
LAKE
ROAD
RICE POND
A.K.A.
SAW MILL POND
GRAPHIC SCALE
0
10
20
40
(IN FEET)
N/F Roger & Barbara Mundell Db 5928 Pg 268 Ap:5-C-1
N/F Royal & Gail Carter Db 28157Pg 310 Ap:5-C-10
N/F Paul & Elise Provost Db 18528 Pg 64 Ap:5-C-31
N/F Herbert & Lisa Chaffee Db 7877 Pg 349 Ap:5-C-13
N/F Paul T. Terry Db 14456 Pg 386 Ap:5-C-12
N/F Arthur & Kathy Huard Db 9757 Pg 64 Ap:5-C-24
N/F Town Of Brookfield Ap:5-C-23

FIGURE 4 - SITE SKETCH

PREPARED FOR

TOWN OF BROOKFIELD

SAWMILL POND DAM REHABILITATION

BROOKFIELD, MASSACHUSETTS

Lenard Engineering, Inc.
Civil, Environmental and Hydrogeological Consultants
2210 Main Street, GLASTONBURY, CT (860) 659-3100
140 Willow Street, WINSTED, CT (860) 379-6669
19 Midstate Drive, AUBURN, MA (508) 721-7600

Designed By:	Drawn By:	Checked By:	CAD File:
DWB	DWB	KWH	AsBuilt

Drawing date: MAR. 3, 2016
Drawing Scale: 1"=20'

Rev.	Date	Revision	By

Figure #: 1

Job #: 15-709

LEGEND

EXISTING	NAME	PROPOSED
610	MAJOR CONTOUR	610
609	MINOR CONTOUR	609

RICE POND
A.K.A.
SAW MILL POND

GRAPHIC SCALE
0 10 20 40
(IN FEET)

TROUT BROOK

LAKE ROAD

Designed By: DWB
Drawn By: DWB
Checked By: KWH
CAD File: AsBuilt

Drawing Scale: 1" = 20'
Drawing date: MAR. 3, 2016

Rev.	Date	Revision	By

FIGURE 5 - PHOTOS

PREPARED FOR
TOWN OF BROOKFIELD
SAWMILL POND DAM REHABILITATION
BROOKFIELD, MASSACHUSETTS

Lenard Engineering, Inc.
Civil, Environmental and Hydrogeological Consultants
2210 Main Street, GLASTONBURY, CT (860) 659-3100
140 Willow Street, WINSTED, CT (860) 379-6669
19 Midstate Drive, AUBURN, MA (508) 721-7600

Figure #: 1

Job #: 15–709

APPENDIX A
Photographs

Photograph 1: Left abutment viewed from the crest. Lake Road passes directly over the left abutment.

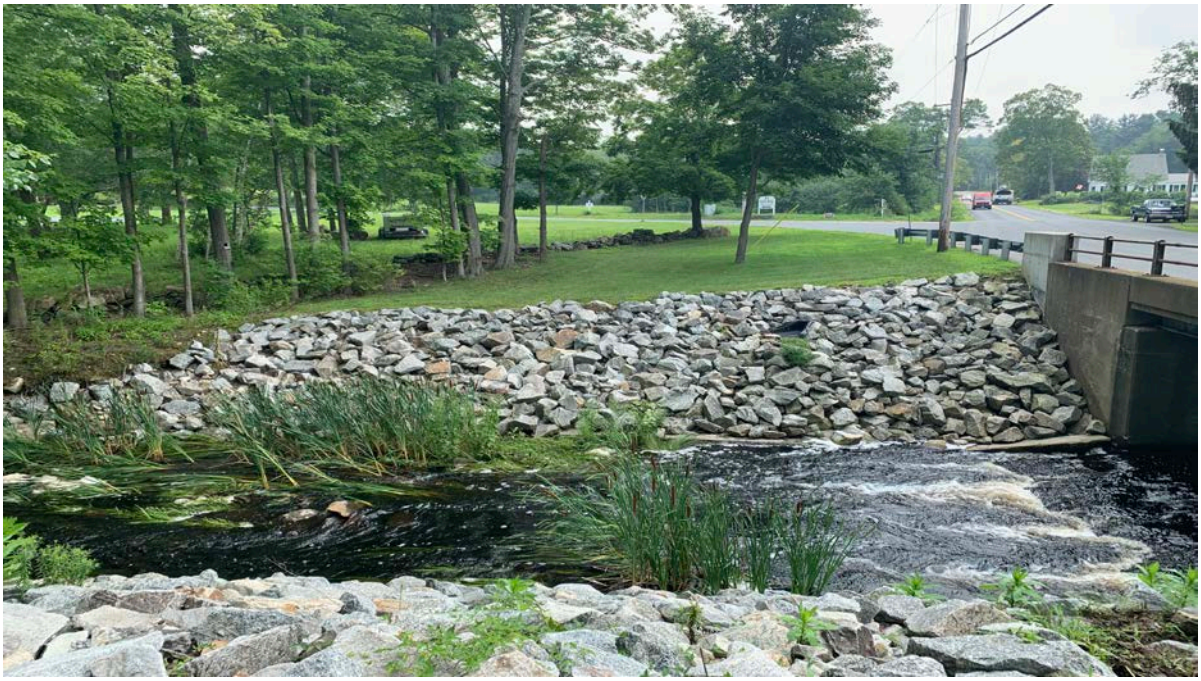
Photograph 2: Right abutment viewed from the crest. Lake Road passes directly over the right abutment.

Photograph 3: Right upstream stone masonry wall and embankment. The right upstream stone masonry wall was missing stones at its base and along its top and was leaning outward toward the impoundment. There was some minor brush growing through the wall.

Photograph 4: Right upstream stone masonry wall and embankment. A small sunken area was observed behind the upstream stone masonry wall to the right of the spillway.

Photograph 5: Left upstream stone masonry wall looking toward the left abutment. The wall was missing cap stones in multiple areas.

Photograph 6: Minor cracking was observed in the asphalt paved crest. Photo was taken from the left abutment to the right abutment.



Photograph 7: Right downstream dam embankment and channel slope.

Photograph 8: Left downstream dam embankment and channel slope. A gravel parking area was located on the earthen embankment near the left abutment.

Photograph 9: View under bridge from downstream side. Weep holes were observed at the base of the bridge abutments that also serve as the spillway training walls.

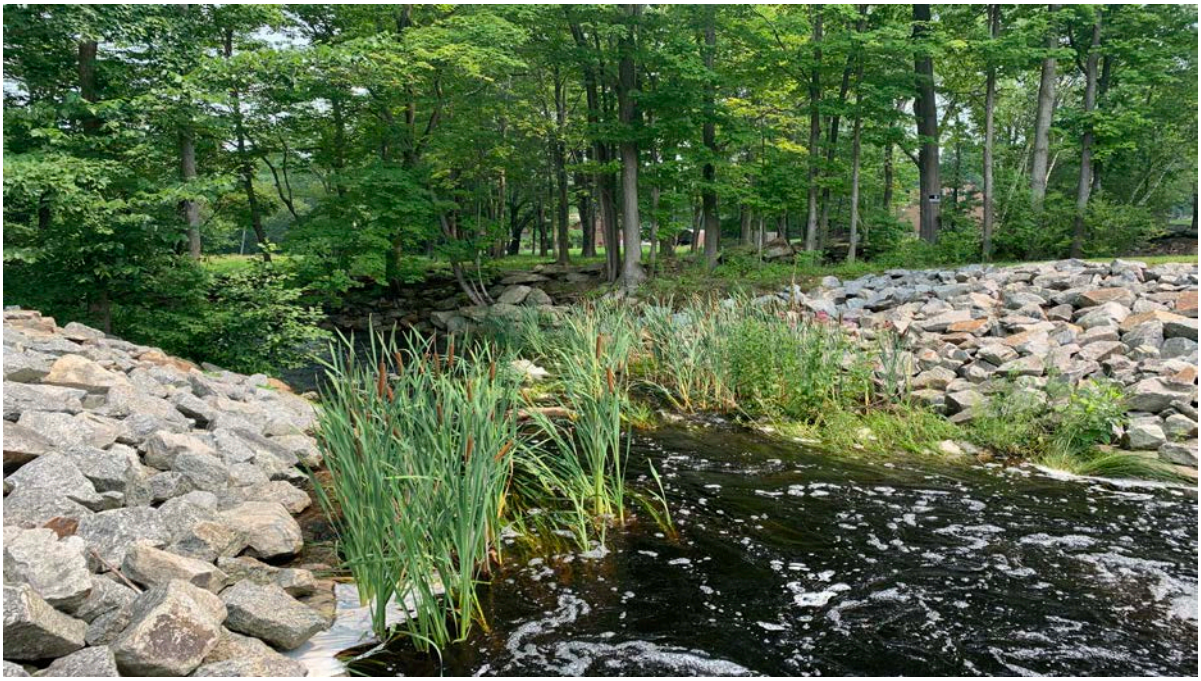
Photograph 10: Left downstream channel slope. Photo shows discharge (left flared end) location of 2 left most catch basins on Lake Road that drain to the downstream side of the dam and through the left channel slope. The flared end shown to the right is the discharge location from a catch basin located further up Lake Road to the left of the dam. Pipes are a 12" HDPE (left) and a 12" CMP (right).

Photograph 11: Right downstream channel slope. Photo shows discharge location of 2 right most catch basins on Lake Road that drain to the downstream side of the dam and through the right channel slope. Pipe is a 12" HDPE

Photograph 12: Spillway ogee weir from right crest embankment. Minor debris was observed at the spillway crest.

Photograph 13: Left spillway training wall/bridge abutment. Some minor cracking was observed in the left concrete training wall/bridge abutment.

Photograph 14: Right spillway training wall/bridge abutment. Some minor cracking was observed in the right concrete training wall/bridge abutment.



Photograph 15: Downstream area. Vegetation is growing within the channel.

Photograph 16: Sawmill/Rice Pond.

APPENDIX B
Inspection Checklist

DAM SAFETY INSPECTION CHECKLIST INSTRUCTION PAGE

The checklist (Excel file) includes sections applicable to a variety of dam structure types. Carefully follow the instructions on the first tab of the checklist. Complete those pages pertaining to each structure and omit pages that are not relevant or mark them "Not Applicable." The Checklist must be signed by the inspecting engineer and a clean, neat copy included in the final inspection report. Use the checklist to generate the Dam Evaluation Summary Detail Sheet (should immediately follow the Executive Summary) and Table 1.1 (should immediately follow Section 1.0).

E1: DESIGN METHODOLOGY
1. Unknown Design – no design records available
2. No design or post-design analyses
3. No analyses, but dam features appear suitable
4. Design or post-design analyses show dam meets most criteria
5. State of the art design – design records available & dam meets all criteria

E2: LEVEL OF MAINTENANCE
1. Dam in disrepair, no evidence of maintenance, no O&M manual
2. Dam in poor level of upkeep, very little maintenance, no O&M manual
3. Dam in fair level of upkeep, some maintenance, and standard procedures
4. Adequate level of maintenance and standard procedures
5. Dam well maintained, detailed maintenance plan that is executed

E3: EMERGENCY ACTION PLAN
1. No plan or idea of what to do in the event of an emergency
2. Some idea but no written plan
3. No formal plan but well thought out
4. Available written plan that needs updating
5. Detailed, updated written plan available, filed with MADCR, annual training

E4: EMBANKMENT SEEPAGE (Embankment, Foundation & Abutments)
1. Severe piping and/or seepage with no monitoring
2. Evidence of monitored piping and seepage
3. No piping but monitored seepage
4. Minor seepage or high volumes of seepage with filtered collection
5. No seepage or minor seepage with filtered collection

E5: EMBANKMENT CONDITION (see Note 1)
1. Severe erosion and/or large trees
2. Significant erosion or significant woody vegetation
3. Brush and exposed embankment soils, or moderate erosion
4. Unmaintained grass, rodent activity and maintainable erosion
5. Well maintained, healthy uniform grass cover

E6: CONCRETE CONDITION (see Note 2)
1. Major cracks, misalignment, discontinuities causing leaks, seepage or stability concerns
2. Cracks with misalignment inclusive of transverse cracks with no mis-alignment but with potential for significant structural degradation
3. Significant longitudinal cracking and minor transverse cracking
4. Spalling and minor surface cracking
5. No apparent deficiencies

E7: LOW-LEVEL OUTLET DISCHARGE CAPACITY
1. No low-level outlet, no provisions (e.g., pumps, siphons) for emptying pond
2. No operable outlet, plans for emptying pond, but no equipment
3. Outlet with insufficient drawdown capacity, pumping equipment available
4. Operable gate with sufficient drawdown capacity
5. Operable gate with capacity greater than necessary

E8: LOW-LEVEL OUTLET PHYSICAL CONDITION
1. Outlet inoperative needs replacement, non-existent or inaccessible
2. Outlet inoperative needs repair
3. Outlet operable but needs repair
4. Outlet operable but needs maintenance
5. Outlet and operator operable and well maintained

E9: SPILLWAY DESIGN FLOOD CAPACITY
1. 0 - 50% of the SDF or unknown
2. 51- 90% of the SDF
3. 91- 100% of the SDF
4. >100% of the SDF with actions required by caretaker (e.g., open outlet)
5. >100% of the SDF with no actions required by caretaker

E10: OVERALL PHYSICAL CONDITION OF THE DAM
1. *UNSAFE* – Major structural, operational, and maintenance deficiencies exist under normal operating conditions
2. *POOR* - Significant structural, operation and maintenance deficiencies are clearly recognized for normal loading conditions
3. *FAIR* - Significant operational and maintenance deficiencies, no structural deficiencies. Potential deficiencies exist under unusual loading conditions that may realistically occur. Can be used when uncertainties exist as to critical parameters
4. *SATISFACTORY* - Minor operational and maintenance deficiencies. Infrequent hydrologic events would probably result in deficiencies.
5. *GOOD* - No existing or potential deficiencies recognized. Safe performance is expected under all loading including SDF

E11: ESTIMATED REPAIR COST

Estimation of the total cost to address all identified structural, operational, maintenance deficiencies. Cost shall be developed utilizing standard estimating guides and procedures

Guidelines and Notes for Evaluations

Each of the evaluation categories has 5 rating levels. In general, the rating levels in each category are intended to reflect the following conditions:

1. Unsafe
2. Poor
3. Fair
4. Satisfactory
5. Good

E10-Overall Safety Rating Guideline

Unless the inspecting engineer presents compelling data, analyses, and observations that justify a higher rating, E10-Overall Safety Rating of the Dam shall not be higher than the lowest ranking in these high importance categories:

-E4-Seepage,

-E5-Embankment Condition (for embankment dams), and
-E6-Concrete Condition (for dams where concrete structures retain water).

Note 1 - Embankment Condition Factor of Safety Criteria
In addition to the inspection conditions listed, the embankment condition rating should consider the slope stability Factor of Safety (FS) according to the following guidelines for downstream (D/S) and upstream slopes (U/S).

	Normal Pool	**SDF**	**Seismic**	**Rapid Drawdown**
Rating	**D/S & U/S FS**	**D/S FS**	**D/S & U/S FS**	**U/S FS**
1	<1.3	<1.1	<1.0	<1.0
2	<1.5	<1.4	<1.0	<1.1
3	>1.5	<1.5	<1.1	<1.2
4	>1.5	>1.5	>1.1	>1.2
5	>1.5	>1.5	>1.1	>1.2

In the absence of stability analyses, use the following factors to evaluate the stability component of the embankment rating. The inspecting engineer will need to consider all factors in combination as the exact combination of conditions listed will rarely occur. For slopes, > indicates "steeper than."

Rating	**Slopes**	**Seepage**	**Material**	**Compaction**
1	>2H:1V	>5' above toe	SP, ML*, SM*	Loose or unknown
2	>2.5H:1V	>2' above toe	ML**, MH	Loose or unknown
3	>3H:1V	at toe	SM**, SW, CH	Likely compacted
4	<3H:1V	DS of toe	SC, CL	Compacted
5	<3H:1V	None	Suitably Zoned	Compacted

ML* - Non-plastic silt or any silt or clay susceptible to dispersion
ML** - Silt with some plasticity (non-dispersive)
SM* - Uniform silty fine sand
SM** - Widely graded silty sand

Note 2 - Concrete Condition Factor of Safety Criteria
In addition to the inspection conditions listed, ratings should consider the sliding stability Factors of Safety (FS) for any concrete structures that retain water according to the following guidelines.

FS Criteria for Dams with Limited Structure and Foundation Information and Testing

Rating	**Normal Pool FS**	**SDF FS**	**Ice Loading FS**	**Seismic FS**
1	<2.0	<1.3	<1.3	<1.0
2	<3.0	<2.0	<2.0	<1.3
3	>3.0	>2.0	>2.0	<1.5
4	>3.0	>2.0	>2.0	>1.5
5	>3.0	>2.0	>2.0	>1.5

FS Criteria for Dams with Well Defined Structure and Foundation Information and Testing

Rating	**Normal Pool FS**	**SDF FS**	**Ice Loading FS**	**Seismic FS**
1	<1.5	<1.3	<1.3	<1.0
2	<2.0	<1.7	<1.7	<1.0
3	<3.0	<2.0	<2.0	<1.1
4	>3.0	>2.0	>2.0	<1.3
5	>3.0	>2.0	>2.0	>1.3

See Appendix D for a complete listing of dam orientation and terminology definitions.

Upstream – Shall mean the side of the dam that borders the impoundment.

Downstream – Shall mean the high side of the dam, the side opposite the upstream side.

Right – Shall mean the area to the right when looking in the downstream direction.

Left – Shall mean the area to the left when looking in the downstream direction.

Height of Dam – Shall mean the vertical distance from the lowest portion of the natural ground, including any stream channel, along the downstream toe of the dam to the crest of the dam.

Embankment – Shall mean the fill material, usually earth or rock, placed with sloping sides, such that it forms a permanent barrier that impounds water.

Crest – Shall mean the top of the dam, usually provides a road or path across the dam.

Abutment – Shall mean that part of a valley side against which a dam is constructed. An artificial abutment is sometimes constructed as a concrete gravity section, to take the thrust of an arch dam where there is no suitable natural abutment.

Appurtenant Works – Shall mean structures, either in dams or separate therefrom, including but not be limited to, spillways; reservoirs and their rims; low-level outlet works; and water conduits including tunnels, pipelines, or penstocks, either through the dams or their abutments.

Spillway – Shall mean a structure over or through which water flows are discharged. If the flow is controlled by gates or boards, it is a controlled spillway; if the fixed elevation of the spillway crest controls the level of the impoundment, it is an uncontrolled spillway.

DAM SAFETY INSPECTION CHECKLIST

NAME OF DAM: Sawmill Pond Dam

STATE ID #: 3-14-45-1

REGISTERED: ☑ YES ☐ NO

NID ID #: MA00098

STATE SIZE CLASSIFICATION: Intermediate

STATE HAZARD CLASSIFICATION: Significant

CHANGE IN HAZARD CLASSIFICATION REQUESTED?: No

DAM LOCATION INFORMATION

CITY/TOWN: Brookfield

COUNTY: Worcester

DAM LOCATION: (street address if known) Lake Road and Rice Corner Road intersection

ALTERNATE DAM NAME: NA

USGS QUAD.: East Brookfield

LAT.: 42.19842 LONG.: 72.10202

DRAINAGE BASIN: Chicopee

RIVER: Trout Brook

IMPOUNDMENT NAME(S): Rice Pond/Sawmill Pond

GENERAL DAM INFORMATION

TYPE OF DAM: Earthen

OVERALL LENGTH (FT): 170

PURPOSE OF DAM: Recreational

NORMAL POOL STORAGE (ACRE-FT): 23.42

YEAR BUILT: Unknown. Bridge built 1939

MAXIMUM POOL STORAGE (ACRE-FT): 70.79

STRUCTURAL HEIGHT (FT): 11

EL. NORMAL POOL (FT): 611.18

HYDRAULIC HEIGHT (FT): 5.75

EL. MAXIMUM POOL (FT): 615.38

FOR INTERNAL MADCR USE ONLY

FOLLOW-UP INSPECTION REQUIRED: ☐ YES ☐ NO

CONDITIONAL LETTER: ☐ YES ☐ NO

NAME OF DAM: Sawmill Pond Dam | STATE ID #: 3-14-45-1

INSPECTION DATE: July 20, 2021 | NID ID #: MA00098

INSPECTION SUMMARY

DATE OF INSPECTION: July 20, 2021 | DATE OF PREVIOUS INSPECTION: March 1, 2016

TEMPERATURE/WEATHER: 80's, Hazy | ARMY CORPS PHASE I: ☐ YES ☑ NO If YES, date

CONSULTANT: Lenard Engineering, Inc. | PREVIOUS DCR PHASE I: ☑ YES ☐ NO If YES, date 1-Mar-16

BENCHMARK/DATUM: Mag nail in Lake Road at utility pole #43, elevation 617.46/NAVD 88

OVERALL PHYSICAL CONDITION OF DAM: FAIR | DATE OF LAST REHABILITATION: 2015

SPILLWAY CAPACITY: >100% SDF w/ no actions by Caretaker

EL. POOL DURING INSP.: 611.48 (0.3' above spillway) | EL. TAILWATER DURING INSP.: 605.00 (0.2' above concrete apron)

PERSONS PRESENT AT INSPECTION

NAME	TITLE/POSITION	REPRESENTING
Douglas W. Bush, PE	Project Engineer	Lenard Engineering, Inc.

EVALUATION INFORMATION

	Click on box to select E-code
E1) TYPE OF DESIGN	2
E2) LEVEL OF MAINTENANCE	2
E3) EMERGENCY ACTION PLAN	5
E4) EMBANKMENT SEEPAGE	5
E5) EMBANKMENT CONDITION	4
E6) CONCRETE CONDITION	4
E7) LOW-LEVEL OUTLET CAPACITY	2

	Click on box to select E-code
E8) LOW-LEVEL OUTLET CONDITION	1
E9) SPILLWAY DESIGN FLOOD CAPACITY	5
E10) OVERALL PHYSICAL CONDITION	3
E11) ESTIMATED REPAIR COST	$59,000
ROADWAY OVER CREST	YES
BRIDGE NEAR DAM	YES

NAME OF INSPECTING ENGINEER: Douglas W. Bush, P.E. | SIGNATURE:

NAME OF DAM:	Sawmill Pond Dam	STATE ID #:	3-14-45-1
INSPECTION DATE:	July 20, 2021	NID ID #:	MA00098

OWNER:	ORGANIZATION	Town of Brookfield	CARETAKER:	ORGANIZATION	Town of Brookfield
	NAME/TITLE	Highway Department		NAME/TITLE	Highway Department
	STREET	56 Mill Street		STREET	56 Mill Street
	TOWN, STATE, ZIP	Brookfield, MA 01506		TOWN, STATE, ZIP	Brookfield, MA 01506
	PHONE	508-867-8357		PHONE	508-867-8357
	EMERGENCY PH. #	911		EMERGENCY PH. #	911
	FAX	NA		FAX	NA
	EMAIL	highway@brookfieldma.us		EMAIL	highway@brookfieldma.us
	OWNER TYPE	Municipality or Political subdivision			

PRIMARY SPILLWAY TYPE	Concrete ogee overflow		
SPILLWAY LENGTH (FT)	22.5	SPILLWAY CAPACITY (CFS)	689.70
AUXILIARY SPILLWAY TYPE	NA	AUX. SPILLWAY CAPACITY (CFS)	NA
NUMBER OF OUTLETS	1	OUTLET(S) CAPACITY (CFS)	47
TYPE OF OUTLETS	24-Inch CMP	TOTAL DISCHARGE CAPACITY (CFS)	736.70
DRAINAGE AREA (SQ MI)	3.78	SPILLWAY DESIGN FLOOD (PERIOD/CFS)	100-Year/310.65

HAS DAM BEEN BREACHED OR OVERTOPPED ☐ YES ☑ NO IF YES, PROVIDE DATE(S)

FISH LADDER (LIST TYPE IF PRESENT) None

DOES CREST SUPPORT PUBLIC ROAD? ☑ YES ☐ NO IF YES, ROAD NAME: Lake Road

PUBLIC BRIDGE WITHIN 50' OF DAM? ☑ YES ☐ NO IF YES, ROAD/BRIDGE NAME: Lake Road

MHD BRIDGE NO. (IF APPLICABLE)

NAME OF DAM: Sawmill Pond Dam STATE ID #: 3-14-45-1

INSPECTION DATE: July 20, 2021 NID ID #: MA00098

EMBANKMENT (CREST)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
CREST	1. SURFACE TYPE	Asphalt roadway andn earthen shoulders	X		
	2. SURFACE CRACKING	Minor cracking is asphalt		X	
	3. SINKHOLES, ANIMAL BURROWS	A small sinkhole behind the right upstream masonry wall surrounding a rotted stump			X
	4. VERTICAL ALIGNMENT (DEPRESSIONS	None observed	X		
	5. HORIZONTAL ALIGNMENT	Satisfactory. Slight curvature follows roadway alignment	X		
	6. RUTS AND/OR PUDDLES	None observed	X		
	7. GRASS COVER CONDITION	Satisfactory with only minor bare areas			X
	8. WOODY VEGETATION (TREES/BRUSH)	Minor near left upstream abutment contact		X	
	9. ABUTMENT CONTACT	Appears satisfactory	X		

ADDITIONAL COMMENTS: The roadway asphalt appears to have been replaced since the last inspection. Grass areas should continue to be seeded to fill in any bare areas that exist.

NAME OF DAM: Sawmill Pond Dam STATE ID #: 3-14-45-1

INSPECTION DATE: July 20, 2021 NID ID #: MA00098

EMBANKMENT (D/S SLOPE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S SLOPE	1. WET AREAS (NO FLOW)	None observed	X		
	2. SEEPAGE	None observed	X		
	3. SLIDE, SLOUGH, SCARP	None observed	X		
	4. EMB.-ABUTMENT CONTACT	Satisfactory	X		
	5. SINKHOLE/ANIMAL BURROWS	None observed	X		
	6. EROSION	None observed	X		
	7. UNUSUAL MOVEMENT	None observed	X		
	8. GRASS COVER CONDITION	Right/left downstream channel slopes protected by a layer of 18 inch diam. blast rock	X		
	9. WOODY VEGETATION (TREES/BRUSH)	The dams left and right downstream dam earth embankments are protected with	X		
		healthy and uniform grass cover			

ADDITIONAL COMMENTS: Construction in July 2015 was completed to stabilize the downstream portion of the dam.

NAME OF DAM: Sawmill Pond Dam STATE ID #: 3-14-45-1

INSPECTION DATE: July 20, 2021 NID ID #: MA00098

EMBANKMENT (U/S SLOPE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
U/S SLOPE	1. SLIDE, SLOUGH, SCARP	See Embankment Crest			
	2. SLOPE PROTECTION TYPE AND COND.				
	3. SINKHOLE/ANIMAL BURROWS				
	4. EMB.-ABUTMENT CONTACT				
	5. EROSION	N/A			
	6. UNUSUAL MOVEMENT				
	7. GRASS COVER CONDITION				
	8. WOODY VEGETATION (TREES/BRUSH)				

ADDITIONAL COMMENTS:

NAME OF DAM: Sawmill Pond Dam STATE ID #: 3-14-45-1

INSPECTION DATE: July 20, 2021 NID ID #: MA00098

INSTRUMENTATION

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
INSTR.	1. PIEZOMETERS	N/A			
	2. OBSERVATION WELLS				
	3. STAFF GAGE AND RECORDER				
	4. WEIRS				
	5. INCLINOMETERS				
	6. SURVEY MONUMENTS				
	7. DRAINS				
	8. FREQUENCY OF READINGS				
	9. LOCATION OF READINGS				

ADDITIONAL COMMENTS:

NAME OF DAM: Sawmill Pond Dam STATE ID #: 3-14-45-1

INSPECTION DATE: July 20, 2021 NID ID #: MA00098

DOWNSTREAM AREA

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S AREA	1. ABUTMENT LEAKAGE	None observed	X		
	2. FOUNDATION SEEPAGE	None observed	X		
	3. SLIDE, SLOUGH, SCARP	None observed	X		
	4. WEIRS	None observed	X		
	5. DRAINAGE SYSTEM	Catch basins from Lake Road drain through downstream channel slopes	X		
	6. INSTRUMENTATION	None observed	X		
	7. VEGETATION WITHIN 15 FT	18" blast rock on channel slopes. Healthy grass on dam slopes	X		
	8. ACCESSIBILITY	By foot	X		
	9. DOWNSTREAM HAZARD DESCRIPTION	Lake Road			

ADDITIONAL COMMENTS: EAP completed by LEI dated 2019-11-25.

NAME OF DAM: Sawmill Pond Dam STATE ID #: 3-14-45-1

INSPECTION DATE: July 20, 2021 NID ID #: MA00098

MISCELLANEOUS

AREA INSPECTED	CONDITION	OBSERVATIONS
MISC.	1. RESERVOIR DEPTH (AVG)	2' to 3' (estimated); Purportedly 40" near the spillway inlet
	2. RESERVOIR SHORELINE	Fields and wooded areas
	3. RESERVOIR SLOPES	Mild slopes
	4. ACCESS ROADS	Lake Road
	5. SECURITY DEVICES	None observed
	6. WATER PUBLIC HAZARDS & PROTECTION	No fencing on upstream side. Signs needed for fall protection
	7. LAND-SIDE PUBLIC HAZARDS & PROTECTION	None
	7. VANDALISM OR TRESPASS	☐ YES ☑ NO WHAT:
	8. AVAILABILITY OF PLANS	☑ YES ☐ NO DATE: 1939, 1956
	9. AVAILABILITY OF DESIGN CALCS	☐ YES ☑ NO DATE:
	10. AVAILABILITY OF EAP/LAST UPDATE	☑ YES ☐ NO DATE: 11/25/2019
	11. AVAILABILITY OF O&M MANUAL	☑ YES ☐ NO DATE: 2013
	12. CARETAKER/OWNER AVAILABLE	☐ YES ☑ NO DATE:
	13. CONFINED SPACE ENTRY REQUIRED	☐ YES ☑ NO PURPOSE:

ADDITIONAL COMMENTS: EAP completed by LEI dated 2019-11-25.

NAME OF DAM: Sawmill Pond Dam STATE ID #: 3-14-45-1

INSPECTION DATE: July 20, 2021 NID ID #: MA00098

PRIMARY SPILLWAY

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
SPILLWAY	SPILLWAY TYPE	Concrete ogee overflow	X		
	WEIR TYPE	Ogee	X		
	SPILLWAY CONDITION	Good condition	X		
	TRAINING WALLS	Fair condition - concrete with some cracking/spalling		X	
	SPILLWAY CONTROLS AND CONDITION	None observed	X		
	UNUSUAL MOVEMENT	None observed	X		
	APPROACH AREA	Minor debris in spillway			X
	DISCHARGE AREA	Concrete apron under bridge crossing - free of debris	X		
	DEBRIS	Minor debris in spillway			X
		Apprx. 0.3 feet above spillway crest; apprx. 611.48	X		

ADDITIONAL COMMENTS: Spillway contains the 24" CMP low level outlet. Outlet pipe protrudes through the ogee spillway. The 24" CMP pipe was badly deteriorated in previous inspections and the pipe has since been removed however the hole through the concrete remains.

NAME OF DAM: Sawmill Pond Dam STATE ID #: 3-14-45-1

INSPECTION DATE: July 20, 2021 NID ID #: MA00098

AUXILIARY SPILLWAY

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
SPILLWAY	SPILLWAY TYPE				
	WEIR TYPE				
	SPILLWAY CONDITION				
	TRAINING WALLS				
	SPILLWAY CONTROLS AND CONDITION	N/A			
	UNUSUAL MOVEMENT				
	APPROACH AREA				
	DISCHARGE AREA				
	DEBRIS				

ADDITIONAL COMMENTS:

NAME OF DAM: Sawmill Pond Dam STATE ID #: 3-14-45-1

INSPECTION DATE: July 20, 2021 NID ID #: MA00098

OUTLET WORKS

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
OUTLET WORKS	TYPE	24" low level outlet			X
	INTAKE STRUCTURE	Submerged by impoundment - Not observed			X
	TRASHRACK	None observed	X		
	PRIMARY CLOSURE	Submerged by impoundment - Not observed			X
	SECONDARY CLOSURE	None observed	X		
	CONDUIT	24" CMP - pipe protrudes through ogee spillway. Pipe has been removed			X
	OUTLET STRUCTURE/HEADWALL	Ogee spillway	X		
	EROSION ALONG TOE OF DAM	None observed		X	
	SEEPAGE/LEAKAGE	Could not observed to water flow in channel		X	
	DEBRIS/BLOCKAGE	Minor debris in spillway			X
	UNUSUAL MOVEMENT	None observed		X	
	DOWNSTREAM AREA	Discharges under Lake Road to concrete apron on downstream side	X		
	MISCELLANEOUS				

ADDITIONAL COMMENTS: Outlet pipe was deteriorated badly and removed prior to inspection.

NAME OF DAM: Sawmill Pond Dam STATE ID #: 3-14-45-1

INSPECTION DATE: July 20, 2021 NID ID #: MA00098

CONCRETE/MASONRY DAMS (CREST)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
CREST	TYPE	N/A			
	SURFACE CONDITIONS				
	CONDITIONS OF JOINTS				
	UNUSUAL MOVEMENT				
	HORIZONTAL ALIGNMENT				
	VERTICAL ALIGNMENT				

ADDITIONAL COMMENTS:

NAME OF DAM: Sawmill Pond Dam STATE ID #: 3-14-45-1

INSPECTION DATE: July 20, 2021 NID ID #: MA00098

CONCRETE/MASONRY DAMS (DOWNSTREAM FACE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S FACE	TYPE	N/A			
	SURFACE CONDITIONS				
	CONDITIONS OF JOINTS				
	UNUSUAL MOVEMENT				
	ABUTMENT CONTACT				
	LEAKAGE				

ADDITIONAL COMMENTS:

NAME OF DAM: Sawmill Pond Dam STATE ID #: 3-14-45-1

INSPECTION DATE: July 20, 2021 NID ID #: MA00098

CONCRETE/MASONRY DAMS (UPSTREAM FACE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
U/S FACE	TYPE	N/A			
	SURFACE CONDITIONS				
	CONDITIONS OF JOINTS				
	UNUSUAL MOVEMENT				
	ABUTMENT CONTACTS				

ADDITIONAL COMMENTS:

APPENDIX C
Previous Reports and References

PREVIOUS REPORTS AND REFERENCES

The following is a list of reports that were located during the file review or were referenced in previous reports.

1. Emergency Action Plan for Saw Mill Pond Dam, by Town of Brookfield, Brookfield, MA, November 25, 2019.
2. Inspection/Evaluation Report, Saw Mill Pond Dam, by Lenard Engineering, Inc., for MA DCR, Office of Dam Safety, March 1, 2016;
3. Emergency Action Plan for Saw Mill Pond Dam, by Town of Brookfield, Brookfield, MA, June 15, 2015.
4. Chapter 253 Permit Application, by Lenard Engineering, Inc., Auburn, MA, January 3, 2013.
5. Inspection/Evaluation Report, Saw Mill Pond Dam, by Lenard Engineering, Inc., for MA DCR, Office of Dam Safety, January 23, 2013;
6. Inspection/Evaluation Report, Saw Mill Pond Dam, by Fuss & O'Neill, for MA DCR, Office of Dam Safety, July 31, 2012;
7. Inspection/Evaluation Report, Saw Mill Pond Dam, by Fuss & O'Neill, for MA DEM, Office of Dam Safety, February 2, 2012;
8. Jurisdictional Inspection and Report, July 30, 2007, performed by Tighe & Bond.

The following references were utilized during the preparation of this report and the development of the recommendations presented herein.

1. USGS "Streamstats", http://water.usgs.gov/osw/streamstats/massachusetts.html.

LEGEND

EXISTING	NAME	PROPOSED
610	MAJOR CONTOUR	610
609	MINOR CONTOUR	609

LIMIT OF RIPRAP SLOPE

STONE BARRIER

LIMIT OF RIPRAP SLOPE

Flared End Inv=611.2

Flared End Inv=610.2

TROUT BROOK

×603.8

×604.8

×615.1

12"CMP

12"HDPE

UP#39

UP#42

Guard Rail

Edge Pave

Bit Curb

BIT. CONC. CURB

CB TF=615.3 INV=611.3 IN INV=611.8 OUT

CB TF=615.0 INV=611.9

CB TF=615.2 INV=610.7

CB TF=615.2 INV=611.5

CONCRETE END POST

Flared End Inv=611.1

CONCRETE END POST

LAKE

ROAD

Bit. Curb

Edge Of Pavement

Concrete Bridge/ Dam Abutment

Stone And Mortar Retaining Wall

Concrete Apron

Concrete Sidewalk

Steel Guardrail

Edge Of Water

Border Vegetated Wetland

Wooded Area

Grass

6"Maple

4"Maple

Gravel Area

Tree Line

Fixed Zone AE Elevation 610.39 (NAVD 88) FIRM Map 25025C0398 D Dated July 2, 1981

24" CMP Inv=605.04

12" CMP Inv=610.32±

2" CMP Inv=610.92± Origin Unknown

Concrete Dam Spillway

R=490.00' L=339.45' Δ 39°41'31"

R=430.00' L=297.88' Δ 39°41'29"

R=1000.00' L=201.37' Δ 11°34'19"

N/F Roger & Barbara Mundell Db 5928 Pg 268 Ap:5-C-1

N/F Royal & Gail Carter Db 28157Pg 310 Ap:5-C-10

N/F Paul T. Terry Db 14456 Pg 386 Ap:5-C-12

N/F Herbert & Lisa Chaffee Db 7877 Pg 349 Ap:5-C-13

N/F Paul & Elise Provost Db 18528 Pg 64 Ap:5-C-31

N/F Arthur & Kathy Huard Db 9757 Pg 64 Ap:5-C-24

N/F Town Of Brookfield Ap:5-C-23

RICE POND
A.K.A.
SAW MILL POND

GRAPHIC SCALE

0 10 20 40

(IN FEET)

RECORD DRAWING

PREPARED FOR

TOWN OF BROOKFIELD

SAWMILL POND DAM REHABILITATION

BROOKFIELD, MASSACHUSETTS

Designed By: DWB

Drawn By: DWB

Checked By: KWH

CAD File: AsBuilt

Drawing Scale: 1"=20'

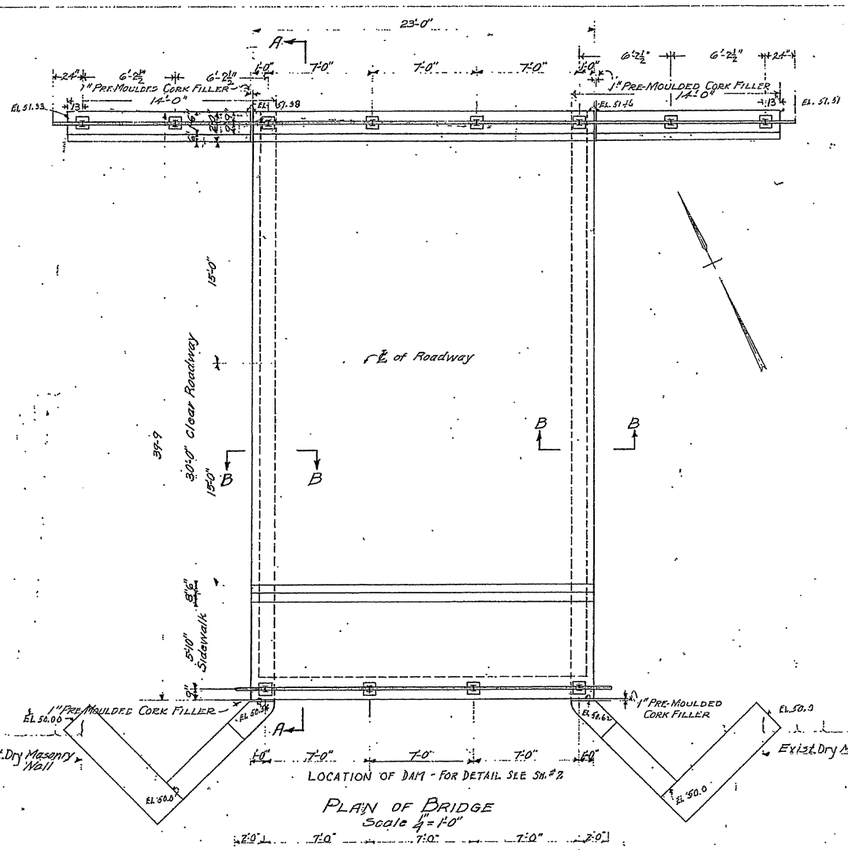
Drawing date: MAR. 3, 2016

Rev.	Date	Revision	By

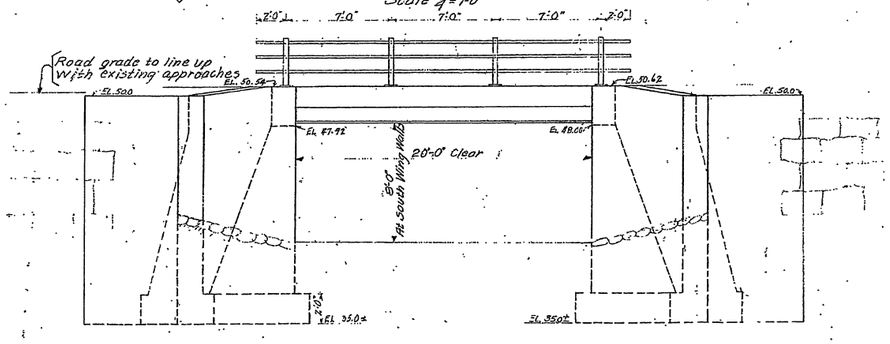
Lenard Engineering, Inc.
Civil, Environmental and Hydrogeological Consultants
2210 Main Street GLASTONBURY, CT (860)659-3100
140 Willow Street WINSTED, CT (860)379-8669
19 Midstate Drive AUBURN, MA (508)721-7600

Figure #: 1

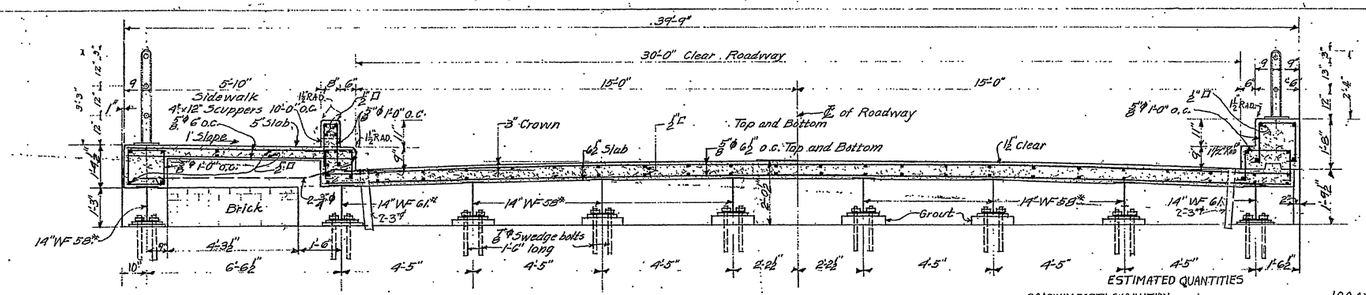
Job #: 15-709



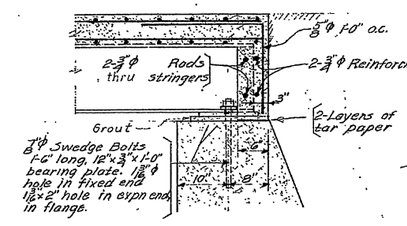
PLAN OF BRIDGE
Scale ¼"=1'-0"



ELEVATION
Scale ¼"=1'-0"



SECTION "AA"
Scale 1"=1'-0"



SECTION "BB"
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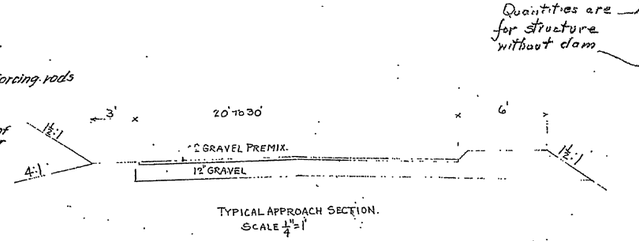
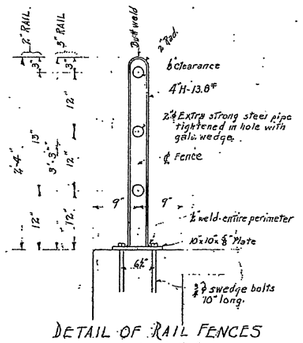


TYPICAL APPROACH SECTION.
SCALE 1½"=1'



DETAIL OF RAIL FENCES
Scale 1"=1'-0"

Quantities are for structure without dam

ESTIMATED QUANTITIES

ROADWAY EARTH EXCAVATION	100 C.Y.
TREES TO BE REMOVED	2 EACH
ORDINARY BORROW	700 C.Y.
STRIPPING GRAVEL PITS	54 C.Y.
FINE GRADING	1000 S.Y.
12" BIT. COAT. CORR. METAL PIPE	40 L.F.
CATCH BASINS	2 EACH
2" PREMIX BIT. GRAVEL SURF.	500 S.Y.
HWY. GUARD TYPE W2C	200 L.F.
CURB INLETS (CONCRETE)	2 EACH
DRY STONE MASONRY	5 C.Y.
BRIDGE EXCAVATION	315 C.Y.
TRENCH LEDGE EXCAVATION	20 C.Y.
CHANNEL EXCAVATION	225 C.Y.
LEDGE EXCAVATION	25 C.Y.
GRAVEL BORROW	540 C.Y.
CONCRETE CLASS A	25 C.Y.
CONCRETE CLASS C	293 C.Y.
REINFORCING STEEL	6100 LBS.
STRUCTURAL STEEL	12750 LBS.
2 RAIL STEEL FENCE	50 L.F.
3 RAIL STEEL FENCE	25 L.F.
RIP RAP	10 C.Y.
LUMBER SHEETING (IF REQUIRED)	1 M.F.B.M.
STONE PAVING	90 S.Y.
REMOVAL OF STRUCTURES	L.S.
TEMPORARY BRIDGE	L.S.
30" COATED COR. METAL PIPE	35 L.F.
SLIDE HEADGATE WITH FRAME	1 EACH
STONE MASONRY WALLS - REMOVED & REBUILT IN CEMENT MORTAR	10 C.Y.
TRENCH EXCAVATION	30 C.Y.

GENERAL NOTES

FINISH: All exposed concrete surfaces to be rubbed smooth with corundum brick and left free from all form marks and imperfections.

FOUNDATIONS: May be altered if necessary to suit conditions of construction.

DESIGN: According to specifications of American Association of State Highway Officials (1935 Edition) for H-15 Loading.

WEEP HOLES: To be provided in wing walls and abutments as directed by the Engineer.

CONCRETE: All concrete in superstructure Class A. All concrete in wing walls, abutments, dam, cut-off wall & culvert head wall Class C.

STEEL: The color chart for Structural Steel shall be Structural Green

REV. BY D.P.W. 10/23/39

FAY, SPOFFORD & THORNDIKE
ENGINEERS
BOSTON, MASS.

ADV. 10/24/39
DAM REMOVED 11/1/39
CON. 11/1/55

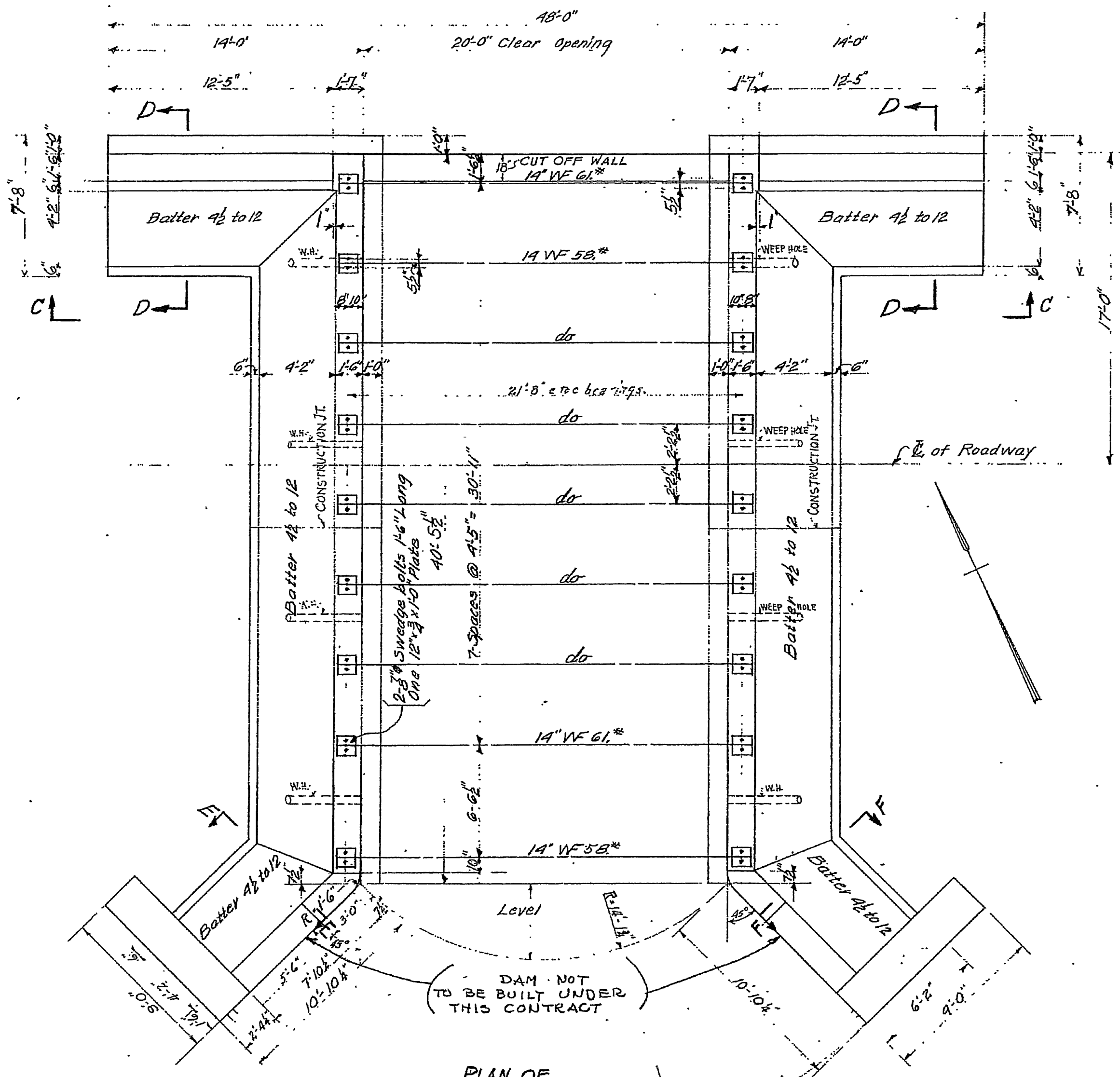
THE COMMONWEALTH OF MASSACHUSETTS.
PROPOSED BRIDGE & DAM
BROOKFIELD
LAKE ROAD
OUTLET RICES POND

SCALES AS NOTED
OFFICE OF
DEPARTMENT OF PUBLIC WORKS
100 NASHUA ST. BOSTON, MASS.
OCTOBER 1939

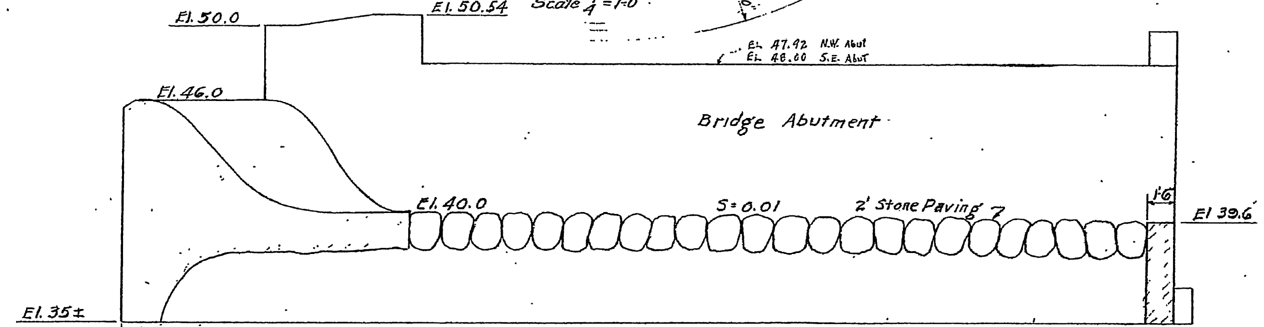
BRIDGE ENGINEER — CHIEF ENGINEER
DESIGNED BY — TRACED BY — CHECKED BY

SHEET No. 1 OF 2 — BRIDGE No. B-26-1

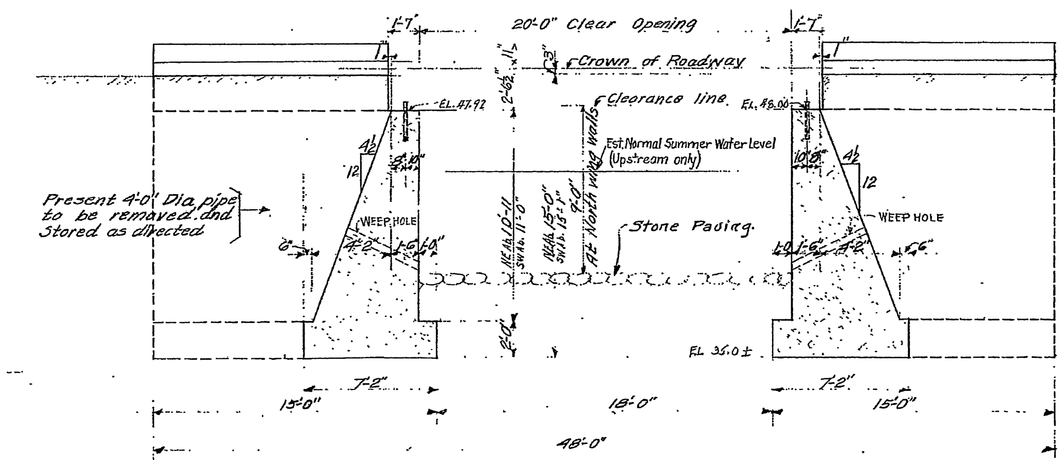
B-26-1 W.P.



PLAN OF DAM & ABUTMENTS
Scale ¼"=1'-0"



SECTION ON ℄
Scale 1"=4'-0"



SECTION "CC"
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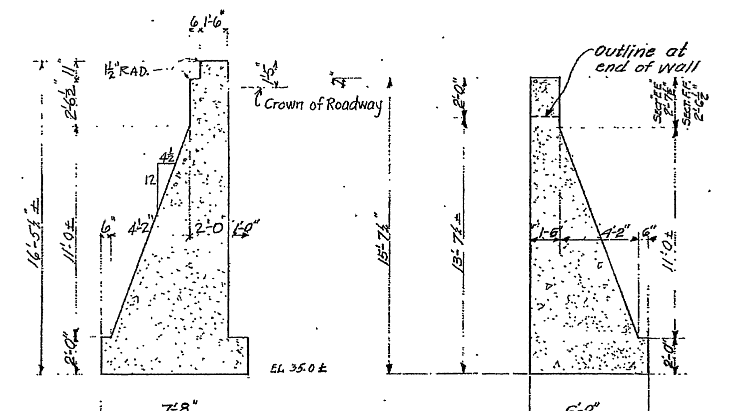
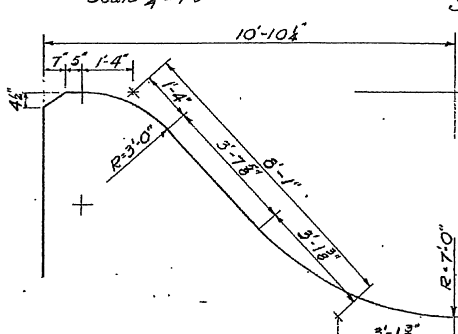
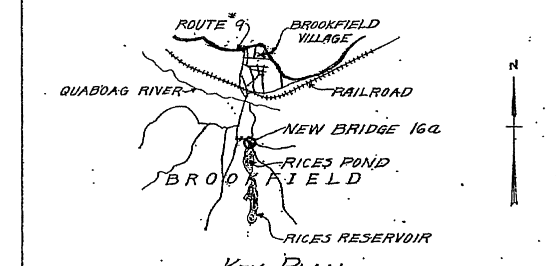


SECTION "DD"
Scale ¼"=1'-0"

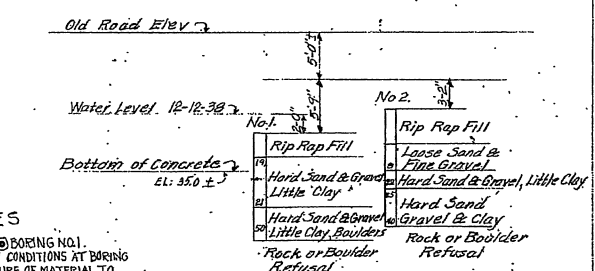
SECTION "EE"
SECTION "FF" OPP HAND
Scale ¼"=1'-0"



DETAILS OF CREST
Scale 1"=2'-0"



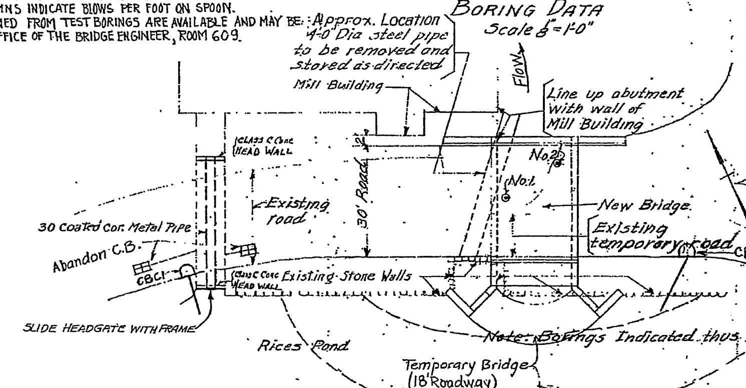
KEY PLAN
Approx Scale 1"=1 Mile



BORING DATA
Scale ⅛"=1'-0"

BORING NOTES

LOCATION OF BORINGS SHOWN ON KEY PLAN THUS ◉ BORING NO.1.
BORINGS TAKEN FOR PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, AND DO NOT NECESSARILY SHOW NATURE OF MATERIAL TO BE ENCOUNTERED IN CONNECTION WITH CONSTRUCTION OF THE BRIDGE.
FIGURES IN COLUMNS INDICATE BLOWS PER FOOT ON SPOON.
SAMPLES OBTAINED FROM TEST BORINGS ARE AVAILABLE AND MAY BE SEEN AT THE OFFICE OF THE BRIDGE ENGINEER, ROOM 609.



LOCATION PLAN
Scale 1"=20'-0"

THE COMMONWEALTH OF MASSACHUSETTS

PROPOSED BRIDGE
BROOKFIELD
LAKE ROAD
OUTLET RICES POND

SCALES AS NOTED.
OFFICE OF
DEPARTMENT OF PUBLIC WORKS
100 NASHUA ST, BOSTON, MASS.
OCTOBER 1939

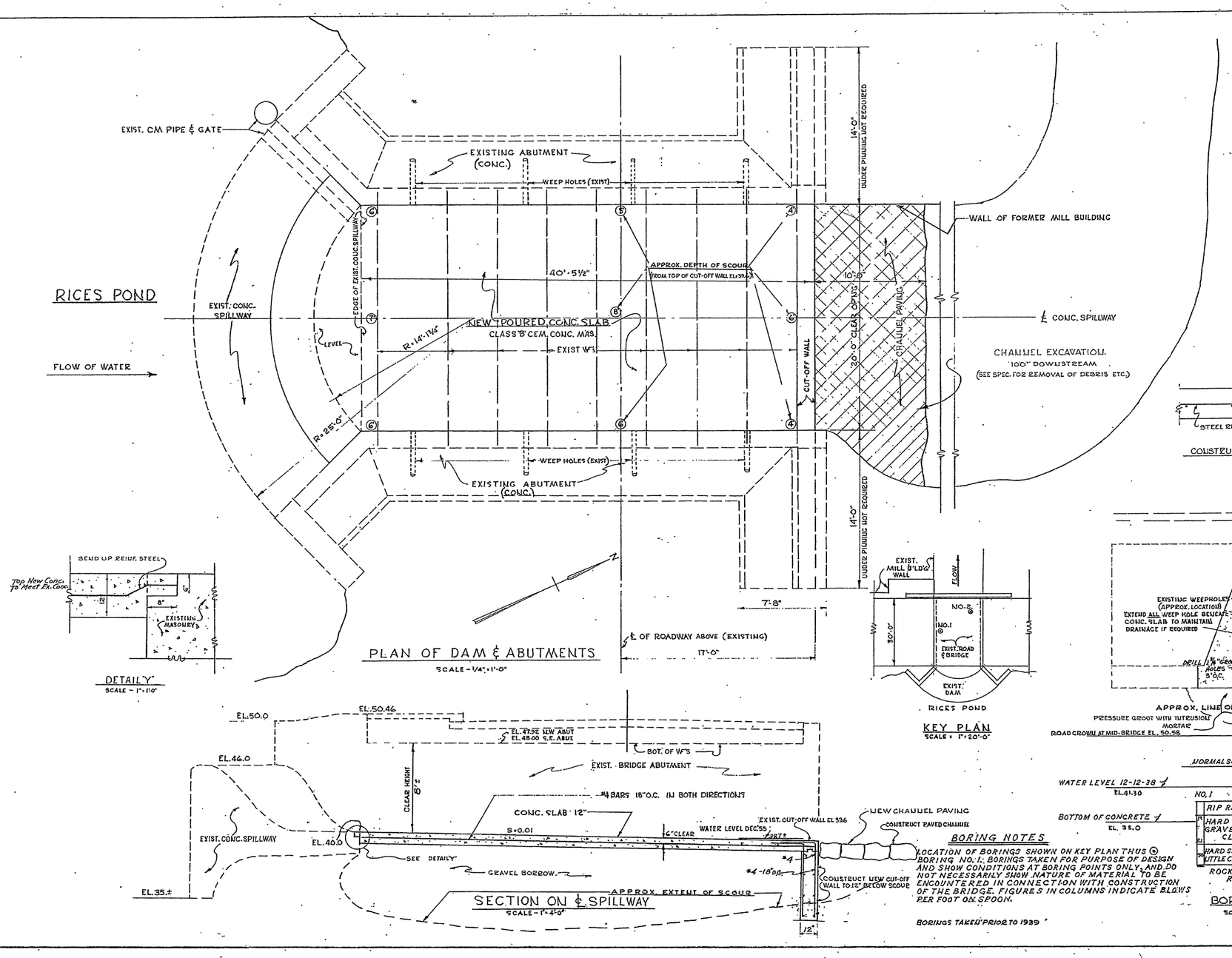
FAY, SPOFFORD & THORNDIKE
ENGINEERS
BOSTON, MASS.

ADV 10/24/39
CON. 11/1/39

SHEET NO. 2 OF 2

BRIDGE NO. B-26-11 16a

B-26-11



PLAN OF DAM & ABUTMENTS

SCALE - 1/4" = 1'-0"

KEY PLAN

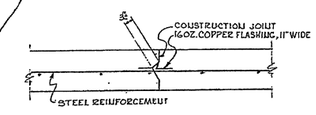
SCALE = 1" = 20'-0"

DETAIL 'Y'

SCALE - 1" = 1'-0"

SECTION ON ℄ SPILLWAY

SCALE - 1" = 4'-0"



CONSTRUCTION JOINT IN SLAB

NO SCALE

GENERAL NOTES

FOUNDATIONS:
MAY BE ALTERED, IF NECESSARY, TO SUIT CONDITIONS ENCOUNTERED IN CONSTRUCTION.

DESIGN:
ACCORDING TO SPECIFICATIONS OF AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS (1953 ED.) FOR H-15-35 (EXIST.)

DIMENSIONS:
ALL DIMENSIONS AND DETAILS SHOWN FOR THE EXISTING STRUCTURE MUST BE CHECKED IN THE FIELD BY THE CONTRACTOR.

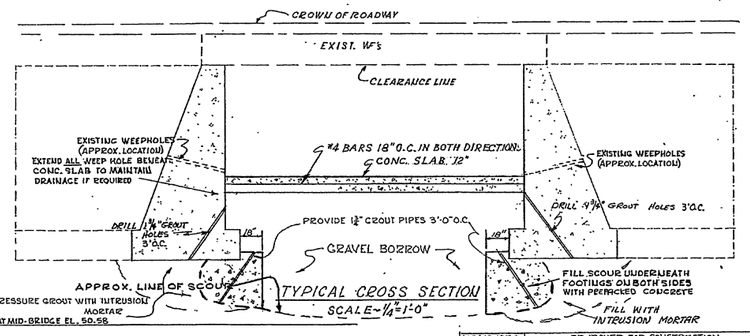
REINFORCEMENT:
ALL BARS SHALL HAVE DEFORMATIONS CONFORMING TO ASTM DESIGNATION A305 UNLESS OTHERWISE SHOWN ON THE PLANS, REINFORCING BARS SHALL BE LAPPED 20 DIAMETERS TO MAKE A SPLICE, EXCEPT THAT MAIN REINFORCING BARS NEAR THE TOP OF THE SLABS AND BEAMS HAVING MORE THAN 12" IN CONCRETE UNDER THE BARS SHALL BE LAPPED 35 DIAMETERS TO MAKE A SPLICE.

OLD BRIDGE PLANS:
PLANS OF EXISTING STRUCTURE - DATED OCT. 1939 - MAY BE SEEN AT THE OFFICE OF THE BRIDGE ENGINEER, 100 HASHUA ST, BOSTON, MASS.

BENCH MARK
B.M. ELEVATIONS SHOWN REFER TO EXISTING STRUCTURE. NEW WORK TO CONFORM TO EXISTING STRUCTURE.

BRIDGE STRUCTURE
(QUANTITIES NOT GUARANTEED)

MASONRY REPAIRS	1 L.S.
CHANNEL EXCAVATION	100 C.Y.
CHANNEL PAVING	25 C.Y.
GRAVEL BORROW	250 C.Y.
CLASS 'A' ROCK EXCAVATION	5 C.Y.
INTRUSION MORTAR FOR PRE-PACKED CONC.	300 BAGS
INTRUSION MORTAR FOR FOUNDATIONS	50 BAGS
AGGREGATE FOR PRE-PACKED CONC.	50 C.Y.
DRILLING GROUT HOLES	120 L.F.

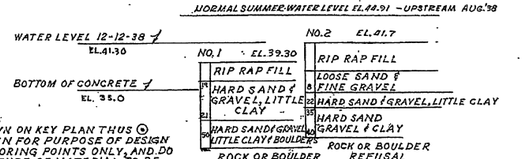


TYPICAL CROSS SECTION

SCALE - 1/8" = 1'-0"

ROAD CROWN AT MID-BRIDGE EL. 50.58

NORMAL SUMMER WATER LEVEL EL 44.91 - UPSTREAM AUG. '38



BORING NOTES

SCALE = 1/8" = 1'-0"

BORING NOTES

LOCATION OF BORINGS SHOWN ON KEY PLAN THUS ⊕ BORING NO. 1. BORINGS TAKEN FOR PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, AND DO NOT NECESSARILY SHOW NATURE OF MATERIAL TO BE ENCOUNTERED IN CONNECTION WITH CONSTRUCTION OF THE BRIDGE. FIGURES IN COLUMNS INDICATE BLOWS PER FOOT ON SPOON.

BORINGS TAKEN PRIOR TO 1939

CONSULTING ENGINEERS
UTILITY ENGINEERS INC.
359 BOYLSTON ST.
BOSTON, MASS.

MAY 19, 1956	RE-ISSUED FOR CONSTRUCTION
MAR. 3, 1956	ISSUED FOR CONSTRUCTION

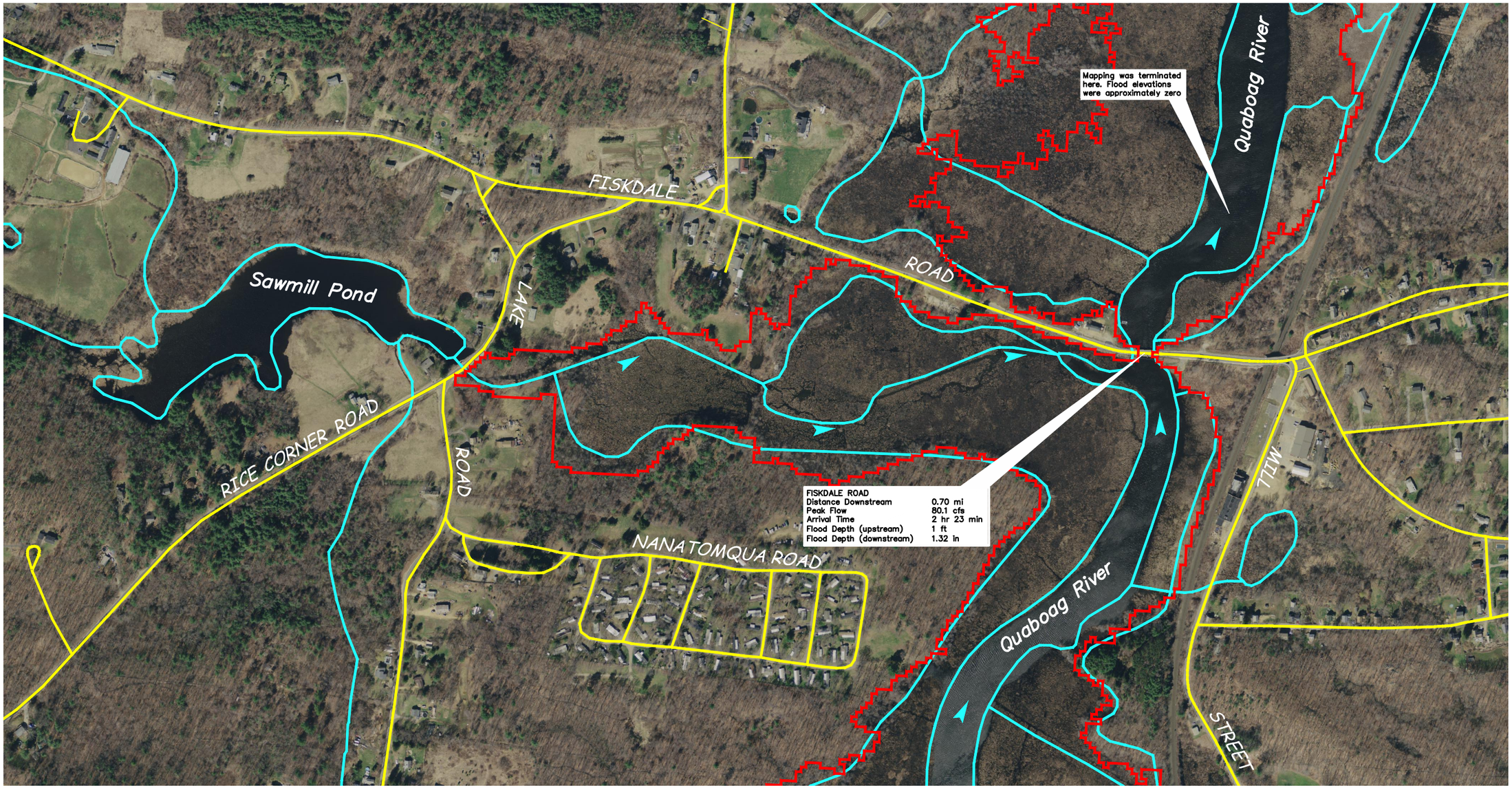
THE COMMONWEALTH OF MASSACHUSETTS
PROPOSED 1955 FLOOD BRIDGE REPAIRS

BROOKFIELD
LAKE ROAD
OUTLET — RICES POND
SCALES AS NOTED
OFFICE OF
DEPARTMENT OF PUBLIC WORKS
100 HASHUA ST. BOSTON, MASS.
MAY 1956

J. Rundlett — BRIDGE ENGINEER
H. S. Levy — CHIEF ENGINEER

SHEET 1 OF 1 SHEETS

BRIDGE No. B-26-11



LEGEND

- TOWN BOUNDARY
- ROADWAYS
- BROOK
- FLOW DIRECTION
- DAM BREACH INUNDATION LIMITS

N

GRAPHIC SCALE

500 0 250 500 1000 2000

(IN FEET)

1 inch = 500 ft.

NOTES:

1. Aerial Photography is from year 2013 downloaded from MassGIS (Bureau of Geographic Information) MassGIS Data Layers. All other background information was obtained from MassGIS (Bureau of Geographic Information) MassGIS Data Layers *(https://www.mass.gov/service-details/massgis-data-layers)*
2. The inundation areas will depend on actual failure conditions and may differ from this map.
3. Inundation areas were calculated by simulating a dam failure using the DSS–WISE Lite computer software.
4. Dam failure was simulated with water at the crest of Sawmill Pond Dam.
5. Inundation areas displayed on this map represent events of extremely remote nature and do not reflect on the integrity of Sawmill Pond Dam.
6. Arrival Times as noted on this plan indicate time after start of breach.
7. A breach of Sawmill Pond Dam may result in failure of downstream dams. The inundation limits as shown on this plan do not account for additional flow that may result from such failures.

Designed By: DWB
Drawn By: DWB
Checked By: CMB
CAD File: EAP Mapping

Drawing date: November 21, 2019
Drawing Scale: AS SHOWN

Rev.	Date	Revision	By

FLOOD INUNDATION MAP

PREPARED FOR

SAWMILL POND DAM

DAM No. 3-14-45-1

BROOKFIELD, MASSACHUSETTS

Lenard Engineering, Inc.
Civil, Environmental and Hydrogeological Consultants
19 Midstate Drive AUBURN, MA (508) 721-7600
140 Willow Street WINSTED, CT (860) 379-6669
2210 Main Street GLASTONBURY, CT (860) 659-3100

Figure #: 1 of 1

Job #: 19–713

APPENDIX D
Definitions

COMMON DAM SAFETY DEFINITIONS

For a comprehensive list of dam engineering terminology and definitions refer to 302 CMR10.00 Dam Safety, or other reference published by FERC, Dept. of the Interior Bureau of Reclamation, or FEMA. Please note should discrepancies between definitions exist, those definitions included within 302 CMR 10.00 govern for dams located within the Commonwealth of Massachusetts.

Orientation

Upstream – Shall mean the side of the dam that borders the impoundment.

Downstream – Shall mean the high side of the dam, the side opposite the upstream side.

Right – Shall mean the area to the right when looking in the downstream direction.

Left – Shall mean the area to the left when looking in the downstream direction.

Dam Components

Dam – Shall mean any artificial barrier, including appurtenant works, which impounds or diverts water.

Embankment – Shall mean the fill material, usually earth or rock, placed with sloping sides, such that it forms a permanent barrier that impounds water.

Crest – Shall mean the top of the dam, usually provides a road or path across the dam.

Abutment – Shall mean that part of a valley side against which a dam is constructed. An artificial abutment is sometimes constructed as a concrete gravity section, to take the thrust of an arch dam where there is no suitable natural abutment.

Appurtenant Works – Shall mean structures, either in dams or separate therefrom, including but not be limited to, spillways; reservoirs and their rims; low-level outlet works; and water conduits including tunnels, pipelines, or penstocks, either through the dams or their abutments.

Spillway – Shall mean a structure over or through which water flows are discharged. If the flow is controlled by gates or boards, it is a controlled spillway; if the fixed elevation of the spillway crest controls the level of the impoundment, it is an uncontrolled spillway.

Size Classification

(as listed in Commonwealth of Massachusetts, 302 CMR 10.00 *Dam Safety*)

Large – structure with a height greater than 40 feet or a storage capacity greater than 1,000 acre-feet.

Intermediate – structure with a height between 15 and 40 feet or a storage capacity of 50 to 1,000 acre-feet.

Small – structure with a height between 6 and 15 feet and a storage capacity of 15 to 50 acre-feet.

Non-Jurisdictional – structure less than 6 feet in height or having a storage capacity of less than 15 acre-feet.

Hazard Classification

(as listed in Commonwealth of Massachusetts, 302 CMR 10.00 *Dam Safety*)

High Hazard (Class I) – Shall mean dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).

Significant Hazard (Class II) – Shall mean dams located where failure may cause loss of life and damage to home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause the interruption of the use or service of relatively important facilities.

Low Hazard (Class III) – Dams located where failure may cause minimal property damage to others. Loss of life is not expected.

General

EAP – Emergency Action Plan – Shall mean a predetermined (and properly documented) plan of action to be taken to reduce the potential for property damage and/or loss of life in an area affected by an impending dam failure.

O&M Manual – Operations and Maintenance Manual; Document identifying routine maintenance and operational procedures under normal and storm conditions.

Normal Pool – Shall mean the elevation of the impoundment during normal operating conditions.

Acre-foot – Shall mean a unit of volumetric measure that would cover one acre to a depth of one foot. It is equal to 43,560 cubic feet. One million U.S. gallons = 3.068 acre-feet.

Height of Dam (Structural Height) – Shall mean the vertical distance from the lowest portion of the natural ground, including any stream channel, along the downstream toe of the dam to the lowest point on the crest of the dam.

Hydraulic Height – means the height to which water rises behind a dam and the difference between the lowest point in the original streambed at the axis of the dam and the maximum controllable water surface.

Maximum Water Storage Elevation – means the maximum elevation of water surface which can be contained by the dam without overtopping the embankment section.

Spillway Design Flood (SDF) – Shall mean the flood used in the design of a dam and its appurtenant works particularly for sizing the spillway and outlet works, and for determining maximum temporary storage and height of dam requirements.

Maximum Storage Capacity – The volume of water contained in the impoundment at maximum water storage elevation.

Normal Storage Capacity – The volume of water contained in the impoundment at normal water storage elevation.

Condition Rating

Unsafe – Major structural*, operational, and maintenance deficiencies exist under normal operating conditions.

Poor – Significant structural*, operation and maintenance deficiencies are clearly recognized for normal loading conditions.

Fair – Significant operational and maintenance deficiencies, no structural deficiencies. Potential deficiencies exist under unusual loading conditions that may realistically occur. Can be used when uncertainties exist as to critical parameters.

Satisfactory – Minor operational and maintenance deficiencies. Infrequent hydrologic events would probably result in deficiencies.

Good – No existing or potential deficiencies recognized. Safe performance is expected under all loading including SDF.

* Structural deficiencies include but are not limited to the following:

- Excessive uncontrolled seepage (e.g., upwelling of water, evidence of fines movement, flowing water, erosion, etc.)
- Missing riprap with resulting erosion of slope
- Sinkholes, particularly behind retaining walls and above outlet pipes, possibly indicating loss of soil due to piping, rather than animal burrows
- Excessive vegetation and tree growth, particularly if it obscures features of the dam and the dam cannot be fully inspected
- Deterioration of concrete structures (e.g., exposed rebar, tilted walls, large cracks with or without seepage, excessive spalling, etc.)
- Inoperable outlets (gates and valves that have not been operated for many years or are broken)