-- ANY LAKE DAM --

PHASE I

INSPECTION / EVALUATION REPORT

Dam Name:	Any Lake Dam
State Dam ID#:	1-1-111-1
NID #:	MA11111
Owner:	MA. Dept. of Conservation and Recreation
Town:	Hinsdale, Massachusetts
Consultant:	Eng Corp, Inc.
Date of Inspection:	November 11, 2008

EXECUTIVE SUMMARY

This Phase I Inspection / Evaluation Report details the inspection and evaluation of Any Lake Dam located in Hinsdale, Massachusetts. The inspection was performed on November 11, 2008 by Eng Corp, Inc. of Boston, Massachusetts.

Any Lake Dam is classified as a **Large**, **High Hazard Potential (Class I)** dam. The dam was found to be in **Poor** condition with the following major deficiencies:

- The existing spillway does not have the adequate hydraulic capacity to safely pass the spillway design flood (1/2 Probable Maximum Flood) without overtopping the earth embankment.
- The downstream slope of the embankment may be susceptible to erosion or a downstream failure considering the steepness of the slope and loose/soft zones identified from previously conducted subsurface explorations.
- Seepage along the downstream toe of the embankment was observed when the lake was at the winter pool elevation.
- Heavily wooded areas were observed on the left and right abutments, the embankment left of the spillway, and the areas along the downstream toe.
- The upstream slope contains large scarps over most of the embankment length.

There have been no dam safety related modifications at the dam since the last inspection on October, 2001.

Eng Corp recommends the following actions be taken to address the major deficiencies observed or found at the dam during this inspection and evaluation:

- Increase the hydraulic capacity of the spillway to safely pass the spillway design flood without overtopping the earth embankment dam.
- Modify the embankment to increase the stability and control seepage. Recommended modifications include clearing and grubbing woody vegetation, repairing the large scarps on the upstream slope, construct a drainage blanket and toe drain, and flatten the downstream slope to 3H:1V.
- Lengthen the low-level outlet works, raise the manhole for the valve at the embankment crest, and install a new manhole for the valve near the downstream end of the existing outlet pipe.
- Perform a detailed inspection of the low-level outlet pipe and existing outlet pipe intake structure, and make any necessary repairs.
- Perform additional modifications and repairs to improve the safety, maintenance, and operation of the dam including: leveling the area downstream of the embankment toe to facilitate mowing, clearing trees from the existing spillway channel, and constructing a timber bridge across the spillway to carry lawn mowing equipment to the left abutment.

Dam Evaluation Summary Detail Sheet

1. NID ID:	**MA11111**	**4. Inspection Date:**	**November 11, 2008**
2. Dam Name:	**Any Lake Dam**	**5. Last Insp. Date:**	**April 29, 1999**
3. Dam Location:	**Hinsdale, MA**	**6. Next Inspection:**	**November 11, 2010**
7. Inspector:	**Jonathon Q. Public, P.E.**		
8. Consultant:	**Eng Corp, Inc.**		
9. Hazard Code:	**High**	**9a. Is Hazard Code Change Requested?:**	**No**
10. Insp. Frequency:	**2 Years**	**11. Overall Physical Condition:**	**POOR**
12. Spillway Capacity (% SDF):	**50-90% SDF**		

E1. Design Methodology:	**3**	**E7. Low-Level Discharge Capacity:**	**3**
E2. Level of Maintenance:	**3**	**E8. Low-Level Outlet Physical Condition:**	**4**
E3. Emergency Action Plan:	**4**	**E9. Spillway Design Flood Capacity:**	**2**
E4. Embankment Seepage:	**2**	**E10. Overall Physical Condition of the Dam:**	**2**
E5. Embankment Condition:	**2**	**E11. Estimated Repair Cost:**	**$884,500**
E6. Concrete Condition:	**5**		

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 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 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

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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.

Jonathon Q. Public

Jonathon Q. Public, PE
Massachusetts License No.: 12345
License Type: Civil

Senior Civil Engineer
Eng Corp, Inc.

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SECTION 1

1.0 DESCRIPTION OF PROJECT

1.1 General

1.1.1 Authority

Massachusetts Department of Conservation and Recreation retained Eng Corp, Inc. (Eng Corp) to perform a visual inspection and develop a report of conditions for the Any Lake Dam in the Town of Hinsdale, Berkshire 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 5) miscellaneous.

1.2 Description of Project

1.2.1 Location

Any Lake Dam is located in the Town of Hinsdale in Berkshire County, Massachusetts about two miles east of the town center. The center of the dam is located at latitude 42°26’10” North and longitude -73°04’57” West (WGS 84 datum) as determined from Google Earth. From the center of Hinsdale, take Route 8 (South Street) south to Middlefield Road. Take a left and follow the road to Smith Road, on the left. Follow Smith Road and at a sharp right turn in the road, take a left onto a dirt road. The dirt road leads to the dam.

The Any Lake drainage area is located within the towns of Hinsdale and Peru, Massachusetts. The discharge from Any Lake forms Bennett Brook, a tributary of the Housatonic River. The location of Any Lake 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

The dam was constructed around 1875 by Crane and Company to store water for manufacturing operations. In 1969, ownership of the dam was transferred from Crane and Company to the Commonwealth of Massachusetts. Any Lake is currently used for recreational purposes and has a number of private residences and summer camps located along the lake shoreline.

1.2.4 Description of the Dam and Appurtenances

Any Lake Dam consists of three major components; the east and west earth embankments, the overflow spillway, and the outlet structure (see Figure 4).

The upstream slope of the east and west earth embankments have variable slopes steeper than 1H:1V near the right abutment to a flatter slope near the overflow spillway of about 2.5H:1V. The upstream slopes of the embankments have 6 to 12 inch thick layer of riprap consisting of cobbles and boulders except for the portion of the embankment from approximately Sta. 10+75 (east of the spillway) to the left (looking downstream) abutment.

The west embankment (west of the spillway) is approximately 1200 feet long with a surveyed crest elevation of 1586.4 feet (NAVD 88). The west embankment contains two straight sections connected by a short curved section as depicted in Figure 4. From the right abutment, the embankment travels in an easterly direction and turns approximately 45-degrees towards the southeast and towards the spillway and east abutment, left of the spillway. The east embankment, located east of the spillway is approximately 225 feet long and has a surveyed crest elevation of 1586.9 feet. The maximum height of about 32 feet as measured from the crest to the invert of the low-level outlet.

The upstream slope of the west embankment is grassed approximately 1 foot below the crest and above the riprap slope. The east embankment (left of the overflow spillway) has significant tree growth, very steep slopes and no riprap protection. The crests of the embankments are generally 10 to 15 feet wide. The east embankment has forest debris and the west embankment has a well vegetated grassy cover. The west embankment crest does have evidence of vehicle traffic from maintenance equipment although no significant tire ruts, depressions or unvegetated areas were observed. Vehicular traffic is limited to operations and maintenance vehicles by a locked gate at the right abutment.

Although the original as-built drawings are not available, an 1871 drawing provided in the 1978 Phase I Inspection Report indicates that the embankment slopes were originally designed to be 3H:1V upstream and 2H:1V downstream. Based on our field observations, portions of the upstream and downstream slopes are significantly steeper than shown on the 1871 drawing indicating that the dam was not built as it was originally designed. The drawing also indicates that the dam has a puddle core implying hydraulically placed fill. According to a trace of an original drawing by Hollingsworth (Ref. 37), the core of the embankment may contain a line of continuous piling toed into the natural soil below the dam. Subsurface investigations, performed by others, have not encountered a line of piling nor have they encountered a distinct core material. The material encountered in the core was similar to the material found throughout the embankment except the core material was looser as reported in Ref. 34.

In 1985, a stability berm and a toe drain were constructed along the downstream slope of the embankment between approximately Station 3+20 and Station 6+40. The surveyed crest elevation of the stability berm ranges from approximately El. 1574 to El. 1576, and the berm side slopes are approximately 2H:1V. The toe drain consists of two separate sections constructed on opposite sides of the low-level outlet discharge channel to collect seepage and direct it toward the discharge channel.

The low-level outlet structure is located near Sta. 5+00 and is the primary outlet for the dam. The outlet consists of a 24-inch-diameter pipe with two butterfly valves, one located near the center of the dam crest and one located near the downstream end of the pipe. The valve near the dam crest is used as the primary control for regulating the lake pool and is accessed through a manhole at the dam crest. The valve near the downstream end of the outlet pipe was installed in 1988 and is exposed near the end of the outlet pipe. Based on available information, the original outlet pipe is cast iron, but an 8-foot-long downstream extension installed in 1988 is ductile iron. Based on the trace of an original drawing by Hollingsworth (Ref. 37), the original outlet pipe consists of 12-foot-long sections of cast iron pipe supported by stone or brick masonry footings spaced at 12 feet on-center, and the pipe appears to be relatively level from inlet to outlet. The outlet pipe intake structure is not visible from the embankment crest, but based on the Hollingsworth trace (Ref. 37), the intake structure is expected to be a stone masonry structure similar to the original outlet structure, except that the intake structure is covered by a steel or cast iron grate. A portion of the original outlet structure is visible, but the outlet structure has been modified to include a concrete headwall and wing walls constructed from precast concrete blocks.

An approximately 75-foot-wide broad crested overflow spillway is located about 225 feet from the left abutment between approximately Sta. 12+00 and Sta. 12+75. The spillway channel is approximately 3.5 feet deep and is bounded on both sides by stone masonry training walls. The bottom of the spillway channel is covered with grass, but the top of a stone masonry cutoff wall/control structure is visible along the embankment crest centerline spanning between the training walls. As-built details of the buried portions of the training and cutoff walls are not known. The trace by Hollingsworth (Ref. 37) shows spillway details and dimensions, but the spillway location and spillway depth shown on the Hollingsworth trace are not consistent with the visible portions of the existing spillway.

1.2.5 Operations and Maintenance

Any Lake Dam is owned by DCR. The Anytown State Forest is responsible for operation and maintenance of the dam. Mr. Steve Dough, Supervisor for the Anytown State Forest is the primary caretaker. Operation and maintenance activities are described in Section 2.3 below.

1.2.6 DCR Size Classification

Any Lake Dam has a height of dam of approximately 32 feet and a maximum storage capacity at the top of the dam of 3872 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, Any Lake Dam is classified as a **large** size dam.

1.2.7 DCR Hazard Potential Classification

Any Lake Dam is located upstream of the sparsely populated areas in Hinsdale and Dalton, Massachusetts. The discharge from the dam flows in a southerly direction and then travels north westerly towards the potentially inundated areas in Hinsdale about 5 miles downstream of the dam. The Town of Dalton is located further downstream, about 8 miles downstream of the dam on the East Branch of the Housatonic River. Although Any Lake Dam is located within a rural area, it appears that a failure of the dam will likely cause loss of life and serious damage to homes, secondary highways, public utilities, and a railroad in the towns of Hinsdale, Peru, and Dalton. 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, Any Lake Dam should be classified as a **High Hazard (Class I)** potential dam. The hazard potential classification recommendation is consistent with the hazard potential classification on record with the Office of Dam Safety for Any Lake Dam.

1.3 Pertinent Engineering Data

1.3.1 Drainage Area

The drainage area for Any Lake Dam is approximately 4.17 square miles and extends through the communities of Hinsdale and Peru. The drainage area was delineated and measured using a digital USGS 7.5-minute topographic map in AutoCAD. Most of the drainage area for Any Lake is undeveloped, wooded, and swampy, but a number of small homes and summer camps are located around the perimeter of the lake. The dam's drainage area is presented in Figure 3. There are no dams or significant bodies of water located upstream of the Any Lake.

1.3.2 Reservoir

See Table 1.1 for data about normal, maximum, and spillway design flood (SDF) reservoir volumes. The reservoir volumes were calculated based on surface areas measurements determined from a bathymetric survey of the reservoir. The reservoir has an irregular shape with a maximum length of about 1.5 miles and a maximum width of about 0.75 miles. The lake is divided into a northern and southern areas divided by the Route 143 Bridge.

1.3.3 Discharges at the Dam Site

Reportedly, no records of discharges at the site are maintained.

1.3.4 General Elevations (feet, NAVD 88)

A.	Top of Dam:	
	East Embankment	1586.4
	West Embankment	1586.9
B.	Spillway Design Flood Pool	1587.1
C.	Normal Pool	1582.3
D.	Spillway Crest	1582.3
E.	Upstream Water Elev. at Time of Inspection	1581.1
F.	Downstream Water Elev. at Time of Inspection	none during inspection
G.	Streambed at Toe of the Dam	1553.9
H.	Low Point along Toe of the Dam	1553.8 at outlet channel

1.3.5 Main Spillway

A.	Type	grassed lined broad-crested weir
B.	Weir Length (feet)	74 +/-
C.	Weir Crest Elevation (feet)	1582.3
D.	Upstream Channel Elevation (feet)	1580.3
E.	Downstream Channel Elevation (feet)	1557.8
F.	Downstream Outlet Invert or Channel Bottom Elev.	1553.9

1.3.6 Outlet Structure

A.	Type	Low-level outlet pipe
B.	Pipe Invert	Upstream: Unknown Downstream: 1553.9
C.	Pipe Size	24-inch diameter
D.	Valve type	(2) Butterfly valves
E.	Downstream Water Elevation	1554.3 feet ±

1.3.7 Design and Construction Records and History

The original design and construction information for the dam is not available. Based on reports from previous investigations, the dam was constructed around 1875 by Crane and Company to store water for manufacturing operations. In 1969, ownership of the dam was transferred from Crane and Company to the Commonwealth of Massachusetts.

Based on information provided to us from previous investigations, the following modifications have been made to the dam since ownership was transferred to the Commonwealth of Massachusetts:

- In the spring of 1984, a small slough and cracking were reported near the top of the downstream slope in the vicinity of the low-level outlet, and in early 1985, increased seepage with "soil particle movement" was observed downstream of the low-level outlet. To improve the downstream slope stability and control seepage in the vicinity of the low-level outlet, a stabilization berm and toe drain were constructed in 1985. For details of repairs, refer to plans prepared by Haley and Aldrich, Inc. (Ref. 32).

- Based on a document labeled "Any Lake Dam, (Summary of Known/ Recorded Events)" contained in Ref. 39, a visual inspection of the dam in 1988 revealed that the existing valve controlling the low-level outlet was inoperable. Construction documents were not available to Eng Corp, but it was reported elsewhere that based on the 1988 inspection the following repairs were made to the low-level outlet in 1988/1989:

    - The outlet pipe was extended 8 feet beyond the downstream end of the existing pipe and a new butterfly valve was installed within the pipe extension.
    - The original butterfly valve near the centerline of the dam crest was repaired.
    - A concrete headwall was installed at the outlet pipe outfall and precast concrete block wing walls were installed on both sides of the outlet pipe outfall.
    - Riprap was placed in the outlet discharge channel.

- In the 1978 dam inspection report (Ref. 35), it was reported that the gatehouse covering the access for the low-level outlet valve was destroyed by a fire in 1977, but based on photographs from 1985, the gatehouse was re-built. Since 1985, the gatehouse over the shaft has been replaced by a circular concrete cover with a locking hatch. Documentation of the gatehouse demolition and resulting shaft or valve modification was not available to us.

1.3.8 Operating Records

Operating records that include inspection checklists, mowing schedules, gate operation logs, and periodic monitoring reports are maintained in a three-ring binder located at the maintenance park maintenance garage. The records are maintained by the superintendent and updated on a regular basis after activity at the dam is completed.

1.4 Summary Data Table

See Table 1.1 Summary Data Table.

1.1 Summary Data Table

Required Phase I Report Data	Data Provided by the Inspecting Engineer
National ID #	MA11111
Dam Name	Any Lake Dam
Dam Name (Alternate)	not applicable
River Name	Bennetts Brook
Impoundment Name	Ashmere Lake
Hazard Class	High
Size Class	Large
Dam Type	Earthen Embankment
Dam Purpose	Recreational
Structural Height of Dam (feet)	32
Hydraulic Height of Dam (feet)	27.5
Drainage Area (sq. mi.)	4.17
Reservoir Surface Area (sq. mi.)	312
Normal Impoundment Volume (acre-feet)	2076
Max Impoundment Volume ((top of dam) acre-feet)	3872
SDF Impoundment Volume* (acre-feet)	3971
Spillway Type	Broad crested overflow spillway
Spillway Length (feet)	74+/-
Freeboard at Normal Pool (feet)	5
Principal Spillway Capacity* (cfs)	1210
Auxiliary Spillway Capacity* (cfs)	0
Low-Level Outlet Capacity* (cfs)	50
Spillway Design Flood* (flow rate - cfs)	1/2 PMF / 4,144 cfs
Winter Drawdown (feet below normal pool)	2.5
Drawdown Impoundment Vol. (acre-feet)	1382
Latitude	42°26'10"
Longitude	73°04'57"
City/Town	Hinsdale
County Name	Berkshire
Public Road on Crest	No
Public Bridge over spillway	No
EAP Date (if applicable)	EAP is available at park headquarters, undated
Owner Name	Dept. of Conservation and Rec
Owner Address	251 Causeway Street
Owner Town	Boston, MA 02114-2104
Owner Phone	(555) 123-4567
Owner Emergency Phone	(555) 234-5678
Owner Type	DCR - Water Resources
Caretaker Name	Steve Dough / Supervisor, State Forest
Caretaker Address	426 Main Street
Caretaker Town	Anytown, MA
Caretaker Phone	(555) 123-4567
Caretaker Emergency Phone	(555) 234-5678
Date of Field Inspection	11/11/2008
Consultant Firm Name	Eng Corp, Inc.
Inspecting Engineer	Jonathon Q. Public, P.E.
Engineer Phone Number	(123) 555-1212

*In the event a hydraulic and hydrologic analysis has not been completed for the dam, indicate "No H&H" in this table, recommendation section shall include specific recommendation to hire a qualified dam engineering consultant to conduct analysis to determine spillway adequacy in conformance with 302 CMR 10.00.

SECTION 2

2.0 INSPECTION

2.1 Visual Inspection

Any Lake Dam was inspected on November 11, 2008 by Jonathon Q. Public, PE and Julie S. Doe, PE of Eng Corp, Inc. At the time of the inspection, the weather was sunny to party cloudy and the temperature was around 40°F. 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 1576.8 feet, approximately 5.5 feet below the crest of the spillway. Underwater areas were not inspected. A copy of the inspection checklist is included in Appendix B.

2.1.1 General Findings

In general, Any Lake Dam was found to be in poor condition due to extensive vegetative growth, the existence of several seepage areas, steep embankment slopes, and inadequate slope protection. The specific concerns are identified in more detail in the sections below:

2.1.2 Dam

- Abutments
    - Trees and brush are growing along the upstream and downstream face of the abutments. Significant tree growth was observed approximately 20 feet from the left and right side of the dam.
    - A public boat ramp is located immediately adjacent to the dam's right abutment. The dam and boat ramp are accessed via a dirt road from Smith Road in Hinsdale. Vehicle access to the dam crest is through a locked gate adjacent to the boat ramp.
    - The left and right abutments appear sound with no evidence of erosion, seepage or cracking.
- Upstream Slope

  The condition of the upstream slope varies significantly along the length of the embankment. Photographs A1 to A3 and A6 to A11 show the embankment upstream slope.
    - Brush and several large trees were observed growing on the upstream slope between the right abutment and the embankment. No riprap was observed in this area. See Photograph A1.
    - The embankment slope from the right abutment to about Sta. 10+75 was covered with riprap. The riprap on the lower slope consisted of 6 to 12 inches in diameter cobble and boulder. The upper slope consisted of flat stone riprap 3 to 6 inches

thick with a maximum width of up to about 18 inches. See Photograph A9. Above the riprap, the slope was covered with grass and low cut brush.

- The riprap on the upstream slope near the low-level outlet consisted of boulders 3 to 5 feet in diameter. An area approximately 8-foot wide was not covered with adequate riprap protection. See Photograph A10.

- From about Sta. 10+75 to the left side of the spillway no riprap was observed. The slope in this area is covered with grass and low cut brush and contains several erosion scarps including a 3-foot high erosion scarp. See Photographs A6 and A11.

- No riprap was observed on the upstream slope of the left embankment, from spillway to the left abutment. This embankment is heavily wooded with trees and brush. The size of the tree growth ranges from several inches to greater than 12 inches in diameter on upstream and downstream slopes. See Photographs A7 and A8.

- Crest

  The embankment crest elevation varies slightly along its length from about El. 1586 to El. 1587 and the width varies from about 10 to 15 feet. Photographs A1 to A8 show the various views of the dam crest.

  - The right embankment crest is grass covered and appears to be in good condition. Minor rutting was observed in the crest, but no significant erosion was observed. See Photographs A1 through A6.

  - The left embankment crest was poorly maintained, not vegetated or protected, and covered with sticks and leaves. The left crest was relatively level and no significant rutting or erosion was observed. See Photographs A7 through A8.

- Downstream Slope

  The downstream slope of the embankments are relatively steep (2H:1V or steeper). No signs of slope movement, erosion, or animal burrows were observed. Photographs A1, A2, A4, A5, A7, A8, and A12 show the downstream slope and toe area.

  - The downstream embankment slope near the right abutment is heavily wooded with trees and brush. See Photograph A1.

  - The right embankment downstream slope is generally covered with grass and low cut brush. See Photographs A4, A5, and A12.

  - No seepage was observed on the downstream slope, but wet, soft areas were observed along the embankment toe at the curved section. From about Sta. 6+25 to Sta. 7+25, wetland flagging on the embankment slope may indicate that seepage occurs in this area when the lake level is at normal pool.

- The left embankment downstream slope is heavily wooded with trees and brush. The size of the tree growth ranges from several inches to greater than 12 inches in diameter on upstream and downstream slopes. See Photographs A7 and A8.

- Several soft and wet areas with standing water were observed along the toe of the right embankment, however, no seepage flow was observed at the time of our inspection with the lake at the winter pool level. Note that previous inspection reports, prepared by others, reported visible seepage flow during normal pool levels.

- The toe drain system was not inspected. The outlet for the toe drains could not be located, but we observed two cleanouts for the toe drains on opposite sides of the low-level outlet channel.

- Instrumentation

  There are no instruments installed at the dam.

2.1.3 Appurtenant Structures

- Primary Spillway

  During the inspection the lake elevation was approximately 5 feet below the spillway crest. Photographs A6 and A13 to A16 show the spillway structure.

  - The spillway approach was covered with reeds and the spillway channel was covered with grass and low cut brush. No riprap or erosion protection was visible in the spillway channel, excluding the stone masonry crest.

  - An erosion area was observed in the downstream spillway channel. See Photograph A13.

  - The transition from the spillway to the channel is abrupt, relatively narrow, and heavily wooded.

  - The stone masonry training walls were generally intact, but the mortar was generally in poor condition or missing. Brush was observed at several locations growing between the masonry training wall joints.

- Low-Level Outlets

  The low-level outlet is used as the primary outlet for controlling the lake pool. The upstream end of the outlet pipe and the intake structure were underwater and not visible at the time of our visit. The downstream end of the low-level outlet was visible for inspection. The visible portions of the outlet structure are shown in Photographs A17 and A18.

  - The outlet pipe was flowing approximately one-third to half full during the inspection.

- The butterfly valve at the embankment crest was protected by a locked manhole and was not accessible. See Photograph A3.

- In general, the headwall and concrete wing walls at the downstream end of the outlet pipe appeared to be in good condition and the remaining portions of the original stone masonry outlet structure appeared stable. See Photograph A17.

- The visible portions of the outlet pipe and downstream butterfly valve appeared to be in good condition. The controls for the valve were not accessible and valve was not operated during the inspection.

- The discharge channel for the outlet pipe was lined with riprap near the end of the pipe and no visible signs of channel deterioration were observed.

- Fallen trees blocked the channel downstream of the outlet and may impede flow during periods of significant discharge.

2.1.4 Downstream Area

- The downstream toes of the left and right embankments are heavily wooded.

- Wet and soft areas were observed along the embankment toe at the curved section, and along the toe of the right embankment.

- The left embankment downstream slope is heavily wooded with trees and brush. The size of the tree growth ranges from several inches to greater than 12 inches in diameter on upstream and downstream slopes. See Photographs A7 and A8.

2.1.5 Reservoir Area

- The impoundment is located within a primarily rural area with private properties located along parts of the impoundment shoreline. The shoreline of the impoundment is primarily wooded. The slopes along the perimeter of the pond are flat to moderate, therefore it is believed that the potential for landslides impacting the lake elevation is remote.

- The reservoir is orientated in a north-south direction, flowing towards the south and has an irregular shape with several coves around the perimeter. The lake is divided by the Route 143 Bridge. The bridge passes over a concrete box culvert with open area 7 feet wide and 8.25 feet high with an invert elevation 1578.25 feet. The low point of the road surface is at elevation 1589 feet, approximately.

- As indicated on available documents, the impoundment is approximately 15 feet at its deepest areas with an average depth of approximately 10 feet.

2.2 Caretaker Interview

The Anytown State Forest is responsible for operation and maintenance of the dam. Mr. Steve Dough, Supervisor for the Anytown State Forest is the primary caretaker and was interviewed

during the inspection on November 11, 2005. Information provided by Mr. Dough has been incorporated into this report.

Mr. Dough indicated that he has concerns regarding the erosion and loss of riprap along the upstream slope of the right embankment. Mr. Dough also indicated that it is difficult to access the low-level outlet control during the winter months due to the accumulation of snow and ice.

Mr. Dough also indicated that:

- The dam is mowed twice a year,
- A winter drawdown is implemented,
- There is current discussion regarding the appropriate normal pool elevation,
- Recent modifications include the installation of toe drain along a portion of the dam, and
- Records are maintained at the maintenance building.

2.3 Operation and Maintenance Procedures

The operation and maintenance (O&M) manual for Any Lake Dam was reviewed during the inspection. The latest revision of the O&M manual was dated March 11, 2006. The manual includes the following information; project description and history; a schedule of inspection, operation and maintenance requirements; detailed gate and low-level outlet operating and maintenance instructions; dam inspection procedures and checklist forms; training requirements; and record keeping procedures. Operating and maintenance records are maintained in a three-ring binder located at the maintenance building and at the Anytown State Forest headquarters.

The dam and the appurtenant features are observed on a monthly basis by the dam caretaker. The dam is also inspected prior to, during, and after significant storm events. The observations are recorded on a formal checklist documenting the condition of the crest, upstream and downstream slopes, spillway, outlet structures, and subsurface drains. Copies of the completed checklists are stored in the maintenance building near the dam. The original checklists are stored at the Anytown State Forest headquarters in Anytown.

Refresher training of the caretakers is performed on every three years by ENG CORP engineers and the Anytown State Forest supervisors. Training of new caretakers is performed as needed. The program includes formal training of the operation, maintenance, and inspection procedures for the dam.

2.3.1 Operational Procedures

The gate controlling flow through the low-level outlet is typically opened through out the year to meet minimum flow requirements. Flashboards are typically installed in May and typically removed mid-September. The lake is drawn down 28 to 32 inches during the winter months.

2.3.2 Maintenance of Dam and Operating Facilities

The embankments are mowed approximately twice per year in the late spring and late summer or as needed. Growth of trees and brush are maintained each spring. The embankment is maintained by filling ruts and depressions, and loamed and seeded each spring or as needed. Animal control measures are implemented each spring and fall.

The gates are lubricated and operated on a monthly basis. The flashboards are repaired as needed after they are removed in the fall each year. Debris is removed from the upstream, downstream and crest of the spillway on a weekly basis. Missing or dislodged riprap is replaced as needed through out the year.

2.4 Emergency Warning System

Copies of the emergency action plan (EAP) for the dam are kept at the Anytown State Forest Park headquarters and at the dam maintenance building. The latest revision of the EAP was dated April 26, 2006 and reportedly updated on an annual basis.

The EAP reviewed during the inspection contained the following information:

- Dam owner/operator contact information;
- Notification procedures and flowchart;
- Warning procedures;
- Identification of emergency equipment, manpower, and material;
- Dam location and dam failure inundation maps (sunny day and flood cases); and
- Addresses and telephone numbers of potentially impacted downstream residents.

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

The Anytown State Forest trains their people involved with the implementation of the EAP to ensure that they are familiar with the elements of the plan, the availability of equipment, and their responsibilities and duties under the plan on an annual basis. Training for emergencies and EAP exercises are also performed on an annual basis. During the EAP drill, people on the Notification Flowchart are contacted to verify names and telephone numbers. As each person or agency is contacted, they are asked if they know where their copy of the Emergency Action Plan is kept and if they know what their responsibilities are in the event of an emergency. After the drill, the EAP is reportedly updated as needed and redistributed as necessary.

A siren is reported to be located in the downstream area to notify downstream people of sudden releases from the dam. The siren is tested on an annual basis.

2.5 Hydrologic/Hydraulic Data

Any Lake Dam is classified as a Large size, high hazard (Class I) potential dam and in accordance with MGL 302 CMR 10.00, the spillway design flood is the ½ Probable Maximum Flood (½ PMF). Previous hydrologic and hydraulic studies completed for Any Lake Dam were completed by GEI in 2005, (Ref. 22) and Eng Corp. in 2006 (Ref. 21). An analysis was performed in conjunction with this inspection report to update the 2005 analysis to revise and update the probable maximum precipitation (PMP) values, drainage areas, delineation of sub-watersheds, and the elevation datum (NAVD 88).

The probable maximum precipitation (PMP) used to determine the ½ PMF was based on procedures in National Weather Service's Hydrometeorological Report No. 51 and 52. The total PMP was estimated to be 36.0 inches for the watershed occurring over a 72-hour period.

The dam's drainage area was delineated using a digital 7.5-minute USGS topographic map in AutoCAD. The area was measured to be approximately 4.17 square miles (compared to 4.4 square miles in the 2005 study). Any Lake accounts for approximately 11.6 percent (or 0.48 square miles) of the total area. The total watershed was subdivided into two subwatersheds separated by the bridge/outlet on Route 143. The upper or north portion of the lake was measured to be 1.27 square miles and the lower portion, south of the Route 143 Bridge and outlet was measured to be 2.90 square miles.

The rainfall-runoff and reservoir routing for the ½ PMF design storm was performed using the U.S. Army Corps of Engineers Hydraulic Engineering Center (HEC) Hydraulic Modeling System (HMS) model and procedures described in Section 4, Hydrology (NEH-4) of the SCS National Engineering Handbook. The elevation datum is NAVD88. Previous analyses were performed using the DEM datum and the NGVD datum. The results from the most recent analysis performed in conjunction with this inspection report are summarized below:

A.	Spillway Design Flood (SDF) Return Period:	½ PMF
B.	Precipitation (inches) and methodology:	HMR 51/52
C.	SDF Inflow (cfs):	4144
D.	SDF Outflow (cfs):	3994
E.	Principal Spillway Capacity (cfs):	1210
F.	Auxiliary Spillway Capacity (cfs):	not applicable
G.	Low-level Outlet Capacity (cfs):	50
H.	Percentage of the SDF that can be safely routed without overtopping:	30
I.	SDF Peak Reservoir Elevation (feet):	1587.1
J.	Maximum Depth of Overtopping for SDF (feet):	0.7
K.	Duration of Overtopping for SDF (hours):	6.5

Based on the results of our analyses, the spillway cannot safely pass the design flood and the dam will likely be overtopped during the ½ PMF. The duration of overtopping is estimated to be 6.5 hours with a maximum estimated depth of overtopping equal to 0.7 feet. Overtopping of the earth embankment crest and downstream slope would likely result in a breach of the dam.

2.6 Structural and Seepage Stability

2.6.1 Embankment Structural Stability

Based on the visual observations made during the inspection, the stability of the upstream and downstream slopes of the embankment are in poor condition. The right embankment upstream slope contained large scarps over most of the length. The downstream slopes are relatively steep at 2H: 1V or steeper. The left embankment contains significant tree growth. Several soft and wet areas with standing water were observed along the toe of the right embankment. A possible slope movement was observed in the bench near the low-level outlet.

During the inspection it was noted the downstream slope of the stability berm right of the outlet and the right groin were soft with evidence of water near the surface. This condition has also been reported in previous inspection reports and was reportedly the cause of a slough failure left of the outlet in 1984 which led to the construction of the stability berm. This indicates that the

phreatic surface is at or just below the surface of the slope and may cause slope stability issues or failure of the embankment, especially during periods of elevated lake levels.

A review of previous observations, analyses, and reports by others, regarding stability, is summarized below:

- Stability problems have been observed by others. In 1985, sloughing of the downstream slope was observed near Sta. 5+00, and to increase the embankment stability, a stabilizing berm was constructed along a portion of the embankment toe as described in Section 2.5.1 of this report. In 2003, Pare Engineering Corporation (Ref. 24) reported signs of possible sloughing of the stability berm near the low-level outlet.

- Subsurface investigations performed in the embankment in 1985 and 2003 (Ref. 33, Ref. 34, Ref. 27, and Ref. 28) indicated that soil conditions are similar throughout the embankment. The subsurface investigations did not find evidence of a low permeability core material to control seepage through the embankment nor did they find evidence of a free draining downstream shell.

- Low SPT N-values and drilling records on several boring logs presented by Haley and Aldrich (Ref. 32) and Root Engineering (Ref. 27) indicate that loose or soft zones are present in the embankment. The locations of all loose/soft zones are not known, and there is potential for soft zones to exist that may jeopardize the stability of the embankment during higher impoundments.

Based on our evaluation and the evaluations by others, it is our opinion that during periods of high water impoundments the embankment may become unstable and increased seepage through embankment and foundation could result in internal erosion and a piping failure of the embankment. As noted above, the embankment may be susceptible to a downstream slope failure during a seismic event because of the steep downstream slope and loose embankment zone.

A detailed stability analysis of the embankment has not been performed and should be performed for the load conditions required in accordance with 302 CMR 10.00 as recommended in Section 3 of this report.

2.6.2 Structural Stability of Non-Embankment Structures

A structural stability analysis of the spillway has not been performed nor is required based on the relatively flat upstream and downstream slopes. The visual inspection of the spillway indicated that the structural stability is satisfactory with no visible signs of instability, movement or erosion. As previously noted, the spillway cannot safely pass the spillway design flood without overtopping the earth embankments.

2.6.3 Seepage Stability

Wet, soft areas were observed along the downstream embankment toe at the curved section although no visible signs of seepage were observed. From about Sta. 6+25 to Sta. 7+25, wetland flagging on the embankment slope may indicate that seepage occurs in this area when the lake level is at normal pool.

Several soft and wet areas with standing water were observed along the toe of the left and right embankment. At the time of our visit, the lake level had been lowered to the winter pool level and no seepage flow was observed in this area. Based on inspection reports prepared by others, visible seepage flow is more likely to occur at normal pool levels.

A soft, wet area was observed during the inspection on the downstream slope of the stability berm right of the outlet and near the right groin. This condition has been reported in previous inspections and reportedly the cause of the sloughing failure in 1984. The stability berm was subsequently constructed to remediate the sloughing and instability of the embankment. A review of historical data indicates that the phreatic surface is at or near the downstream face of the dam. During elevated lake levels and flood events the seepage condition may increase and quickly lead to failure or eventual failure of the embankment.

The embankment is relatively homogenous and does not have a system to safely collect, filter, and channel seepage that passes through the dam and the foundation. As a result, the dam has a potential for internal erosion due to seepage. Due to the steep downstream slope and the presence of loose zones in the embankment, Any Lake Dam may be susceptible to a downstream slope failure during a seismic event.

There is no instrumentation installed at the dam to measure seepage. A detailed seepage analysis of the right or left embankments has not been performed.

SECTION 3

3.0 ASSESSMENTS AND RECOMMENDATIONS

3.1 Assessments

In general, the overall condition of Any Lake Dam is Poor. The dam was found to have the following deficiencies:

1. The existing spillway does not safely pass the spillway design flood (SDF) of ½ Probable Maximum Flood (PMF) without overtopping of the embankment as required by Commonwealth of Massachusetts Regulations 302 CMR 10.00 for an existing dam. Overtopping the Any Lake Dam embankment is likely to cause significant erosion that would lead to a breach failure of the dam.

2. Due to loose zones in the embankment and seepage in the downstream slope, the embankment is likely to become unstable at high pool impoundments.

3. The embankment may be susceptible to a downstream slope failure during a seismic event because of the steep downstream slope and loose embankment zones.

4. The embankment is relatively homogenous and does not have a system to safely collect, filter, and channel seepage that passes through parts of the dam and the dam foundation. As a result, the dam has a potential for internal erosion due to seepage.

5. The left and right abutments, the embankment left of the spillway, and the areas along the downstream toe are heavily wooded. Large trees could be uprooted during a storm event leaving cavities in the slope. These potential cavities and potential cavities left from tree roots can provide shortened flow paths for embankment seepage with the potential for internal erosion and embankment failure.

6. The upstream slope contains large scarps over most of the embankment length. Continued erosion of the upstream embankment can result in shortened seepage paths resulting in increased seepage in the downstream slope, decreased embankment stability, and internal erosion.

7. The downstream slope is relatively steep at 2H: 1V and difficult to maintain. Based on reports by others, undesirable vegetation has previously been observed growing on the downstream slope of the dam, and in our opinion, difficulty of maintaining the downstream slope may contribute to reduced maintenance.

8. Collect the necessary data and perform a detailed stability and seepage of the left and right embankments for the load conditions required in accordance with 302 CMR 10.14.

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

Previously Identified Deficiency	*Resolution or Current Condition*
Repair upstream riprap slope.	Unresolved, scarp and erosion increasing.
Remove heavy vegetation and trees.	Unresolved, vegetation on left abutment, toe, and groin areas spreading.
Flatten the downstream embankment slopes to prevent erosion and increase stability.	Unresolved, no apparent change since last inspection.
Address the apparent deficiencies with the toe drain.	Unresolved and appears to be unchanged since last inspection.
Increase the discharge capacity to accommodate the spillway design flood.	Unresolved, no apparent change since last inspection.
Remove vegetation and debris from spillway	This recommendation was resolved in May, 2005.

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.

1. Perform stability and seepage analysis upon the narrow section of the embankment at the bend in the embankment and at the primary outlet, as well as along the previously reinforced sections. Based upon the result of these analyses, embankment repairs including widening of the embankment, the construction of stability berms, installation of blanket drains, or the construction of a core wall may be necessary. The stability analysis should be performed in accordance with current state requirements and evaluate the structure under normal and extreme operating conditions taking into affect ice loading.

2. Evaluate the capacity and integrity of the erodible overflow channel based upon current conditions. Perform a stability analysis upon the training walls for the overflow spillway and perform any necessary repairs. Evaluate alternatives to increase the discharge capacity through the structure.

3.3 Recurrent Maintenance Recommendations

The activities presented below should be untaken 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:

1. Control and prevent further growth of unwanted vegetation.

2. Perform regular monitoring and inspection of the dam, especially in areas of suspected movement and seepage. Continue monitoring seepage along the downstream slope, toe

and areas. Consider installing a means of measuring flow may be necessary along the existing toe drain.

3. Trap and remove rodents form the embankment and the immediate downstream areas.

3.4 Minor Repair Recommendations

The following recommendations to 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.

1. Install piezometers and inclinometers to monitor and map the phreatic surface to determine the impact on the overall stability and integrity of the structure.

2. Level the area downstream of the embankment toe to facilitate mowing, clearing trees from the existing spillway channel, constructing a timber bridge across the spillway to carry lawn mowing equipment to the left abutment.

3. Regrade and reshape the upstream slope, install filtered slope protection, and place additional riprap on the upstream embankment slope for erosion protection from wave and ice action.

3.5 Remedial Modification Recommendations

1. Modify the embankment and spillway to safely pass the ½ PMF without overtopping the dam. Proposed modifications include raising the embankment crest, modifying the existing spillway by creating a more efficient spillway configuration, replacing the existing stone masonry training walls with reinforced concrete training walls, lowering the spillway crest to the normal pool elevation, and improving the spillway channel immediately downstream of the embankment.

2. Modify the dam embankment to increase the embankment stability and control seepage. Modifications include clearing and grubbing vegetation, repairing the upstream slope, constructing a drainage blanket and toe drain, and placing common fill to flatten the downstream slope to 3H:1V.

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.

Alternatives for improving the stability of the structure may include the implementation of one or more of the following:

- Construction of additional stability berms
- Installation of a blanket and tope drain system
- Construction of a cut off wall
- Installation of an upstream blanket

Alternative for increasing the discharge capacity of the dam include the following:

- Increase the storage within the reservoir by lowering the normal pool or raising the height of the earth embankments.
- Creating a deeper channel through the overflow spillway with the invert or top of boards set to regulate flows at the winter drawdown elevation.
- Increase the existing overflow spillway discharge by adding a concrete lining to improve the flow characteristics.
- Install a new spillway to safely pass the spillway design flood with minimum freeboard.
- Create an emergency spillway by armoring the embankment, or portion of the embankment, to prevent erosion and to allow overtopping during significant floods.

3.7 Opinion of Probable Construction Costs

The following conceptual opinions of probable costs 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.

Recurrent Maintenance Recommendations

1. Control and prevent vegetation	$3,000 to $5,000 per year
2. Regular monitoring and inspection, seepage	$10,000 to $15,000 per year
3. Rodent Control	$2,000 to $4,000 per year
sub-total	$15,000 to $24,000 per year
10 % Contingency	$1,500 to $24,000 per year
Total	$16,500 to $26,400 per year

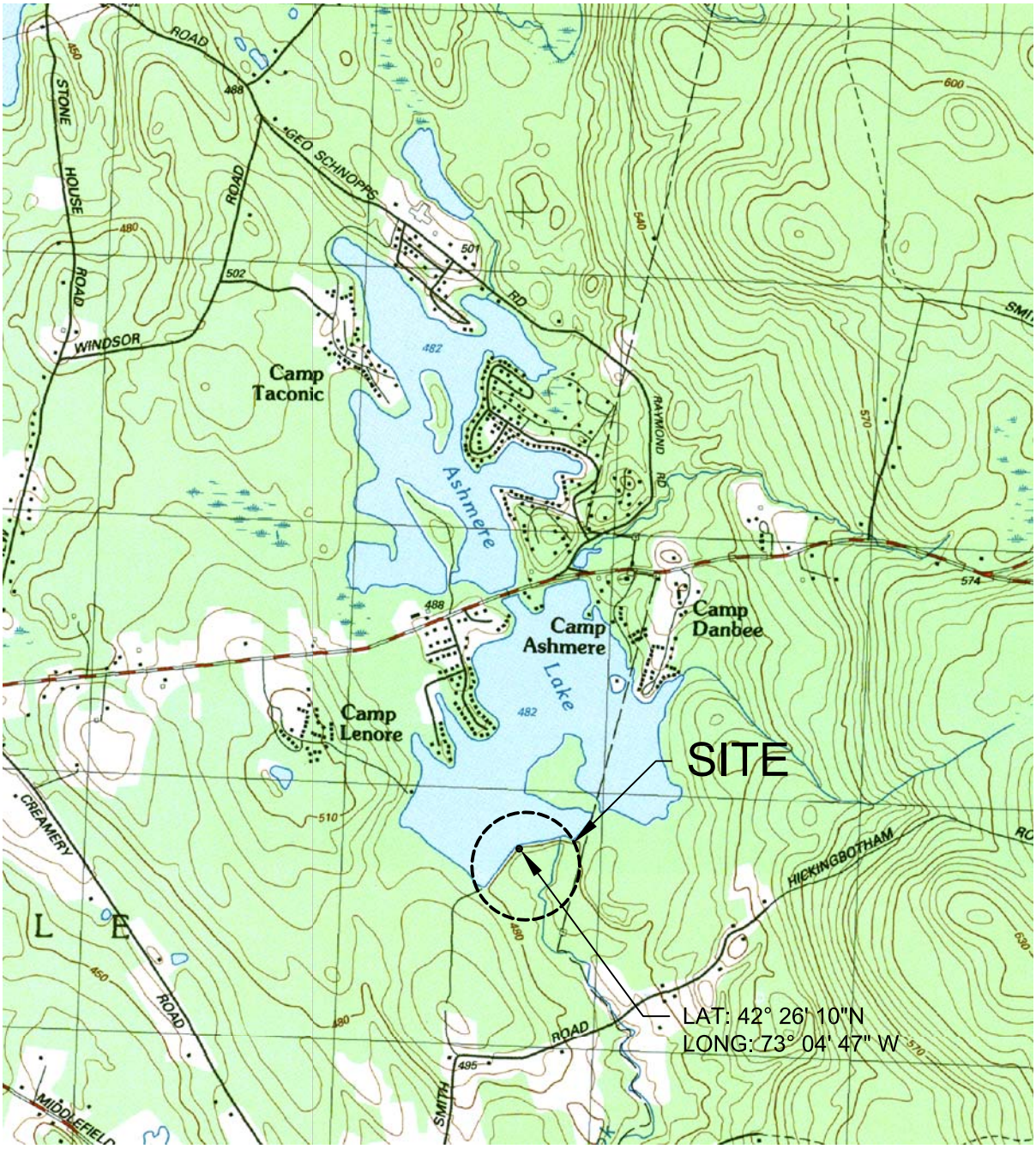
Minor Repair Recommendations

1. Install piezometers and inclinometers	$10,000 to $15,000
2. Level, clear toe area, construct spillway bridge	$25,000 to 45,000
3. Regrade, reshape, repair upstream slope	$15,000 to $25,000
sub-total	$45,000 to $80,000
10 % Contingency	$4,500 to $8,000
Total	$55,000 to $93,500

Remedial Modification Recommendations

1. Modify spillway to safely pass ½ PMF	$100,000 to $150,000
2. Modify embankments	$350,000 to $450,000
3. Engineering and Design	$55,000 to $70,000
4. Permitting	$15,000 to $25,000
sub-total	$520,000 to $695,000
10 % Contingency	$52,000 to $69,500
Total	$572,000 to $764,500

FIGURES



This Image provided by MassGIS is from U.S.G.S.
Topographic 7.5 X 15 Minute Series
Pittsfield, MA Quadrangle, 1988.
Datum is National Geodetic Vertical Datum (NGVD).
Contour Interval is 6 Meters.

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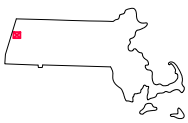
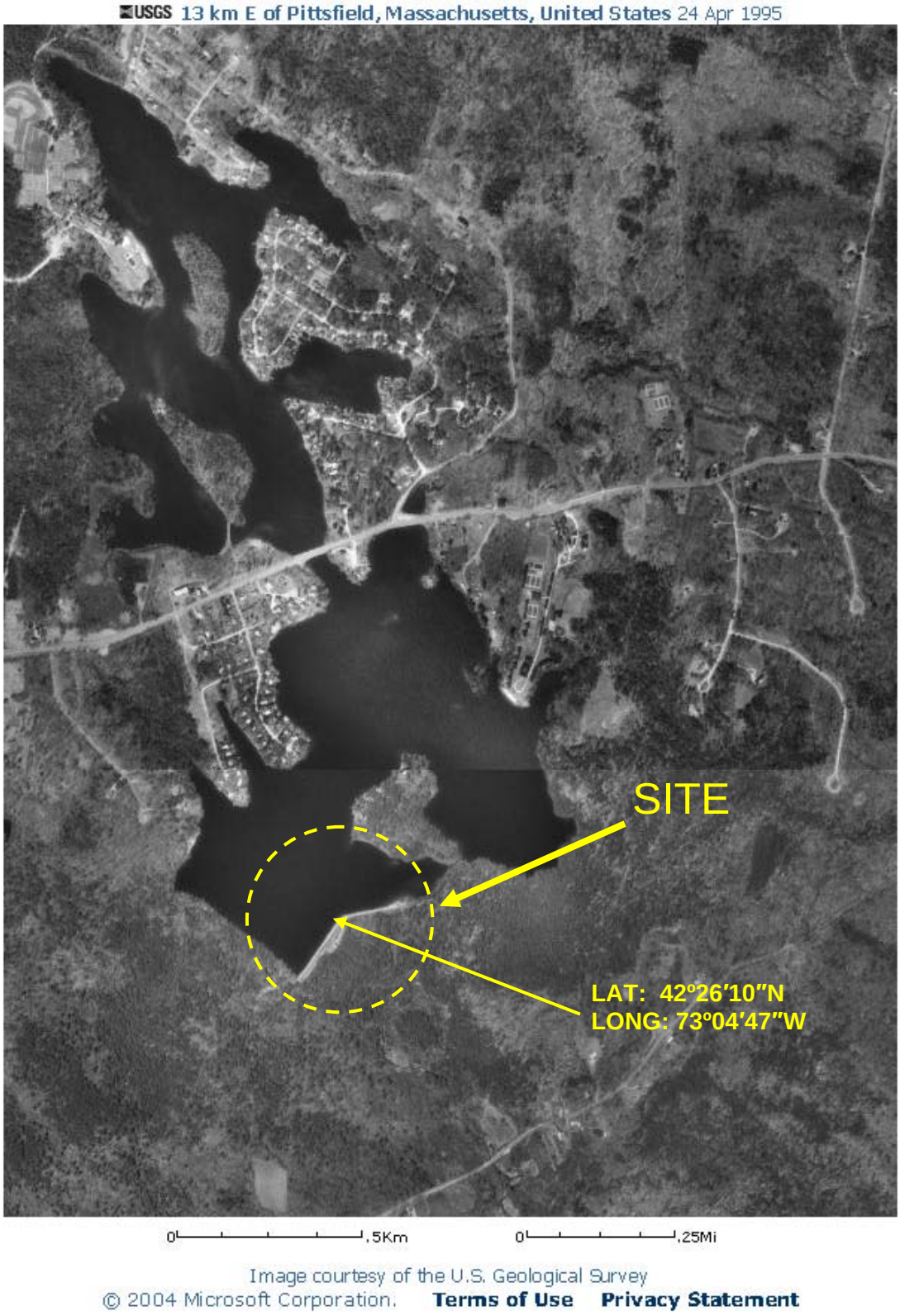


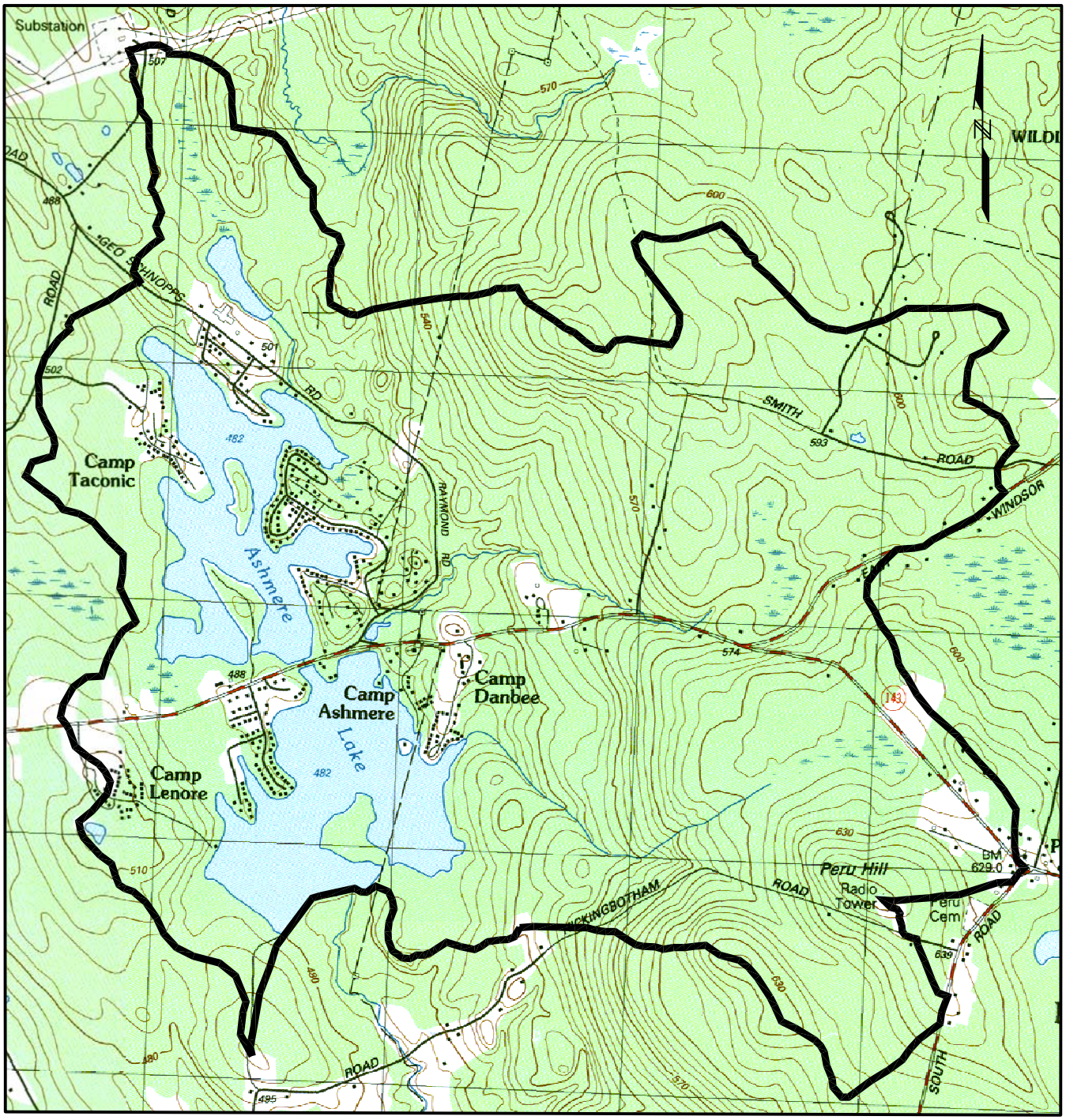
MASSACHUSETTS
QUADRANGLE LOCATION

Any Lake Dam, MA11111 Any Town, Massachusetts	Eng Corp	LOCUS PLAN
Massachusetts Department of Conservation and Recreation Boston, Massachusetts	Project 000000	December 2008 Fig. 1

M:\DRAFTING\2007\070042 MA DCR\070042-01_Site Location



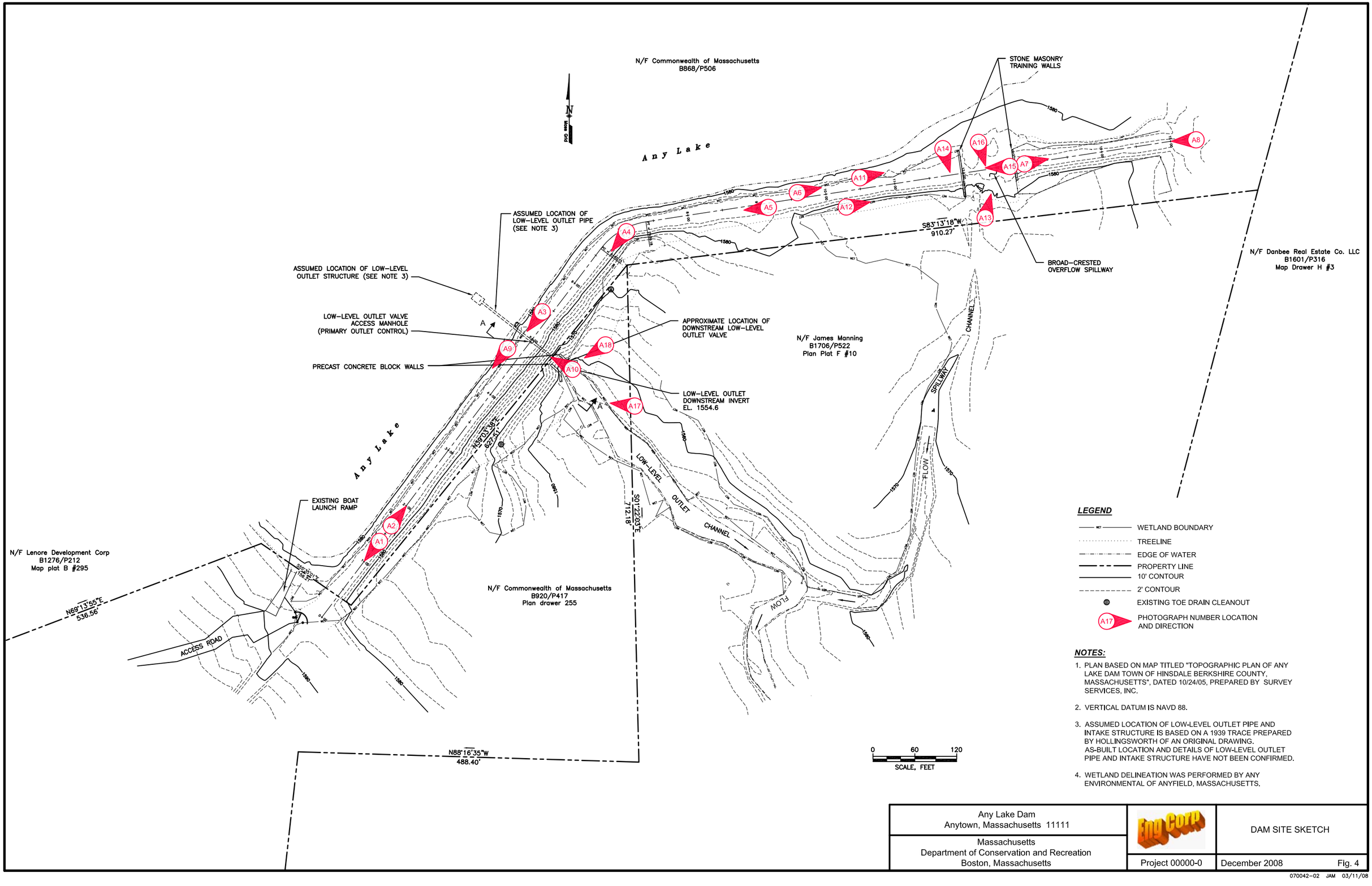
Any Lake Dam, MA 11111 **Any Town, Massachusetts**		**AERIAL PHOTOGRAPH**
Massachusetts **Department Of Conservation and Recreation** **Boston, Massachusetts**	Project 000000	**December 2008** **Fig. 2**



DRAFT

Any Lake Dam, MA11111 Any Town, Massachusetts		DRAINAGE AREA
Massachusetts Department of Conservation and Recreation Boston, Massachusetts	Project 000000	December 2008 Fig. 3

M:\DRAFTING\2007\070042 MA DCR\070042-03_Drainage Area



LEGEND

- WETLAND BOUNDARY
- TREELINE
- EDGE OF WATER
- PROPERTY LINE
- 10' CONTOUR
- 2' CONTOUR
- EXISTING TOE DRAIN CLEANOUT
- PHOTOGRAPH NUMBER LOCATION AND DIRECTION

NOTES:

1. PLAN BASED ON MAP TITLED "TOPOGRAPHIC PLAN OF ANY LAKE DAM TOWN OF HINSDALE BERKSHIRE COUNTY, MASSACHUSETTS", DATED 10/24/05, PREPARED BY SURVEY SERVICES, INC.
2. VERTICAL DATUM IS NAVD 88.
3. ASSUMED LOCATION OF LOW-LEVEL OUTLET PIPE AND INTAKE STRUCTURE IS BASED ON A 1939 TRACE PREPARED BY HOLLINGSWORTH OF AN ORIGINAL DRAWING. AS-BUILT LOCATION AND DETAILS OF LOW-LEVEL OUTLET PIPE AND INTAKE STRUCTURE HAVE NOT BEEN CONFIRMED.
4. WETLAND DELINEATION WAS PERFORMED BY ANY ENVIRONMENTAL OF ANYFIELD, MASSACHUSETTS.

Any Lake Dam Anytown, Massachusetts 11111	Eng Corp	DAM SITE SKETCH
Massachusetts Department of Conservation and Recreation Boston, Massachusetts	Project 00000-0	December 2008 Fig. 4

070042-02 JAM 03/11/08

APPENDIX A
Photographs

Photo A1 – Panorama composite - Right abutment from embankment crest*

Photo A2 – Embankment from right embankment

Photo A3 – Panorama composite – Crest and upstream slope from ~Sta. 5+50 toward right abutment*

Photo A4 – Panorama composite – Crest and downstream slope from ~Sta. 7+00 toward right abutment*

Photo A5 – Crest and upstream slope from ~Sta. 9+00 towards embankment bend

Photo A6 – Panorama composite – Crest and upstream slope from ~Sta. 9+00 toward left abutment*

Photo A7 – Composite panorama – Left embankment from spillway toward left abutment*

Photo A8 – Composite panorama – Left embankment from left abutment*

Photo A9 – Typical riprap and scarp on upstream slope

Photo A10 – Upstream slope near low-level outlet

Photo A11 – Upstream slope from ~Sta. 10+75 toward spillway

Photo A12 – Downstream slope from ~Sta. 10+75 toward spillway

Photo A13 – Composite panorama – Spillway from downstream channel looking upstream*

Photo A14 – Spillway from right training wall

Photo A15 – Spillway from left training wall

Photo A16 – Downstream end of spillway & spillway channel looking downstream from spillway

Photo A17 – Panorama composite – Downstream slope and low-level outlet discharge structure*

Photo A18 – Low-level outlet downstream control valve

*Note: Distortions and color or light irregularities in panorama composite photos are due to discontinuities between individual photographic images used to create composite panoramas.

APPENDIX B
Inspection Checklist

DAM SAFETY INSPECTION CHECKLIST

NAME OF DAM: Any Lake Dam

STATE ID #: 1-2-132-1

REGISTERED: ☑ YES ☐ NO

NID ID #: MA11111

STATE SIZE CLASSIFICATION: Large

STATE HAZARD CLASSIFICATION: High

CHANGE IN HAZARD CLASSIFICATION REQUESTED?: No

DAM LOCATION INFORMATION

CITY/TOWN: Hinsdale

COUNTY: Berkshire

DAM LOCATION: not applicable
(street address if known)

ALTERNATE DAM NAME: not applicable

USGS QUAD.: Pittsfield East

LAT.: 42°26'10"

LONG.: 73°04'57"

DRAINAGE BASIN: Housatonic

RIVER: Bennetts Brook

IMPOUNDMENT NAME(S): Ashmere Lake

GENERAL DAM INFORMATION

TYPE OF DAM: Earthen Embankment

OVERALL LENGTH (FT): 1475

PURPOSE OF DAM: Recreational

NORMAL POOL STORAGE (ACRE-FT): 2076

YEAR BUILT: 1875

MAXIMUM POOL STORAGE (ACRE-FT): 3872

STRUCTURAL HEIGHT (FT): 32

EL. NORMAL POOL (FT): 1582.0

HYDRAULIC HEIGHT (FT): 27.5

EL. MAXIMUM POOL (FT): 1587.1

FOR INTERNAL MADCR USE ONLY

FOLLOW-UP INSPECTION REQUIRED: ☐ YES ☐ NO

CONDITIONAL LETTER: ☐ YES ☐ NO

NAME OF DAM: Any Lake Dam | STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008 | NID ID #: MA11111

INSPECTION SUMMARY

DATE OF INSPECTION: November 11, 2008 | DATE OF PREVIOUS INSPECTION: April 29, 1999

TEMPERATURE/WEATHER: 40 deg. F, Sunny to part cloudy | ARMY CORPS PHASE I: ☑ YES ☐ NO If YES, date August 1978

CONSULTANT: Eng Corp, Inc. | PREVIOUS DCR PHASE I: ☑ YES ☐ NO If YES, date 2003

BENCHMARK/DATUM: NAVD 88

OVERALL PHYSICAL
OVERALL CONDITION: POOR | DATE OF LAST REHABILITATION: 1989 (Low-level outlet valve)

SPILLWAY CAPACITY: 50-90% SDF

EL. POOL DURING INSP.: 1581.1 | EL. TAILWATER DURING INSP.: 1557.8

PERSONS PRESENT AT INSPECTION

NAME	TITLE/POSITION	REPRESENTING
Jonathon Q. Public, P.E.	Senior Civil Enginer	Eng Corp, Inc.
Julie S. Doe, P.E.	Project Engineer	Eng Corp, Inc.
Mr. Steve Dough	Supervisor/dam tender	Anytown State Forest

EVALUATION INFORMATION

E1)	TYPE OF DESIGN	3	
E2)	LEVEL OF MAINTENANCE	3	
E3)	EMERGENCY ACTION PLAN	4	
E4)	EMBANKMENT SEEPAGE	2	
E5)	EMBANKMENT CONDITION	2	
E6)	CONCRETE CONDITION	5	
E7)	LOW-LEVEL OUTLET CAP	3	
E8)	LOW-LEVEL OUTLET COND.	4	
E9)	SPILLWAY DESIGN FLOOD CAPACITY	2	
E10)	OVERALL PHYSICAL CONDITION	2	
E11)	ESTIMATED REPAIR COST	$884,500	
	ROADWAY OVER CREST	NO	
	BRIDGE NEAR DAM	NO	

NAME OF INSPECTING ENGINEER: Jonathon Q. Public, P.E. | SIGNATURE: Jonathon Q. Public

NAME OF DAM: Any Lake Dam

STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008

NID ID #: MA11111

OWNER:		CARETAKER:	
ORGANIZATION	Dept. of Conservation and Rec	ORGANIZATION	Anytown State Forest
NAME/TITLE	DCR - Water Resources	NAME/TITLE	Steve Dough / Supervisor, State Forest
STREET	251 Causeway Street	STREET	426 Main Street
TOWN, STATE, ZIP	Boston, MA 02114-2104	TOWN, STATE, ZIP	Anytown, MA
PHONE	(555) 123-4567	PHONE	(555) 123-4567
EMERGENCY PH. #	(555) 234-5678	EMERGENCY PH. #	(555) 234-5678
FAX	(555) 345-6789	FAX	(555) 345-6789
EMAIL	lakedam@something.com	EMAIL	lakedam@something.com
OWNER TYPE	DCR - Water Resources		

PRIMARY SPILLWAY TYPE: Broad crested overflow spillway

SPILLWAY LENGTH (FT): 74+/-

SPILLWAY CAPACITY (CFS): 1,210

AUXILIARY SPILLWAY TYPE: none

AUX. SPILLWAY CAPACITY (CFS): 0

NUMBER OF OUTLETS: 1

OUTLET(S) CAPACITY (CFS): 50

TYPE OF OUTLETS: low-level outlet pipe

TOTAL DISCHARGE CAPACITY (CFS): 1,260

DRAINAGE AREA (SQ MI): 4.17

SPILLWAY DESIGN FLOOD (PERIOD/CFS): 1/2 PMF / 4,144 cfs

HAS DAM BEEN BREACHED OR OVERTOPPED: ☑ YES ☐ NO IF YES, PROVIDE DATE(S): 1984, Partial downstream slope

FISH LADDER (LIST TYPE IF PRESENT): No

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

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

MHD BRIDGE NO. (IF APPLICABLE)

NAME OF DAM: Any Lake Dam STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008 NID ID #: MA11111

EMBANKMENT (CREST)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
CREST	1. SURFACE TYPE	Primarily grass covered; 10' + wide; dirt left of overflow spillway	X		
	2. SURFACE CRACKING	None observed.	X		
	3. SINKHOLES, ANIMAL BURROWS	None observed.	X		
	4. VERTICAL ALIGNMENT (DEPRESSIONS)	None observed - Minor rusting noted left of the low-level outlet		X	X
	5. HORIZONTAL ALIGNMENT	Good - no evidence of misalignment	X		
	6. RUTS AND/OR PUDDLES	Minor vehicle depressions		X	
	7. VEGETATION (PRESENCE/CONDITION)	Grassed, maintained, overgrown with large trees			X
	8. ABUTMENT CONTACT	Good - no evidence of seepage or leakage, drainage		X	

ADDITIONAL COMMENTS: 7 - Trees and brush cover the left embankment and should be cut, grubbed, and the slope regarded and planted with grass cover. Trees and brush are also established at the right abutment contacts and should be removed and grubbed.

NAME OF DAM: Any Lake Dam STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008 NID ID #: MA11111

EMBANKMENT (D/S SLOPE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S SLOPE	1. WET AREAS (NO FLOW)	Wet area on lower 1/4 of slope over limited area near Sta. 7+00 (at alignment change)		X	
	2. SEEPAGE	No seepage observed	X		
	3. SLIDE, SLOUGH, SCARP	None observed	X		
	4. EMB.-ABUTMENT CONTACT	Numerous trees and brush		X	X
	5. SINKHOLE/ANIMAL BURROWS	None observed	X		
	6. EROSION	None observed	X		
	7. UNUSUAL MOVEMENT	None observed	X		
	8. VEGETATION (PRESENCE/CONDITION)	Grass cover well established & mowed, some brush mixed with grass, but also cut		X	X

ADDITIONAL COMMENTS: 1 - Most of the main embankment surface was dry, probably because of the downstream berm drain and the low level of the lake. However the bottom 1/4 of a ~20 ft. length of the dam was wet near the alignment change. Larger wet areas are likely during the higher summer pool.

4, 8 - Trees and brush cover the left embankment and should be cut, grubbed, and the slope regarded and planted with grass cover. Trees and brush are also established at the right abutment contacts and should be removed and grubbed.

NAME OF DAM: Any Lake Dam STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008 NID ID #: MA11111

EMBANKMENT (U/S SLOPE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
U/S SLOPE	1. SLIDE, SLOUGH, SCARP	Numerous scarps at top of riprap		X	X
	2. SLOPE PROTECTION TYPE AND COND.	See Note 2		X	X
	3. SINKHOLE/ANIMAL BURROWS	None observed	X		
	4. EMB.-ABUTMENT CONTACT	Numerous trees and brush		X	X
	5. EROSION	Scarps from wave or ice action			
	6. UNUSUAL MOVEMENT	None observed	X		
	7. VEGETATION (PRESENCE/CONDITION)	Grass & brush above riprap material		X	X

ADDITIONAL COMMENTS: 1,2,5 - Riprap covers the upstream slope of the main dam from about 2 feet below the dam crest to below the water line from the right (west) abutment to about Station 10+75. The riprap is typically about 6 to 12 inches in size except near the low-level outlet alignment where several large 3- to 5-foot boulders have been placed. There is an 8- to 10-foot wide area near Station 5+00 which is missing riprap. The area east or right of Station 10+75 with no riprap has more erosion with one area having a ~3-foot-high erosion scarp. Areas of erosion should be repaired. Riprap should be extended to the spillway.
7 - Trees and brush cover the left embankment and should be cut, grubbed, and the slope regraded and planted with grass cover. Trees and brush are also established at the right abutment contacts and should be removed and grubbed.

NAME OF DAM: Any Lake Dam STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008 NID ID #: MA11111

INSTRUMENTATION

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
INSTR.	1. PIEZOMETERS	Unable to locate			
	2. OBSERVATION WELLS	Unable to locate			
	3. STAFF GAGE AND RECORDER	None			
	4. WEIRS	None			
	5. INCLINOMETERS	None			
	6. SURVEY MONUMENTS	None			
	7. DRAINS	Two cleanouts observed but could not locate outfalls			
	8. FREQUENCY OF READINGS	Not applicable			
	9. LOCATION OF READINGS	Not applicable			

ADDITIONAL COMMENTS:

NAME OF DAM: Any Lake Dam STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008 NID ID #: MA11111

DOWNSTREAM MASONRY WALLS

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S WALLS	1. WALL TYPE				
	2. WALL ALIGNMENT				
	3. WALL CONDITION				
	4. HEIGHT: TOP OF WALL TO MUDLINE	min: m: avg:			
	5. SEEPAGE OR LEAKAGE				
	6. ABUTMENT CONTACT				
	7. EROSION/SINKHOLES BEHIND WALL				
	8. ANIMAL BURROWS				
	9. UNUSUAL MOVEMENT				
	10. WET AREAS AT TOE OF WALL				

Not Applicable to this dam

ADDITIONAL COMMENTS:

NAME OF DAM: Any Lake Dam STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008 NID ID #: MA11111

UPSTREAM MASONRY WALLS

AREA INSPECTED	CONDITION	OBSERVATIONS			NO ACTION	MONITOR	REPAIR
U/S WALLS	1. WALL TYPE						
	2. WALL ALIGNMENT						
	3. WALL CONDITION						
	4. HEIGHT: TOP OF WALL TO MUDLINE	min:	max:	avg:			
	5. ABUTMENT CONTACT						
	6. EROSION/SINKHOLES BEHIND WALL						
	7. ANIMAL BURROWS						
	8. UNUSUAL MOVEMENT						

Not Applicable to this dam

ADDITIONAL COMMENTS:

NAME OF DAM: Any Lake Dam STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008 NID ID #: MA11111

DOWNSTREAM AREA

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S AREA	1. ABUTMENT LEAKAGE	None observed		X	
	2. FOUNDATION SEEPAGE	Standing water and saturated subgrade in areas downstream of embankment toe		X	
	3. SLIDE, SLOUGH, SCARP	None observed		X	
	4. WEIRS	None observed		X	
	5. DRAINAGE SYSTEM	Two drain cleanouts observed. No outfalls were seen.		X	
	6. INSTRUMENTATION	None observed		X	
	7. VEGETATION	Heavily wooded, clear for 10'+ right of bend, trees extend to toe of slope left of bend		X	
	8. ACCESSIBILITY	No access to area left of the outlet channel, access from right abutment for area		X	X
		right of the outlet channel			
	9. DOWNSTREAM HAZARD DESCRIPTION	Several residences, local and state roads, utiltities			
	10. DATE OF LAST EAP UPDATE	EAP is available at park headquarters, undated			

ADDITIONAL COMMENTS:

NAME OF DAM: Any Lake Dam STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008 NID ID #: MA11111

MISCELLANEOUS

AREA INSPECTED	CONDITION	OBSERVATIONS
MISC.	1. RESERVOIR DEPTH (AVG)	15 ft. + max depth, 10 ft. + average
	2. RESERVOIR SHORELINE	Wooded, residential houses
	3. RESERVOIR SLOPES	Moderate; no slides observed; residential / vacation development surrounds much of reservoir
	4. ACCESS ROADS	Unpaved road to main embankment and crest is passable to the spillway. No access for maintenance to the left embankment.
	5. SECURITY DEVICES	Locks on low-level outlet control valve chamber. Locked gate for access to crest.
	6. VANDALISM OR TRESPASS	☑ YES ☐ NO WHAT: Campfires
	7. AVAILABILITY OF PLANS	☐ YES ☑ NO DATE:
	8. AVAILABILITY OF DESIGN CALCS	☐ YES ☑ NO DATE:
	9. AVAILABILITY OF EAP/LAST UPDATE	☑ YES ☐ NO DATE: EAP is available at park headquarters, undated
	10. AVAILABILITY OF O&M MANUAL	☑ YES ☐ NO DATE: September 24, 1990
	11. CARETAKER/OWNER AVAILABLE	☑ YES ☐ NO DATE: September 25, 2003
	12. CONFINED SPACE ENTRY REQUIRED	☐ YES ☑ NO PURPOSE:

ADDITIONAL COMMENTS:

NAME OF DAM: Any Lake Dam STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008 NID ID #: MA11111

PRIMARY SPILLWAY

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
SPILLWAY	SPILLWAY TYPE	uncontrolled spillway with seasonal 12-inch high flashboards	X		
	WEIR TYPE	broad crested weir, grass-lined channel	X		
	SPILLWAY CONDITION	satisfactory	X		
	TRAINING WALLS	no evidence of concrete deterioration, spalling, or effloresence	X		
	SPILLWAY CONTROLS AND CONDITION	uncontrolled spillway, flashboards not installed during inspection	X		
	UNUSUAL MOVEMENT	none observed			
	APPROACH AREA	gradual slope; grassed and reed covered		X	
	DISCHARGE AREA	no erosion or undercutting observed		X	X
	DEBRIS	minor amount of vegetation and debris in discharge area	X		
	WATER LEVEL AT TIME OF INSPECTION	approximately 5.2 feet below spill crest			

ADDITIONAL COMMENTS:

NAME OF DAM: Any Lake Dam STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008 NID ID #: MA11111

AUXILIARY SPILLWAY

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
SPILLWAY	SPILLWAY TYPE				
	WEIR TYPE				
	SPILLWAY CONDITION				
	TRAINING WALLS				
	SPILLWAY CONTROLS AND CONDITION				
	UNUSUAL MOVEMENT				
	APPROACH AREA				
	DISCHARGE AREA				
	DEBRIS				
	WATER LEVEL AT TIME OF INSPECTION				

Not Applicable to this dam

ADDITIONAL COMMENTS:

NAME OF DAM: Any Lake Dam STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008 NID ID #: MA11111

OUTLET WORKS

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
OUTLET WORKS	TYPE	16 inch cast-iron pipe			
	INTAKE STRUCTURE	Not observed	X		
	TRASHRACK	Not observed	X		
	PRIMARY CLOSURE	Valve within a locked vault, not observed	X		
	SECONDARY CLOSURE	Butterfly valve at outfall	X		
	CONDUIT	16 inch cast-iron pipe			
	OUTLET STRUCTURE/HEADWALL	24-inch diameter cast iron or ductile iron pipe	X		
	EROSION ALONG TOE OF DAM	None observed	X		
	SEEPAGE/LEAKAGE	None observed	X		
	DEBRIS/BLOCKAGE	None observed			
	UNUSUAL MOVEMENT	None observed	X		
	DOWNSTREAM AREA	None observed	X		
	MISCELLANEOUS	Some orange staining observed in the channel, believed to be from toe drain		X	X
		discharge, but actual source was not observed			

ADDITIONAL COMMENTS:

NAME OF DAM: Any Lake Dam STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008 NID ID #: MA11111

CONCRETE/MASONRY DAMS

AREA INSPECTED	CONDITION	OBSERVATIONS	ACTION	MONITOR	REPAIR
GENERAL	TYPE				
	AVAILABILITY OF PLANS				
	AVAILABILITY OF DESIGN CALCS				
	PIEZOMETERS				
	OBSERVATION WELLS				
	INCLINOMETERS				
	SEEPAGE GALLERY				
	UNUSUAL MOVEMENT				

Not Applicable to this dam

ADDITIONAL COMMENTS:

NAME OF DAM: Any Lake Dam STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008 NID ID #: MA11111

CONCRETE/MASONRY DAMS (CREST)

AREA INSPECTED	CONDITION	OBSERVATIONS	ACTION	MONITOR	REPAIR
CREST	TYPE				
	SURFACE CONDITIONS				
	CONDITIONS OF JOINTS				
	UNUSUAL MOVEMENT				
	HORIZONTAL ALIGNMENT				
	VERTICAL ALIGNMENT				

Not Applicable to this dam

ADDITIONAL COMMENTS:

NAME OF DAM: Any Lake Dam STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008 NID ID #: MA11111

CONCRETE/MASONRY DAMS (DOWNSTREAM FACE)

AREA INSPECTED	CONDITION	OBSERVATIONS	...TION	MONITOR	REPAIR
D/S FACE	TYPE				
	SURFACE CONDITIONS				
	CONDITIONS OF JOINTS				
	UNUSUAL MOVEMENT				
	ABUTMENT CONTACT				
	LEAKAGE				

Not Applicable to this dam

ADDITIONAL COMMENTS:

NAME OF DAM: Any Lake Dam STATE ID #: 1-2-132-1

INSPECTION DATE: November 11, 2008 NID ID #: MA11111

CONCRETE/MASONRY DAMS (UPSTREAM FACE)

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

Not Applicable to this dam

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. Any Lake Dam – Any Town, Emergency Action Plan, ENC COM, Boston, April 2003.

2. Department of Environmental Management, Office of Dam Safety, Memorandum, Lake Dam, R. David Cark; December 4, 1997.

3. Department of Environmental Management, Any Lake Dam, Memo; October 4, 1990.

4. Department of Environmental Management, Any Lake Dam, Operation Plan; October 4, 1990.

5. Department of Environmental Management, Any Lake Dam, Operation Plan; September 24, 1990.

6. Department of Environmental Management, Letter, March 2, 1989.

7. Department of Environmental Management, Memo, Emergency Service Contract; April 28, 1989.

8. Department of Environmental Management, Any Lake Dam, Memo-Site Visit; April 21, 1989.

9. Department of Environmental Management, Emergency Work Authorization, Any Lake Dam; May 3, 1989.

10. Department of Environmental Management, Letter, October 20, 1988.

11. Department of Environmental Management, Any Lake Dam, Emergency Conditions; October 20, 1988.

12. Department of Environmental Management, Any Lake Dam, Letter, October 20, 1988.

13. Department of Environmental Management, Memo, Any Lake Dam, October 17, 1988.

14. Department of Environmental Management Waterways Division, Any Lake Dam, Itemized Proposal with Special Provisions for Proposed Repairs and Modifications to the Dam Embankment at Any Lake Dam; September 10, 1985.

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

15. United States Department of Agriculture (2005), National Resource Conservation Service, “Soil Survey – Berkshire County, Massachusetts”, September 2005.

16. United States Army Corps of Engineers (2003), Hydraulic Engineering Center “Hydraulic Modeling System Version 3.1.0”; May 28, 2003.

17. United States National Weather Service (1982). “Application of Probable Maximum Precipitation Estimates, United States East of the 105th Meridian,” NOAA Hydrometeorological Report No. 52, prepared by E. M. Hansen, L. C. Schreiner, and J. T. Riedel.

18. United States Army Corps of Engineers (1979), "Recommended Guidelines for Safety Inspections of Dams". Washington, DC, 1979.

19. United States National Weather Service (1978). "Probable Maximum Precipitation Estimates, United States East of the 105th Meridian," Hydrometeorological Report No. 51, prepared by L. C. Schreiner and J. T. Riedel.

20. Mockus, V. (1972). "National Engineering Handbook, Section 4, Hydrology", 1972, National Soil Conservation Service.

The following references, specific to Any Lake Dam, were utilized during the preparation of this report and the development of the recommendations presented herein.

21. ENG CORP (2006). "Any Lake Dam Inspection/Evaluation Report" June 2006.

22. GEI Consultants, Inc. (2005). "Phase II Inspection Report Any Lake Dam, Hinsdale, Massachusetts", December 2005.

23. Sackett Survey Services, Inc. (2005). "Topographic Plan of Any Lake Dam, Town of Hinsdale, Berkshire County, Massachusetts," Prepared by Sackett Survey Services, Inc., Pittsfield, Massachusetts, dated October 24, 2005, (one sheet).

24. PARE (2003). "Department of Conservation and Recreation Office of Dam Safety, DCR Owned Dam Inspection/Evaluation Report".

25. Bellisle, J.M. (2003). "Department of Conservation and Recreation Office of Dam Safety, DCR Owned Dam Inspection/Evaluation Report." Report for September 25, 2003 inspection of Any Lake Dam (ID 1-2-132-1), Prepared for Department of Conservation and Recreation Office of Dam Safety by Pare Engineering Corporation Norwood, Massachusetts.

26. Sackett Survey Services, Inc. (2002). "Topographic Plan of Any Lake Dam, Town of Hinsdale, Berkshire County, Massachusetts," Prepared by Sackett Survey Services, Inc., Pittsfield, Massachusetts, (one sheet).

27. Root, M.J. (2002). "Boring Logs: Any Lake Dam," Letter Report to Department of Environmental Management Department of Dam Safety, Root Engineering, Springfield, Vermont, May.

28. Root, M.J. (2002). "Soil Testing, Any Lake Dam-Hinsdale," Letter Report to Office of Dam Safety of Department of Environmental Management, Root Engineering, Springfield, Vermont, June.

29. Clark, R. D. (2001). "Any Lake Dam 1-2-263-2, Notice of Inspection," Report for July 20, 2001 inspection of Any Lake Dam (ID 1-2-132-1), Prepared by Department of Environmental Management Office of Dam Safety.

30. "Lake Management Plan, Any and Plunkett Lakes – Hinsdale, MA", dated March 2000.

31. Jennings, T. E. (1999). "Department of Environmental Management Office of Dam Safety, DEM Owned Dam Inspection/ Evaluation Report," Report for April 29, 1999 inspection of Any Lake Dam (ID 1-2-132-1), Prepared for Department of Environmental Management Office of Dam Safety by Baystate Environmental Consultants Inc., East Longmeadow, Massachusetts.

32. Haley and Aldrich, Inc. (1985). “Proposed Repairs to Lake Any Dam, Hinsdale, Massachusetts,” (three sheets), July.

33. LeCount, P.L. (1985). “Test Boring and Piezometer/Observation Well Data, Lake Any Dam (MA00223), Hinsdale, Massachusetts,” Report to Commonwealth of Massachusetts Department of Environmental Management, Haley & Aldrich Inc., Boston, MA.

34. LeCount, P. L. (1985). “Evaluation of Data and Hydrologic/Hydraulic Analysis, Lake Any Dam (MA00223), Hinsdale, Massachusetts,” Report to Commonwealth of Massachusetts Department of Environmental Management, Haley & Aldrich Inc., Boston, Massachusetts.

35. O’Brien, E. (1978). “Any Lake Dam MA00223, Phase I Inspection Report, National Dam Inspection Program,” Report for June 22, 1978 inspection of Any Lake Dam, Prepared for the New England Division of the Corps of Engineers by Tippetts,-Abbett-McCarthy-Stratton.

36. Maisner, W. P. (1968). “Plan of Land Showing Ownership in Vicinity of Any Lake Hinsdale and Peru, Mass.,” (one sheet).

37. Hollingsworth, C.W. (1939). Trace of Any Lake Dam plans, sections, and details, February 9.

38. Department of Conservation and Recreation. “Any Lake, MA00223, Correspondence,” File folder provided by Department of Conservation and Recreation.

39. Department of Conservation and Recreation. “Any Lake Dam, MA00223, Designs and Field Notes,” File folder provided by Department of Conservation and Recreation.

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)