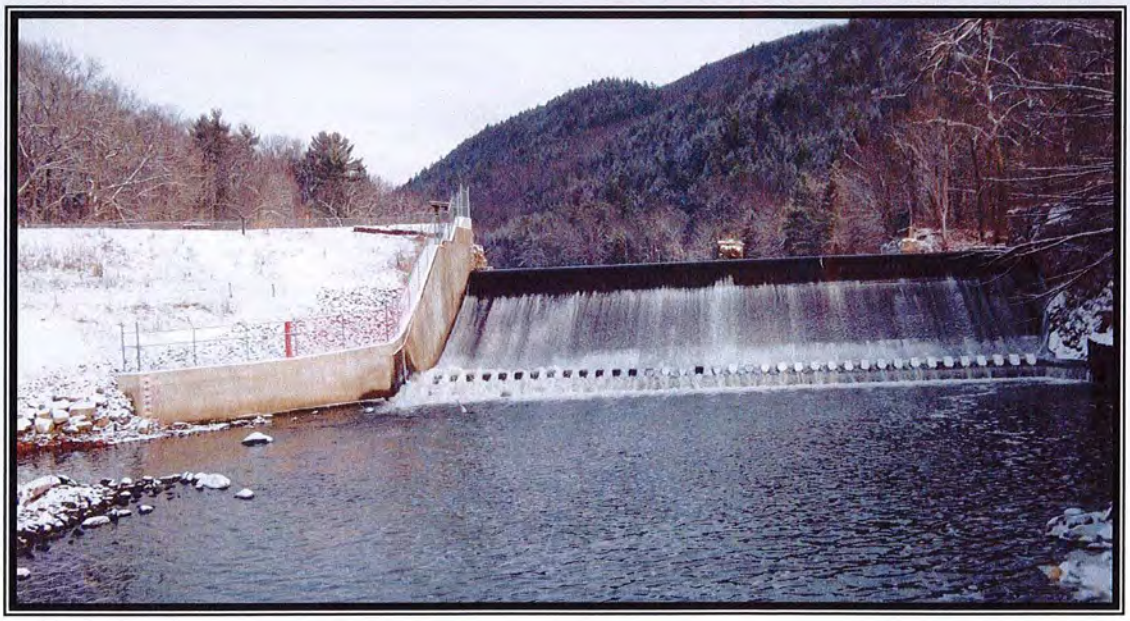
EMERGENCY ACTION PLAN

Rising Pond Dam

Updated November 2022 (Rev. 4)

GREAT BARRINGTON, MASSACHUSETTS
NID # MA 00250



PREPARED FOR:
GENERAL ELECTRIC COMPANY

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GZA File No.01.0019896.40

Dam Failure EAP-Controlled Copy Distribution:

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1	4	11/2022	General Electric Company Global Operations, Environment, Health & Safety 1 Plastics Avenue Pittsfield, Massachusetts 01201	Dam Caretaker/Alternate Caretaker
2	4	11/2022	Town of Great Barrington Police & Emergency Management 465 Main Street Great Barrington, Massachusetts 01230	Chief of Police, Emergency Response Personnel
3	4	11/2022	Town of Sheffield Emergency Management 10 South Main Street Sheffield, Massachusetts 01257	Chief of Police, Emergency Response Personnel
4	4	11/2022	Massachusetts Emergency Management Agency 400 Worcester Road (Route 9 East) Framingham, Massachusetts 01702-5399	Response and Field Services Section Chief
5	4	11/2022	Massachusetts DCR – Office of Dam Safety 180 Beaman Street, West Boylston, Massachusetts 01583	Chief of Staff
6	4	11/2022	GZA GeoEnvironmental, Inc. 249 Vanderbilt Ave Norwood, Massachusetts 02062	Consulting Dam Safety Engineer & Support Staff

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* **Responsible Individual**: is the person responsible for managing and overseeing the revisions and updates to this document. The Caretaker will be the Responsible Individual for this document.

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1.0 SUMMARY OF EMERGENCY ACTION PLAN RESPONSIBILITIES

This Emergency Action Plan (EAP) for the Rising Pond Dam addresses the roles and responsibilities of the General Electric Company (GE) (the dam owner), the Town of Great Barrington, Massachusetts, and other entities for potential and actual emergency conditions at the dam. This section provides a brief overview of the critical EAP responsibilities of those entities. Ultimately, the Great Barrington Emergency Management Director will act as Incident Commander in the event of an emergency at Rising Pond Dam. The following is a brief summary of critical responsibilities. An expanded discussion of roles and responsibilities is included in Section 6.0.

Dam Owner/Operator - General Electric Company:

- Activate appropriate notifications in accordance with the Notification Flowchart in Section 2 of this EAP.
- Request assistance, as needed.
- Receive condition status reports and share with the Incident Commander and emergency responders.
- Provide updates to Massachusetts Department of Conservation and Recreation (DCR) Office of Dam Safety.

Town of Great Barrington Emergency Dispatch Center:

- Activate appropriate notifications in accordance with the Notification Flowchart in Section 2 of this EAP.
- Verify and assess emergency conditions (with assistance of Incident Commander).
- Determine the level of the emergency (e.g., Condition A, Condition B, etc., as described in Section 5.3) (performed with assistance of Incident Commander).
- Activate the Great Barrington Emergency Operations Center (EOC).
- Take corrective action at the dam (for Condition B and Non-Emergency Condition) (performed with assistance of Incident Commander).
- Order evacuation of response personnel from the potential hazard area at the dam (for Condition A) (performed with assistance of Incident Commander).
- Receive condition status reports from GE, the Massachusetts Emergency Management Agency (MEMA), and other on-site personnel.
- Notify the downstream public.
- Conduct evacuation from inundation areas within Town limits.
- Declare termination of the emergency at the dam (performed with assistance of Incident Commander).

The following agencies will support the Town of Great Barrington and emergency responders by providing personnel and equipment (as requested by the Incident Commander and as available):

- MEMA
- Massachusetts State Police (Troop B-1 Lee, MA)
- Berkshire County Sheriff
- Town of Sheffield, Massachusetts

2.0 NOTIFICATION FLOWCHART

2.1 INTRODUCTION

Emergency situations are herein defined as conditions at Rising Pond Dam which have or could potentially lead to a sudden, uncontrolled release of water. **Figure 1 - Notification Flowchart** summarizes the key operational, governmental, and public safety personnel to be notified in the event of an emergency condition at the Rising Pond Dam. The objective of this flowchart is to outline clear, concise, and concurrent notifications. The organization of the flowchart is based on review of existing communication networks and discussions with the Towns of Great Barrington and Sheffield and Commonwealth of Massachusetts personnel. The flowchart shows the contact information for Emergency Conditions A and B, as described in Section 5. The contact procedures shown will not be necessary for Non-Emergency Conditions or Non-Failure Emergency Conditions, as also described in Section 5.

2.2 LIMITATIONS

The **Figure 1 - Notification Flowchart** should be considered a "top-down" system for initial notifications. Other means and avenues of communication between and among key local and state emergency personnel that may develop may not be specifically depicted in the referenced flow chart as an emergency progresses. Also, as the emergency condition intensifies, normal telephone lines and some two-way radio frequencies may be overloaded or otherwise unavailable.

The Notification Flowchart is to be used as a guide during an emergency condition. For clarity and brevity, not all possible emergency phone numbers have been shown. However, additional names and notification information of persons are provided in the Contact Lists in **Tables 1 through 6**. Each notification "cell" on the flowchart may have its own subset of emergency numbers and procedures. **This EAP does not suggest that GE personnel take over the established responsibilities of other governmental and institutional elements (such as the police, fire and emergency management departments in the downstream communities) to enact their own emergency preparedness plans and to evacuate people.** However, the flowchart and outlined duties and responsibilities described herein provide a means for initial notification. It is assumed that state public safety entities and local police departments in potentially affected downstream communities will activate their own specific procedures for evacuation, sheltering, and mobilization of resources, once the initial warning is provided.

The Notification Flowchart relies heavily on the use of the Town of Great Barrington dispatch/call center.

Massachusetts State Police Barracks B-1/Lee Dispatch is the local State Police dispatch center located at 215 Laurel Street (Route 20) in Lee, MA.

The Town of Great Barrington Emergency Dispatch Center is the dispatch center for the town and is located at 465 Main Street in Great Barrington, MA.

The Berkshire County Sheriff's Communication Center is the dispatch center for the Town of Sheffield and is located at 467 Cheshire Road in Pittsfield, MA.

All dispatch centers are staffed 24 hours a day, 7 days a week and are responsible for contacting the Emergency Management, Police, and Fire Departments, the Great Barrington Department of Public Works (DPW) contact, and the specified government official for their respective towns. The Towns of Great Barrington and Sheffield are responsible for providing warning messages to their own residents.

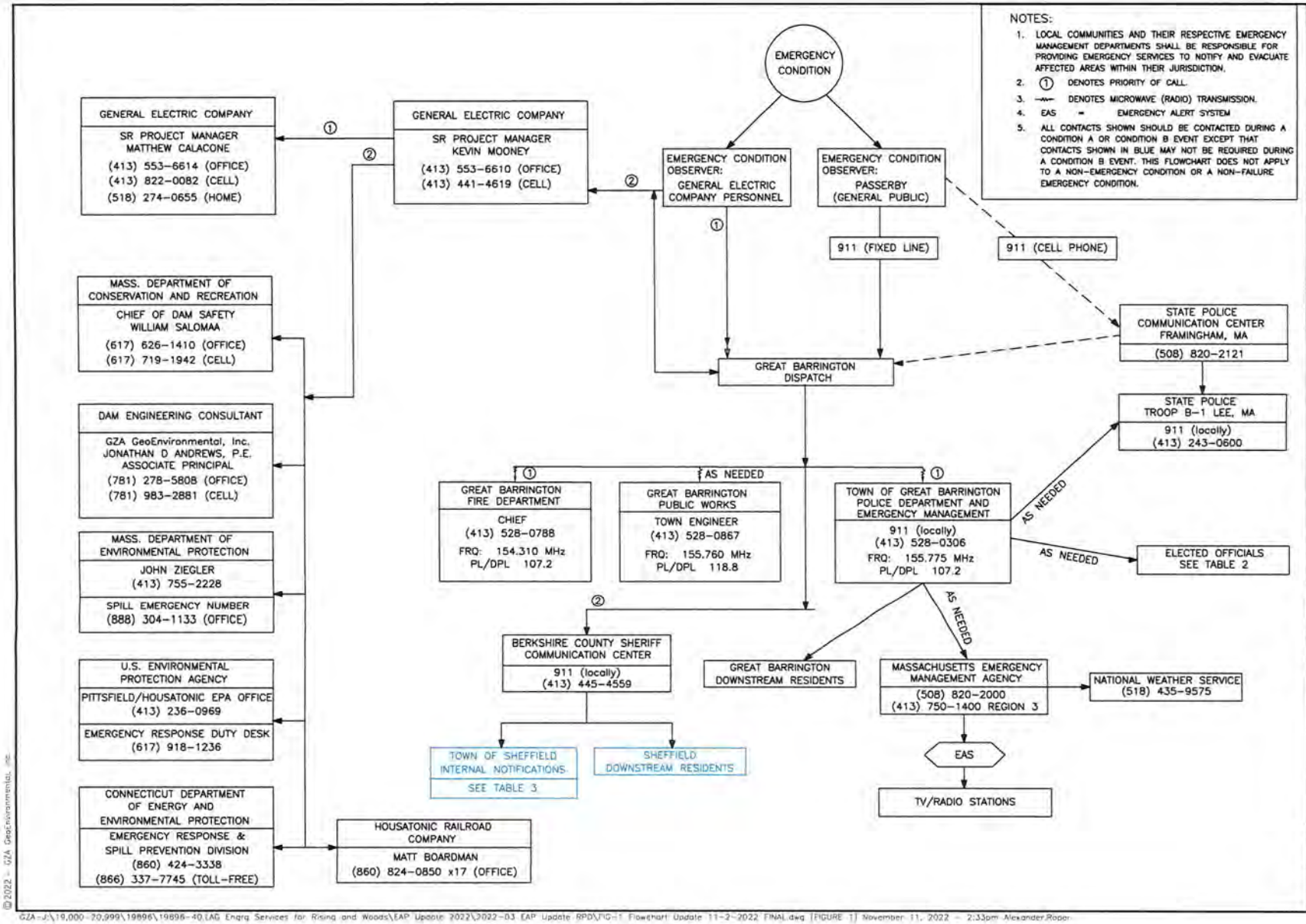
2.3 SUPPLEMENTAL EMERGENCY CONTACT LISTS

Tables 1 through 6 provide detailed Alert Lists which present names, position, title, telephone number, etc. for the following entities:

Table 1	General Electric Company Contact List
Table 2	Town of Great Barrington Community Alert List
Table 3	Town of Sheffield Community Alert List
Table 4	State Agency Alert List
Table 5	Major Utilities List
Table 6	Emergency Response Contractor List

These lists are considered to be a supplement to the information provided on **Figure 1 - Notification Flowchart**. The telephone numbers provided are often listed numbers. Some numbers are serviced 24 hours or have a call forwarding capability. However, as the emergency condition intensifies, all listed telephone lines may be in use with incoming calls and thus be unavailable.

Table 5 lists major utilities within the potential downstream impact area and includes telephone numbers for the applicable utility companies. The table has been provided for general reference purposes and is not intended to be an all-inclusive list. Primary responsibility for notifying key utilities, rail lines, etc. will rest with the individual community public safety agencies.



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RISING POND DAM
EMERGENCY ACTION PLAN
GENERAL ELECTRIC COMPANY
GREAT BARRINGTON, MA

NOTIFICATION FLOWCHART

PROJECT NO.
19896.40

FIGURE NO.
1

3.0 STATEMENT OF PURPOSE AND SCOPE

3.1 STATEMENT OF PURPOSE

This EAP defines responsibilities and provides procedures designed to identify unusual and unlikely conditions which may endanger the Rising Pond Dam in time to take mitigative action and to notify the appropriate emergency management officials of possible, impending, or actual failure of the dam.

This EAP is a management document intended to be read, understood, annually tested, and updated before an emergency condition occurs. It is designed to outline the activities of GE, the Town of Great Barrington, and other local and state emergency management officials within the framework of existing, in-place emergency management systems. It provides the planning basis for emergency detection, evaluation and classification; notification; evacuation; security, termination and follow-up; and preparedness.

3.2 SCOPE

The EAP sets forth basic procedures, duties, and responsibilities to be implemented by the Town of Great Barrington and GE (owner and operator of the dam) and other key operational and public safety personnel in the event of an emergency condition at the Rising Pond Dam.

An "emergency," for the purposes of this EAP, is defined as an impending or actual sudden uncontrolled release of water caused by a failure of the dam.

The major focus of the EAP is the description of the area of inundation resulting from a hypothetical dam break flood, and the development of a detailed notification plan that describes responsibilities to warn key operational personnel, local public safety agencies, state law enforcement, and emergency management agencies in the path of an anticipated dam break flood wave. The EAP also provides preparedness steps.

As indicated above, the contents of this EAP, including recommendations describing organization and duties, are not intended for GE personnel to take over the responsibilities of the state and other local governmental entities. Rather, the EAP has been developed to be integrated within the framework of existing emergency preparedness plans. During the development of this EAP, GE and its dam safety engineering consulting firm, GZA GeoEnvironmental Inc. (GZA), have coordinated with the Towns of Great Barrington and Sheffield, and other emergency preparedness personnel. The following public agencies will be directly involved in the event of the activation of this EAP:

- Town of Great Barrington
- Town of Sheffield
- Massachusetts State Police
- Massachusetts Emergency Management Agency (MEMA)
- Massachusetts DCR Office of Dam Safety

- United States Army Corps of Engineers

This updated EAP was prepared to conform with 2013 DCR requirements that the EAP format be consistent with the "*Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners* (FEMA 64)," dated July 2013. The scope and format of this EAP generally conform to the FEMA guidelines. In addition, the technical engineering aspects of the dam break flood routing analysis conforms to the Federal Energy Regulatory Commission (FERC) requirements outlined in its "Engineering Guidelines for the Evaluation of Hydropower Projects," issued in October 1993 and updated in October 2007. Dam break analyses are included in **Attachment A** and the inundation maps are discussed in Section 8.0 and located in **Attachment E**.

GE's plans for training of GE personnel and personnel from the Towns of Great Barrington and Sheffield for implementation of this EAP in the event of an emergency at Rising Pond Dam, along with the requirements for updating this EAP and posting the above-reference Notification Flowchart, are provided in **Attachment B**.

4.0 PROJECT DESCRIPTION

4.1 LOCATION

The Rising Pond Dam is located in the Town of Great Barrington, in Berkshire County, Massachusetts. The left abutment of Rising Pond Dam is on Route 183 (at 285 Park Street, the Hazen Paper Mill) near the intersection of Park Street and Mountain Street. Its general location is shown on **Figure 2**.

The dam is at the longitude and latitude coordinates:

Longitude: -74.35796° Latitude: 42.2424°

4.2 OWNER\OPERATOR

The Rising Pond Dam is owned, operated, and maintained by GE. The current Caretaker is Kevin Mooney and the Alternate Caretaker is Matthew Calacone, both located at the address below.

Dam Owner/Caretaker	
Name	General Electric Company Global Operations, Environment, Health & Safety
Mailing Address Town	1 Plastics Avenue Pittsfield, MA 01201
Daytime Phone	413-553-6610 (Caretaker Direct Office Number) 413-553-6603 (General Office Number)
Emergency Phone	413-441-4619 (Caretaker Cell Phone)

4.3 PURPOSE OF THE DAM

The dam was likely constructed in the 1800s. The original purpose of the dam was likely to divert water into the adjacent mill complex to power machinery. The right embankment of the dam was previously used as a railroad embankment/bridge abutment. Currently, the dam impounds water for recreational and environmental purposes.

4.4 DESCRIPTION OF THE DAM AND APPURTENANCES

The engineering data presented below are based on available information in previous reports prepared by or on behalf of GE. Engineering drawings of the dam are available at the following office of GZA, GE's dam safety engineering consulting firm:

GZA GeoEnvironmental, Inc.
249 Vanderbilt Avenue
Norwood, Massachusetts 02062
Contact: Jonathan D, Andrews, P.E.
Phone: (781) 278-5808

Certain site-specific concerns relating to the dam are described in **Attachment C**.

Rising Pond Dam is a run-of-the-river structure located on the Housatonic River in the Housatonic or Risingdale section of Great Barrington, Massachusetts.

The dam was originally constructed in the 1800s. The embankment was constructed of alluvial sand and gravel excavated from the west river bank. Original upstream slopes ranged from 1.5H:1V to 4H:1V, and downstream slopes ranged from 1H:1V to 1.5H:1V. The original embankment height was about 17 feet. The spillway and railroad bridge abutment were reportedly constructed on rock-filled timber cribbing over grouted cobbles in timber cribbing laid on the original river bottom. The original spillway was about 17 feet high and was faced with wooden planks laid at a 1H:1V slope.

In 1934, the embankments and spillway were reportedly raised by about 10.5 feet and spillway flashboards were added. Rockfilled timber cribbing was placed above the original structure and new wooden facing was placed on the spillway.

In 1953, the dam was reportedly raised to elevation 716.5 feet (National Geodetic Vertical Datum - NGVD). The stone masonry outlet channel training walls were replaced with a headgate and 14-foot-diameter steel penstock. The downstream timber plank spillway facing was demolished and replaced with a concrete slab. The spillway crest was rebuilt with a concrete slab faced with a steel plate. The upstream timber plank facing was covered with sand and gravel fill covered by a new concrete apron slab and an upstream concrete wall was added.

Between 1991 and 1993, the dam was significantly rehabilitated. The rehabilitation generally included: installation of an upstream steel sheetpile cutoff wall; removal of the upstream timber plank spillway facing; filling of voids in the timber cribbing with peastone and sandy gravel; flowable fill placement in voids below the crest and upstream slab; installation of tiedowns and passive H-pile shear keys in the downstream apron; replacement of deteriorated areas of spillway training wall concrete; repointing of the forebay walls and floor; replacement of trashracks; construction of a concrete tailrace outlet channel and plugging of the former penstock where it entered the mill; placement of riprap slope armor; and raising of the embankments to elevation 727.0 feet (NGVD). In addition, piezometers and observation wells were installed in and below the embankment and spillway. In 2002, the forebay walls and right downstream training wall were repaired, and riprap was placed and reworked at the upstream slope and downstream toe of the right embankment.

The Rising Pond Dam currently consists of left and right earth embankments, with a spillway and outlet works. The spillway consists of a concrete facing with steel crest plate. The spillway is

approximately 127 feet wide and 30 feet high, with a crest elevation of approximately 716.6 feet (NGVD). Spillway training walls are a combination of concrete, grouted stone masonry, and steel sheetpile.

The low level outlet is located directly to the left of the spillway. The low-level outlet works consist of a grouted stone masonry forebay with steel trash racks, a concrete-walled gate chamber with sluice gate and a 14-foot-diameter steel penstock that extends approximately 110 feet downstream to a surge chamber. The surge chamber is drained by an open channel reinforced concrete tailrace that discharges to the Housatonic River approximately 150 feet downstream. The invert of the penstock is reported to be elevation 699 feet (NGVD). Gate chamber drainage was formerly provided by a 12-inch-diameter well drain that outlets to the left downstream training wall. Well drain flow is controlled by a valve located in a covered pit between the gate chamber and left training wall. A fire-protection pumphouse is located on the left embankment crest to the left of the forebay.

A wide embankment/fill area is present on the left side of the spillway and outlet structures. The upstream slopes are steep and have some riprap protection near the low level outlet. The downstream slope is poorly defined and consists of the mill.

The right earthen embankment is approximately 38 feet high, with upstream and downstream slopes of approximately 2H:1V. Slope protection at the waterline consists of a combination of steel sheetpiles and riprap. A shed for instrumentation leads is located at the crest near the right spillway training wall.

The shores of the pond are generally wooded. Route 183 extends parallel to the east bank of the impoundment/river. An abandoned railroad bridge abutment and center pier are located immediately upstream of the dam. The western railroad bridge pier was formerly integral with the right embankment. The immediate downstream area includes the mill and wooded river banks. A U.S. Geological Survey (USGS) gaging station is located on the Division Street bridge approximately 1 mile downstream of the dam.

Previous inspection reports indicated that the sluice gate stem was broken and the closure was inoperable. The sluice gate was replaced in 2006.

In 2011 through 2013, the dam underwent a series of repairs and rehabilitations. During this rehabilitation, a row of sheetpiles was construction in front of the spillway apron, then the concrete apron demolished. The rubble underneath the apron surface was filled with unreinforced, high-slump concrete, and a new two-foot thick reinforced concrete apron poured. Concrete energy dissipaters were constructed on the downstream end of the apron, and large riprap dumped in the discharge area to return the channel to preconstruction conditions. In addition, the downstream right training wall was resurfaced and raised by two feet, the embankment was regraded, small riprap placed behind the right training wall, and spillway apron vibrating wire piezometers re-connected. Left side stone masonry was repointed along the spillway, and the blow-off valve closed to the extent possible. Anchors for warning buoys were installed upstream of the spillway.

4.5 OPERATIONS AND MAINTENANCE

The dam is operated and maintained by GE and is subject to GE's Operation, Monitoring, and Maintenance (OM&M) Plan for Rising Pond Dam (dated December 2018). GE maintains files on the Rising Pond Dam, including plans, inspection reports, and results of investigations, at it office at 1 Plastics Avenue, Pittsfield, Massachusetts 01201. In accordance with the OM&M Plan for this dam, GE or its contractor conducts routine quarterly inspections of the dam, and a qualified and registered Professional Engineer with experience in dam safety conducts Engineering Phase 1 Inspections/Evaluations of the dam on a biennial basis. GE or its contractor mows grass and removes debris from the spillway regularly, and conducts maintenance activities and minor repairs as described in the OM&M Plan for this dam. The gate is operated annually. Warning buoys are deployed upstream of the spillway. In addition, GE plans to install and maintain warning signs at Rising Pond Dam.

The operations and controls for the dam are operated by GE.

4.6 DCR SIZE CLASSIFICATION

Rising Pond Dam has a height of dam of approximately 38 feet and a maximum storage capacity of 710 acre-feet. In accordance with DCR Office of Dam Safety classification under Commonwealth of Massachusetts dam safety rules and regulations in 302 CMR 10.00. as amended by Chapter 330 of the Acts of 2002, Rising Pond Dam is an Intermediate size structure.

4.7 DCR HAZARD CLASSIFICATION

In accordance with DCR Office of Dam Safety classification procedures under Commonwealth of Massachusetts dam safety rules and regulations in 302 CMR 10.00, as amended by Chapter 330 of the Acts of 2002, Rising Pond Dam is classified as a dam with Significant Hazard potential.

5.0 EMERGENCY DETECTION, EVALUATION, AND CLASSIFICATION

5.1 EMERGENCY DETECTION

This section describes the detection of an unusual or emergency event at the dam and provides information to assist the Town of Great Barrington in determining the appropriate emergency level for the event.

Unusual or emergency events may be detected by:

- Observations at or near the dam by government personnel (local, state, or federal), landowners, visitors to the dam, or the public;
- Earthquakes felt or reported in the vicinity of the dam; or
- Forewarning of weather conditions that may cause an unusual event or emergency event at the dam (for example, a severe weather or flash flood forecast).

5.2 EMERGENCY EVALUATION

The Incident Commander (Great Barrington Emergency Management Director) will coordinate with the Caretaker (GE), Great Barrington DPW, and a registered professional dam safety engineer to evaluate the severity of the observed dam safety issue.

5.3 EMERGENCY CLASSIFICATION

After an unusual or emergency event is detected or reported and evaluated, the Incident Commander is responsible for classifying the event into one of the following four conditions.

1. Condition A: Urgent; dam failure appears imminent or has occurred.

   This is an extremely urgent situation when a dam failure is occurring or obviously is about to occur and cannot be prevented. Flash flooding will occur downstream of the dam.

2. Condition B: Potential dam failure situation, rapidly developing.

   This situation may eventually lead to dam failure and flash flooding downstream, but there is not an immediate threat of dam failure. Time may be available to employ remedial actions on the order of hours or days.

3. Non-Emergency Condition: Unusual event, slowly developing.

   This situation is not normal (e.g. an increased amount of seepage) but has not yet threatened the operation or structural integrity of the dam. If this situation worsens it could threaten the integrity of the dam.

4. Non-Failure Emergency Condition: No danger of dam failure, only flooding concerns.

   Generally, this situation indicates that there is no sign of pending or imminent dam failure. This Condition is only used when there are flooding concerns caused by high reservoir/river/flow conditions are such that flooding is expected to occur downstream of the dam.

Examples of different situations that could occur at the dam and the corresponding emergency condition are presented in **Table 7**. Expanded descriptions of the observed conditions, including guidance on response actions, are included in **Table 8** and **Attachment D**. Refer also to **Attachment F** for examples of general conditions that could lead to dam failure.[1]

[1] Texas Commission on Environmental Quality, "Guidelines for Operation and Maintenance of Dams in Texas," Publication No. GI-357, November 2006.

6.0 GENERAL RESPONSIBILITIES UNDER THE EMERGENCY ACTION PLAN

6.1 DAM OWNER RESPONSIBILITIES

As owner, GE has overall responsibility for care and maintenance of Rising Pond Dam. The following duties and responsibilities are assigned to on-site personnel for the five phases of emergency response. Within the context of the EAP, GE's duties and responsibilities include the following:

1. Condition A: Failure of the Rising Pond Dam is imminent or has occurred

   Once the Incident Commander has determined that there is no longer any time available to safely attempt corrective measures to prevent failure, the "failure is imminent or has occurred" warning should be issued. Responsibilities of GE include:

   - Initiate the notification procedures for Condition A. Refer to Section 6.3 and **Figure 1 – Notification Flowchart** (in Section 2).
   - Continuously update the Incident Commander and emergency responders on the emergency situation.
   - Provide periodic updates to DCR Office of Dam Safety as to condition of affected area, pool level, and discharge through any breach.

2. Condition B: A failure situation at Rising Pond Dam may be developing

   Under this scenario, it is assumed that some time is available for further analyses/decisions to be made before dam failure is considered to be imminent. Dam failure may eventually occur but preplanned actions may avert or mitigate a full dam failure. Responsibilities of GE include:

   - Initiate notification procedures for Condition B. Refer to Section 6.3 and **Figure 1 – Notification Flowchart** (in Section 2).
   - Continuously update the Incident Commander on the emergency situation to mobilize staff to the affected area to institute emergency repair procedures (if time and safety considerations permit).
   - Contact GE's consulting dam safety engineer for repair guidance.
   - Provide periodic situation reports/emergency messages concerning ongoing repair efforts to DCR Office of Dam Safety as outlined in **Figure 1 - Notification Flowchart**. Also provide periodic updates through the Great Barrington Emergency Dispatch Center.

3. Non-Emergency, Unusual Event, Slowly Developing Condition

   During an unusual, non-emergency condition, the situation is abnormal but has not yet threatened the integrity of the dam. GE is responsible for monitoring the situation and for providing updates to the Incident Commander. GE will seek guidance from a qualified dam safety engineer and from the DCR Office of Dam Safety, as necessary.

   Note that not all responsibilities of GE are listed above. Where duties fall into other specific categories (such as responsibilities for the Town of Great Barrington or responsibilities for termination and follow-up, etc.), these duties are discussed separately in Sections 6.2, 6.3, 6.4, and 6.5.

4. Non-Failure Emergency Condition

   During a non-failure emergency condition, flooding is expected to occur downstream but there is little danger of dam failure. GE is responsible for performing a post-event assessment of Rising Pond Dam to determine if the dam has been damaged.

6.2 RESPONSIBILITY FOR NOTIFICATION

It is assumed that an emergency situation at Rising Pond Dam will be identified prior to complete structural failure. Although reaction time prior to complete failure may be limited, it is assumed that notification procedures can be initiated at the Great Barrington Emergency Dispatch Center (Great Barrington Dispatch), depending upon the source of initial notification and the condition of the emergency.

Condition A calls for **immediate evacuation** and therefore notification priorities are given to the downstream communities of Great Barrington and Sheffield.

Condition B allows for some evaluation of the condition by GE, with the Town of Great Barrington, prior to notification of the downstream community of Sheffield.

The likely mode of initial identification of the emergency condition will be from a passer-by (i.e. Observer – General Public).

If the initial observation of an emergency is made by a GE employee or contractor, then he or she will report the situation to the Caretaker and the 911 dispatch center for the Town of Great Barrington. Great Barrington Dispatch's first contact will be to Great Barrington Emergency Management, which is in turn is responsible for providing notification to the emergency responders in Great Barrington: Police, Fire, and (as needed) Highway Departments. The second set of contacts provides notification to the emergency responders in Sheffield: Emergency Management, Police and Fire Departments. The Town of Great Barrington Emergency Management will contact Great Barrington elected officials, Massachusetts State Police, Massachusetts Emergency Management Agency (MEMA), and the Berkshire County Sheriff's Office as needed.

If the initial observation is made by the general public, the observer is expected to call 911 from either a cell phone or landline in the Town of Great Barrington. A cell phone call will be directed to State Police, which will route the call to Great Barrington Dispatch. Great Barrington Dispatch is responsible for carrying out the same notification procedures described above for an emergency that is initially observed by a GE employee or contractor. Once the communication reaches the local level, direct communication via radio or cell phone may be the quickest way to communicate amongst the local responders. Major announcements; however, will be distributed through the dispatch centers.

If time allows, GE is responsible for contacting its consulting dam safety engineer and the DCR Office of Dam Safety for advice. GE is also responsible for contacting the Housatonic Railroad Company should the entrance to the west side of Rising Pond Dam be blocked by railroad cars

The Incident Commander will contact MEMA or the Massachusetts State Police (MSP) if he/she deems that assistance is or may be needed. Assistance can be requested from and updates can be provided to MEMA through the Web Emergency Operations Center (WebEOC). MEMA has the ability to issue flood watches and warnings to the public through the National Weather Service if appropriate. MEMA also has the ability to transmit warning messages to the public over the Emergency Alert System (EAS).

The Notification Flowchart provided in Section 2 summarizes the notification responsibilities listed above; however, individuals listed on the Flowchart may not be available, in which case alternates or designees may be involved in the notification procedures. Alternate contacts and additional phone numbers are listed in the Contact Lists provided in **Tables 1 through 6**. Initial means of notification will likely be made by telephone landlines or cellular telephones. Additional communication systems are listed in Section 7.6.

Upon notification of an emergency condition, the Towns of Great Barrington and Sheffield are responsible for providing direct warning to their residents via a pre-arranged warning system. A discussion of evacuation responsibilities is included in Section 6.3. The Towns of Great Barrington and Sheffield will coordinate their responses from their individual EOCs at the Great Barrington Police Station and Sheffield Fire Departments, respectively.

Preparation of warning messages should begin as soon as their potential need is apparent, which is likely to be immediately after initial notification. When time is available for preparation, the initial message should contain pertinent information as to the severity of the problem, expected extent and timing of inundation at key population centers, and general instructions concerning evacuation. However, in some cases, an emergency condition may be declared when failure is imminent with little advance notice or time to compose a specific message intended for broadcast. The example messages below provide a model for the initial announcements in those cases. Subsequent announcements should be scripted so to provide additional data as the situation dictates.

Sample Message for Emergency Condition A – Announcement for Major Failure of Rising Pond Dam

In the event of a Condition A emergency, the Incident Commander or his or her designee has the authority to issue the following message to the emergency responders from the Towns of Great Barrington and Sheffield via telephone or local two-way radio.

Urgent: THE RISING POND DAM IN GREAT BARRINGTON, MASSACHUSETTS HAS FAILED.

Rising Pond Dam, located near the intersection of Park Street and Mountain Street in Great Barrington, Massachusetts, is failing. Water from the dam is expected to cause widespread flooding along Park Street, Route 7, Route 23, and Route 41 in the towns of Great Barrington and Sheffield. The downstream area must be evacuated immediately. Repeat, Rising Pond Dam is failing; evacuate the area along low-lying portions of Housatonic River.

We have activated the emergency action plan for this dam and are currently under emergency Condition A.

The peak of the resultant flood will take approximately 30 to 60 minutes to reach the Division Street Bridge in Great Barrington. Reference the inundation map in your copy of the Emergency Action Plan.

Stay alert for further announcements. Updated information as to river levels, flood arrival times and evacuation efforts will be provided as soon as they are available.

This is an emergency. This is *identify your name and position.*

Sample Message for Emergency Condition B – Announcement for Rapidly Developing Condition at Rising Pond Dam

In the event of a Condition B emergency, the Incident Commander or his or her designee has the authority to issue the following message to the emergency responders from the Towns of Great Barrington and Sheffield via telephone or local two-way radio.

Urgent: The Town of Great Barrington has announced that a potential failure situation is developing at Rising Pond Dam in Great Barrington, Massachusetts.

We have an emergency condition at Rising Pond Dam, located near the intersection of Park Street and Mountain Street in Great Barrington, Massachusetts. We have activated the emergency action plan for this dam and are currently under emergency Condition B.

We are implementing pre-determined actions to respond to a rapidly developing situation that could result in dam failure.

If the dam fails, the peak of the resultant flood will take approximately 30 to 60 minutes to reach the Division Street Bridge in Great Barrington. Please prepare to evacuate the area along low-lying portions of Housatonic River.

Reference the inundation map in your copy of the Emergency Action Plan.

Standby for periodic updates on the repair efforts at the dam and additional guidance on evacuate. We will advise you when the situation is resolved or if the situation gets worse.

This is *identify your name and position.*

Sample Message for Emergency Services Personnel to Communicate the Status of the Emergency with the Public

In the event of a Condition A emergency, the emergency managers for the Towns of Great Barrington and Sheffield have the authority to issue the following message to the general public through Reverse 911. This message may be modified for a Condition B emergency.

Urgent: This is an emergency message from the *name of community*. Listen carefully. Your life may depend on immediate action.

Rising Pond Dam, located near the intersection of Park Street and Mountain Street in Great Barrington, Massachusetts, is failing. Repeat. Rising Pond Dam, located near the intersection of Park Street and Mountain Street in Great Barrington, Massachusetts, is failing.

If you are in or near this area, proceed immediately to high ground away from the valley. Do not travel on Route 7, Route 23, Route 41 or return to your home to recover your possessions. You cannot outrun or drive away from the floodwave. Proceed immediately to high ground away from the valley.

This message will be repeated once.

The accurate and timely dissemination of emergency public information is very important to the overall success of an EAP.

6.3 RESPONSIBILITY FOR EVACUATION

Warning and evacuation planning are the responsibilities of local authorities who have the statutory obligation within their respective communities (i.e., the Towns of Great Barrington and Sheffield). The Great Barrington and Sheffield Police Departments will provide security, traffic control for secondary and local roadways and direct evacuees along the major evacuation routes toward upland areas and away from the inundation areas shown on the inundation maps in **Attachment E**. In addition to traffic control, local police/fire department will provide a warning of the emergency by loudspeakers, door to door and Reverse 911. The Great Barrington Fire Department will assist in rescues and evacuations, and the Great Barrington DPW will assist with road closures and other

support. Emergency evacuation routes will also be broadcast simultaneously over local radio, television, cable stations. Additionally, the Towns of Great Barrington and Sheffield may request activation of the EAS through MEMA. The Towns of Great Barrington and Sheffield have limited resources and may request evacuation and/ or traffic control and resident warning assistance from MSP. MSP will provide traffic control along major interstate highways, state highways, and bridges in accordance with the procedures prescribed in the Incident Command System (ICS). In addition, the Berkshire County Sherriff's Office will respond to emergency sites with emergency supply equipment, including shelter trailers and a portable command center.

According to dam break analysis, the inundation areas occur along the Housatonic River. Based on the generally northerly to southerly flow direction within the downstream floodplain zone, the general evacuation direction adjacent to the east and west sides of the flooding should be toward the east and west, respectively, away from the floodplain zone.

6.4 RESPONSIBILITY FOR DURATION, SECURITY, TERMINATION AND FOLLOW-UP

The Incident Commander (Great Barrington Emergency Management Director) or his or her designee will perform on-site monitoring of the situation at the dam and keep local authorities informed of developing conditions at the dam until the emergency has been terminated.

The Town of Great Barrington will provide security measures to prevent unauthorized entry into the emergency area and establish access control points. Security measures may include warning signage, security tape, staffed outposts, etc. Additional materials may be provided by the Berkshire County Sheriff's Office.

Throughout the duration of an emergency, emergency responders will update the Unusual Emergency Event Log, which is available in **Table 9**.

Whenever the EAP has been activated, an emergency level has been declared, all EAP actions have been completed, and the emergency is over, the EAP operations must eventually be terminated and follow-up procedures completed. The Incident Commander is responsible for terminating EAP operations and relaying this decision to all responders. It is then the responsibility of each dispatch center to notify the same group of contacts that were notified during the original event notification process to inform those people that the event has been terminated.

Prior to the termination of an emergency Condition A event that has not caused actual dam failure, the Great Barrington Incident Commander, with the assistance of GE and its consulting dam safety engineer, will inspect the dam to determine whether any damage has occurred that could potentially result in loss of life, injury, or property damage. The DCR Office of Dam Safety may also participate in the inspection. If it is determined that conditions do not pose a threat to people or property, the Incident Commander may terminate EAP operations as described above. If the severity of a Condition A emergency changes such that there is no longer a threat of imminent failure, the emergency condition will be reduced to Condition B. If the severity of a Condition B emergency changes such that there is no longer a threat of dam failure, the Incident Commander may terminate EAP operations as described above.

GE will document the emergency event and all actions that were taken. GE will also perform an initial damage assessment and also modify/update this EAP, if warranted, based upon lessons learned during the emergency situation.

The Towns of Great Barrington and Sheffield should also document their responses and perform initial damage assessments. The results of their evaluations should be documented in written reports for their own files.

6.5 EAP COORDINATION RESPONSIBILITY

GE is responsible for identifying the EAP Coordinator. The EAP Coordinator is responsible for EAP-related activities, including the following:

- Review and update, as necessary, EAP including notification procedures, contact lists, and responsibilities on at least a yearly basis (per 302 CMR 10.11). Updates will be recorded in **Table 10**, entitled "EAP Update Log".
- Conduct staff training and Orientation Seminars of proper procedures for surveillance and emergency repair.
- Conduct a biennial test of the validity of notification procedures and communication systems.
- Review and update available resources information.
- Be prepared to mobilize available on-site resources and obtain contractors on short notice.

6.6 TYPICAL MUTUAL AID POLICE DEPARTMENT FUNCTIONS

Great Barrington is part of a robust mutual aid system with local towns. Should the Incident Commander request assistance, mutual aid communities will respond with manpower and equipment. Other functions include:

- Assist Great Barrington personnel with road closures.
- Support evacuation procedures.
- Provide security in and around the Rising Pond Dam.
- Other typical police functions as requested by Great Barrington.

6.7 TYPICAL MEMA FUNCTIONS

If the Great Barrington Emergency Management Director deems that assistance is or may be needed, he or she may contact MEMA. Typical MEMA functions include the following:

- Dispatch MEMA personnel to coordinate support activities with the local incident commander, when appropriate.

- Activate the State Emergency Operations Center when appropriate.
- Monitor and document potential or actual emergency situations resulting from failure of the Rising Pond Dam.
- Coordinate the delivery of assistance to local governments and state agencies as requested and available.
- Brief the Governor and advise him or her as to necessary actions.
- Assist Governor's Office with emergency and non-emergency public information releases.
- Transmit warning messages over EAS when the State EOC is activated.
- Receive and evaluate Situation Reports from local governments, state agencies, and utility companies.
- Prepare thorough documentation of emergency response activities and development of post-disaster reports on overall emergency operations by state government.
- Contact National Weather Service.

6.8 TYPICAL MASSACHUSETTS STATE POLICE FUNCTIONS

If the Incident Commander deems that assistance is or may be needed, he or she may also contact MSP. Typical MSP functions include the following if requested by the Incident Commander:

- Provide the key communication lines for rapid and simultaneous notification to local public safety within the affected inundated areas.
- Mobilize, deploy, and organize personnel for crowd and traffic control operations in support of evacuation.
- Provide personnel specifically trained in a wide range of expertise, and specialized equipment, as necessary, to support the public safety response to affected areas
- Issue initial emergency messages and situation updates and relay them via the Law Enforcement Automated Personnel System (LEAPS) to local public safety personnel.
- Act as community liaison for MEMA.
- Report damage and other vital information including road closures, bridge failures, collapsed buildings, and casualty estimates.
- Conduct search and rescue operations.
- Control access to dangerous or impassable sections of State-maintained and/or State-patrolled roads.
- Provide assistance as requested to local public safety forces primarily for the purposes of search and rescue, route alerting, anti-looting, traffic control, curfew enforcement, and access control.

- Provide emergency transportation for town, state/federal officials, and engineering consultants.
- Provide emergency communications links through mobile units and the State Police communications.
- Provide departmental Situation Reports to MEMA throughout the increased readiness and emergency response phases of a disaster or emergency.
- Advise the Governor, as to necessary actions, particularly regarding the issuance of curfews and the need for National Guard support.
- Prepare thorough documentation and debriefing of State Police emergency response activities.

6.9 TYPICAL BERKSHIRE COUNTY SHERIFF FUNCTIONS

If the Incident Commander deems that assistance is or may be needed, he or she may also contact the Berkshire County Sheriff (BCS). Typical BCS functions include the following:

- Provide specialized equipment to assist in emergency management, including light towers with generators, and traffic safety equipment including programmable highway signs and barricades.
- Conduct search and rescue operations and provide equipment for off-road rescue operations.
- Conduct boat-based or underwater search and rescue operations.
- Provide assistance as requested to local public safety forces primarily for the purposes of search and rescue, route alerting, anti-looting, traffic control, curfew enforcement, and access control.
- Provide a mobile communications center/command post, and communications equipment including VHF and multiband radios and handheld GPS units with integrated radios
- Provide departmental Situation Reports to MEMA throughout the increased readiness and emergency response phases of a disaster or emergency.
- Prepare thorough documentation and debriefing of BCS's emergency response activities.

7.0 PREPAREDNESS

7.1 SURVEILLANCE PROCEDURES

The keys to the successful implementation of the EAP are the means, timeliness and accuracy of identifying potential emergencies. An emergency condition is one in which the occurrence of a significant hazard to life and/or property is possible or certain to occur (COE, 1983).[2] Conditions justifying declaration of an emergency condition may be imminent (Condition A) or may develop over a longer term (Condition B). However, in either case, such a declaration will likely come from GE personnel who are familiar with the operations/maintenance history and existing conditions of the Rising Pond Dam.

This section summarizes the routine observations and inspections of the dam and appurtenant structures. Additional details are provided in the OM&M Plan for Rising Pond Dam. Early identification of the existence or potential for occurrence of such emergency conditions is essential as a basis for initiating emergency repairs and for issuing appropriate notifications. Refer to **Table 8** for key items for which the dam inspector(s) should be on the lookout during dam inspections. Refer to **Attachment F** for images of these key items.

1. Quarterly visual inspections will be conducted by GE or its contractor. These inspections will include a walk along the structure and across the bridge downstream of the dam to check for cracks, movement, seepage, boils and/or other signs of increased leakage or other unusual occurrences at the dam. These routine inspections will be augmented with inspections after every high-flow event, defined as a flow event with a peak river flow of 3,650 cubic feet per second (cfs) at the USGS gage on the Housatonic River at Division Street in Great Barrington.

2. A complete visual inspection of the Rising Pond Dam will be made on a biennial basis by a dam safety engineer registered in the Commonwealth of Massachusetts who has extensive experience in dam inspections. The inspection reports will document existing conditions, and present recommendations for maintenance and repairs, as necessary.

Additional inspections will be conducted prior to a forecasted Minor Flood Stage event (i.e., an event with a river flow of 5,830 cfs or greater at the USGS gage at Division Street), after ice-out in the spring, every four years for the penstock, and after an earthquake with reported damage in Berkshire County, all as provided in the OM&M Plan for this dam. In addition, a topographic and bathymetric survey and a dive inspection of the dam will be performed in 2019 and at a minimum of five-year intervals thereafter, as further provided in the OM&M Plan.

All inspection reports and checklists will be completed by or on behalf of GE, kept permanently on file by GE, and submitted to EPA when required by the OM&M Plan.

[2] U.S. Army Corps of Engineers (COE), The Hydrologic Engineering Center, "Example Emergency Plan for Blue Marsh Dam and Lake," Research Document No. 19, August 1983.

7.2 RESPONSE DURING PERIODS OF DARKNESS

During normal business hours, response time of GE personnel to the site of an identified potential emergency condition would be rapid. Actual response time, especially during non-business hours, will be a function of how and by whom the initial emergency condition is discovered and by weather conditions. The Town of Great Barrington Dispatch Emergency Center is available 24 hours a day.

Please refer to the Notification Flowchart in **Figure 1** and Section 6 for special notification procedures.

Emergency power and remote lighting contingencies are available from the Town of Great Barrington. Additional power and remote lighting can be provided by the Berkshire County Sheriff's Office and by local contractors at the request of the Incident Commander.

7.3 ACCESS TO SITE

To access the right abutment from Route 183, one turns west onto Division Street, continues for 0.9 miles and proceeds north on Van Deusenville Road for about 1.1 miles to a railroad access gate on the right. On the east, a 0.3-mile path, capable of passing vehicular traffic, leads to the right side of the dam.

7.4 RESPONSE DURING WEEKENDS AND HOLIDAYS

During normal business days and hours, response time of GE and Town of Great Barrington personnel to the site of an identified potential emergency condition would be rapid. Actual response time will be a function of how and by whom the initial emergency condition is discovered and communicated. It will also be affected by weather conditions.

Response time could be impacted if the emergency event occurs on a weekend or holiday. The Town of Great Barrington will attempt to minimize the impact of weekends and holidays through its preparedness measures. Emergency phone numbers listed are for dispatch centers, which are operational 24 hours per day, 7 days per week. Dispatch centers have the ability to contact individuals during weekends and holidays.

7.5 RESPONSE DURING PERIODS OF ADVERSE WEATHER

GE personnel will be placed on a heightened state of readiness in the event of predicted or actual adverse weather conditions. Should weather events make local roads impassable, the dam can be accessed from either abutment.

7.6 ALTERNATIVE SYSTEMS OF COMMUNICATION

In the event of an emergency condition, the primary means of notification will be made by telephone landlines or cellular telephones; however, additional/alternative communication systems are listed below. The Contact Lists provided in **Tables 1 through 6** contain responder contact information available at the time that this EAP was prepared. This contact information includes emergency

dispatch phone numbers, office phone numbers, cell phone numbers, home phone numbers and radio frequencies, when available.

Should the method of primary communication being used fail, responders should be prepared to utilize alternative communication systems. During an ongoing emergency, many of the communication systems listed below will be vital communication links for use in directing and coordinating emergency operations, issuing alerts and warnings, and instructing the general public.

7.6.1 Local Two-Way Radio

The Police, Fire, and Highway Departments in the Towns of Great Barrington and Sheffield communicate through portable radios. Each department communicates via its Emergency Dispatch Center. The following are the Towns' departments' radio frequencies:

Town	Police Department		Fire Department		DPW/Highway DEP.	
	Frequency (MHz)	PL Code	Frequency (MHz)	PL Code	Frequency (MHz)	PL Code
Great Barrington	155.775	107.2	154.310 (dispatch) 152.9825 (response) 154.160 (tactical) 158.805 (tactical) 153.8825 (tactical)	107.2 (dispatch) 131.8 (response) 107.2 (tactical) 107.2 (tactical) D343 (tactical)	151.760	118.8
Sheffield	154.950	107.2	154.310	107.2	155.955	107.2

Other radio contact capabilities include contact with MEMA, which operates on an 800 MHz trunked system, and the mobile communications system available from the Berkshire County Sherriff.

7.6.2 Emergency Alert System (EAS)

EAS allows government officials to access local radio and TV stations to communicate with the public in times of impending or actual emergency. To activate the EAS at the state level, a request may be directed to an Originating Primary Relay Station (usually an FM station located near the State capital) by the Governor, State Police, State Emergency Management, or the National Weather Service.

7.6.3 Internet Access Capabilities

The Towns of Great Barrington and Sheffield have internet access capabilities and may utilize the MEMA WebEOC portal (https://webeoc.chs.state.ma.us/eoc7/) to report an emergency condition, provide updates to MEMA and request assistance (manpower, materials, equipment, etc.) as needed.

7.6.4 Reverse 911

The Towns of Great Barrington and Sheffield utilize Reverse 911 (or equivalent) systems. Reverse 911 (or equivalent) systems would allow Town officials to send out pre-recorded messages to residents by telephone, during an emergency (flood) or a situation that requires public outreach to residents and businesses. Pre-recorded messages would be sent out to entire communities or to specific locations depending on the nature of the emergency. In the case of a dam break flood wave, the notification system would be used to notify residents in the potential impact areas.

7.7 EMERGENCY SUPPLIES AND INFORMATION

7.7.1 Stockpiling Materials and Equipment

A list of emergency supplies is kept on hand within the Town of Great Barrington's Comprehensive Emergency Management Plan, which is available to the local emergency management agency and police department. GE has selected an Emergency Response Contractor to respond to an emergency situation at the dam: LB Corporation, whose contact information is provided in **Table 6**. LB Corporation is a full-service contractor that maintains and will provide materials and equipment that could be used in case of an emergency**.** The Town of Great Barrington DPW and Town of Sheffield DPW should be prepared to respond with additional equipment, material, and labor as required.

7.7.2 Coordination of Information

The Glendale Dam is located on the Housatonic River in Stockbridge, Massachusetts approximately 3½ to 4 miles upstream of Rising Pond Dam. The Glendale Dam has the capability to regulate flow via the dam powerhouse. The Glendale Dam is reportedly owned by the Littleville Power Company, Inc., a subsidiary of Enel Green Power, and is operated under a FERC license for electric power generation. The owner/operator can be reached at 978-681-1900.[3]

Willow Mill Dam is operated by Onyx Specialty Papers and is located about 10 miles upstream of Rising Pond Dam. The owner/operator can be reached at 413 243-1231.[4]

7.7.3 Other Site-Specific Actions

Under the direction of the Incident Commander, the Town of Great Barrington employees may provide manpower to perform emergency repair activities. If additional manpower is required, the Town of Great Barrington may request the assistance of the National Guard through MEMA. GE has an on-call relationship with local contractors who will assist as needed.

[3] Phone number from the Enel Green Power website at https://www.enelgreenpower.com/about-us.

[4] Phone number from the Onyx Specialty Papers website at https://onyxpapers.com/contact-us.

7.8 PUBLIC AWARENESS AND COMMUNICATION

As previously noted, GE will install and maintain warning signs at Rising Pond Dam. GE will shortly submit to EPA a proposal for the format, wording, and locations of those signs. During the quarterly inspections, the posted signs will be observed to evaluate whether they remain in place and intact and whether they need repair or replacement. Any sign repair or replacement activities will be conducted as a follow-up to the inspections.

8.0 INUNDATION MAPS

Note that the inundation maps available in **Attachment E** include a limited number of key landmarks within the impact area and presents estimated flood zones. However, the maps do not include all possible structures and facilities that may be impacted due to a dam break of Rising Pond Dam. It is incumbent upon the Towns of Great Barrington and Sheffield to locate key local landmarks and modify the inundation maps, as they deem appropriate.

TABLES

TABLE 1

GENERAL ELECTRIC COMPANY CONTACT LIST

General Electric Company
159 Plastics Avenue
Pittsfield, Massachusetts 01201

Name	Title	Telephone No.
Kevin Mooney	Senior Project Manager	(413) 553-6610 office (413) 441-4619 cell
Matthew Calacone	Senior Project Manager	(413) 553-6614 office (413) 822-0082 cell (518) 274-0655 (home)
Pittsfield Plant Security	GE Emergency Line	(413) 553-6625 24-hr

TABLE 2

TOWN OF GREAT BARRINGTON COMMUNITY ALERT LIST

City/Town	Name/Dept.	Position/Title	Address	Telephone No.
Great Barrington	**Police Department / Emergency Management** Paul Stroti	Chief	465 Main Street Great Barrington, Massachusetts 01230	911 (413) 528-0306 ext. 104 Freq: 155.775 / PL 107.2
	Fire Department Charles Burger	Chief	37 State Road Great Barrington, Massachusetts 01230	911 (413) 528-0788 ext. 2900 Freq: 154.310 / PL 107.2
	Town Manager Mark Pruhenski	Town Manager	334 Main Street Great Barrington, Massachusetts 01230	(413) 528-1619 ext. 2900
	Selectboard Stephen Bannon	Selectboard Chair	334 Main Street Great Barrington, Massachusetts 01230	(413) 528-1619 ext. 2900
	Department of Public Works Joseph Aberdale	Superintendent	334 Main Street Great Barrington, Massachusetts 01230	(413) 528-0867 ext. 1 Freq: 155.760 / PL 118.8

TABLE 3

TOWN OF SHEFFIELD COMMUNITY ALERT LIST

City/Town	Name/Dept.	Position/Title	Address	Telephone No.
Sheffield	**Police Department / Emergency Management** Eric R. Munson, III	Chief / Director	10 South Main Street Sheffield, Massachusetts 01257	911 (413) 229-8522 / -8523 Freq: 154.950 / PL 107.2
	Berkshire County Sheriff's Communication Center	Desk Officer/ Dispatcher	467 Cheshire Road Pittsfield, Massachusetts 01201	911 (413) 442-0512 (413) 445-4559
	Fire Department David Ulrich	Chief	65 Depot Street (PO Box 860) Sheffield, Massachusetts 01257	911 (413) 229-7033 Freq: 154.310 / PL 107.2
	Board of Selectmen Renee C. Wood	Chairman	21 Depot Square (PO Box 325) Sheffield, Massachusetts 01257	413-229-7000 ext. 152
	Highway Department David Ruot	Highway Superintendent	Pike Road East Sheffield, Massachusetts 01257	(413) 229-7030 Freq: 155.955 / PL 107.2

TABLE 4

STATE AGENCY ALERT LIST

Location	Name/Contact	Address	Telephone No.
Lee, Massachusetts	State Police Troop B-1 SP	215 Laurel Street Route 20 Lee, Massachusetts 01238	(413) 243-0600
Northampton, Massachusetts	State Police Troop B Headquarters	555 North King Street Northampton, Massachusetts 01060	(413) 584-3000
Framingham, Massachusetts	State Police Communication Center	470 Worcester Road Framingham, Massachusetts 01702-5399	(508) 820-2121
Framingham, Massachusetts	Massachusetts Emergency Management Agency (MEMA) Executive Office	400 Worcester Road Framingham, Massachusetts 01702-5399	(508) 820-2000 (24 hrs) (508) 820-2022
Boston, Massachusetts	Department of Conservation and Recreation - Office of Dam Safety	251 Causeway Street Suite 800 Boston, Massachusetts 02114-2104	(617) 626-1410 (Office) (617) 719-1942 (Cell) or (617) 828-1649 (Cell)
Agawam, Massachusetts	Massachusetts Emergency Management Agency (MEMA) Region 3	1002 Suffield Street Agawam, Massachusetts 01001	(413) 750-1400
Springfield, Massachusetts	Massachusetts Department of Environmental Protection (MassDEP)	436 Dwight Street Springfield, Massachusetts 01103	John Ziegler: (413) 755-2228
Hartford, Connecticut	Connecticut Department of Energy and Environmental Protection (CTDEEP)	79 Elm Street Hartford, Connecticut 06106	Emergency Response & Spill Prevention (860) 424-3338 Additional Emergency Contact: (866) 337-7745
Boston, Massachusetts	U.S. Environmental Protection Agency (EPA)	EPA Region 1 5 Post Office Square- Suite 100 Boston, Massachusetts 02114	Pittsfield/Housatonic Office: (413) 236-0969 Emergency Reponse Duty Desk: (617) 918-1236

TABLE 5

MAJOR UTILITIES LIST

Name	Telephone No.
Telephone	
Verizon	(800) 870-9999 Emergency Repair - Residence: (413) 555-1611 Emergency Repair - Business: (413) 555-1515
Electric	
Great Barrington Utility: National Grid	National Grid Emergency: (800) 465-1212
Sheffield Utility: National Grid	National Grid Emergency: (800) 465-1212
Gas	
Berkshire Gas	Emergency: (888) 779-8559
Railroad	
Housatonic Railroad	(860) 824-0850 Emergency (Matt Boardman): (860) 824-0850 x17
Mass DOT	
Massachusetts Department of Transportation – Highway District 1	(413) 637-5700

Note:

This list has been provided for general reference purposes and is not intended to be an all-inclusive list of major utilities within the potential downstream impact area. Primary responsibility for notifying key utilities, rail lines, etc. will rest with the public safety agencies of the individual community.

TABLE 6

GENERAL ELECTRIC EMERGENCY RESPONSE CONTRACTOR LIST

Thomas M. Garrity	LB Corporation	(413) 243-1072 office (413) 441-9318 cell
Steve Garrity	LB Corporation	(413) 243-1072 office (413) 441-1412 cell

J:\19,000-20,999\19896\19896-40.LAG Engrg Services for Rising and Woods\EAP Update 2020\2020-04-08 RPD Final for EPA\[Tables 1-4_6-8 RPD EAP 4-8-2020.xlsx]T6

TABLE 7
GUIDANCE FOR DETERMINING THE EMERGENCY CONDITION

Event	Situation	Emergency Condition*
Spillways	Principal spillway blocked with debris and pool is rapidly rising	B
	Principal spillway severely blocked with debris or structurally damaged	NE
	Principal spillway leaking	NE
Flooding	Action level river stage (7 feet) or above occurring or forecasted by Advanced Hydrologic Prediction Service for Housatonic River at Great Barrington (See NOAA AHPS website)	NE
	Flood flows are overtopping the dam	A
	The reservoir elevation reaches the predetermined evacuation trigger elevation 725.8 NGVD (i.e. 0.5 feet below top of embankment)	A
	The reservoir elevation reaches the predetermined notification trigger elevation 725.3 NGVD (i.e. 1.0 foot below top of embankment; Consider rate of rise)	B
	National Weather Service issues a flood warning for the area	NE/NF
Seepage	Boils observed downstream of dam with cloudy discharge	B
	New seepage areas with cloudy discharge or increasing flow rate	B
	New seepage areas in or near the dam	NE
	Boils observed downstream of dam	NE
Sinkholes	Rapidly enlarging sinkhole	A
	Observation of new sinkhole in reservoir area or on embankment	B
Embankment Cracking	Cracks in the embankment with seepage	B
	New cracks in the embankment greater than 1/4-inch wide without seepage	NE
Embankment Movement	Sudden or rapidly proceeding slides of the embankment slopes	A
	Visual movement/slippage of the embankment slope	NE
Instruments	Instrumentation readings beyond predetermined values	NE
Earthquake	Earthquake resulting in uncontrolled release of water from the dam	A
	Earthquake resulting in visible damage to the dam or appurtenances	B
	Measurable earthquake felt or reported on or within 50 miles of the dam	NE
Security Threat	Detonated bomb that has resulted in damage to the dam or appurtenances	A
	Verified bomb threat that, if carried out, could result in damage to the dam	B
Sabotage / Vandalism	Damage to dam or appurtenances that has resulted in uncontrolled water release	A
	Damage to dam or appurtenances that has resulted in seepage flow	B
	Modification to the dam or appurtenances that could adversely impact the functioning of the dam	NE
	Damage to dam or appurtenances with no impacts to the functioning of the dam	NE

* Emergency Conditions:

A: Urgent; dam failure appears imminent or is in progress

B: Potential dam failure situation, rapidly developing

NE: Non-emergency, unusual event, slowly developing

NF: Non-failure emergency condition, no danger of dam failure, only flooding concerns

Note: This table is based upon the 2007 ASDSO sample EAP format.

TABLE 8

EMERGENCY REPAIR GUIDELINES

Observed Conditions	Potential Effects of the Observed Conditions	Guide for Action	Data to be Reported Situation Report	Remarks
1. CRACKS/DISPLACEMENT in Dam	Not serious, if minor axial cracks in crest. If crack does not extend completely through the dam and no movement or displacement is evident, gradual surficial cracking and/or deterioration of concrete or masonry may not be serious.	Start repairs as soon as possible. Mobilize construction equipment and manpower to perform necessary repairs. Contact professional dam engineer to assess condition	Location, width, length, and pattern (horizontal, vertical, or in some intermediate direction). Record pond elevation.	Observe daily until repair work is complete. NOTE: Although cracks can develop anywhere, the most likely location is at transition zones.
	Could cause failure, if crack extends completely through the dam or if recent movement or displacement of concrete or masonry is evident	Backfilling or other means of filling the crack will be required after the extent of the crack is determined.	Same as above. **Activate EAP. (Situation B).**	Observe hourly until repair work is completed.
	Failure imminent, if cracks extend completely through the dam and water is entering the crack and emerging on the downstream side at an increasing rate or if large sections of concrete or masonry have displaced significantly or fallen off the dam.	Replace and reinforce behind the area of shifted concrete/masonry with large rip rap to form a buttress. Plug the crack on upstream side to the extent possible using stone and gravel (or with other suitable material larger than the crack width) before adding sand or impervious material. After slowing flow, place two layers of geotextile filtration fabric across small cracks and cover with fine grained or impervious soil. This procedure will help prevent the washing out of the finer materials through the crack. The work should be started nearest the water surface on the upstream side.	Location, width, lengths and pattern of crack; also flow rate of downstream exit. **Activate EAP. (Situation A).**	Observe constantly.

Observed Conditions	Potential Effects of the Observed Conditions	Guide for Action	Data to be Reported Situation Report	Remarks
2. LEAKAGE (THROUGH CONCRETE OR MASONRY) a. Moist or wet surfaces	This may be due to cracks, deteriorated or porous concrete, open joints or plugged drains. This may not be serious or it could be the start of a serious problem.	Review to see if conditions relating to 1 applies and pursue same remedial actions.	Note the time, size, and location of leakage area and approximate flow rate.	Observe at least once per day until sure that leakage does not change into one of the conditions noted below.
b. Concentrated	Not serious. No loss of concrete or unusual movement. Rate of flow not increasing. Flow is clear.	Map location of all leaks, determine path of water if feasible through the use of dye tests. Report to the Consultant Engineer.	Note the time, size and location of leakage area and approximate flow rate.	Monitor quantities and relate to reservoir elevation and other potential influencing conditions.
	Could lead to failure. Increase in flow or leakage leading to deterioration, movement, and weakening.	Same as above and: Specifically assess hazards associated with cracks/ displacement above and pursue same remedial actions. Control leakage with drainage system and channel uncontrolled flows. Protect eroded areas with concrete, gunite, rock, or gabions.	Note the time, size, and location of leakage area and approximate flow rate. **Activate EAP (Type B)**	Same as above. Monitor condition hourly, until otherwise notified by Consultant Engineer.
3. SEEPAGE a. Wet surface area, located on downstream abutment slope or otherwise normally dry areas downstream of the dam, with very little or no surface water, or very minor seeps.	This may be caused by infiltration of rain water which is not serious, or may be the start of a serious seepage problem, which could be indicated by a quick change to one of the conditions below.	Compare to previously reported conditions under similar weather conditions. Perform complete visual inspection of abutment and downstream area. If situation cannot be fully explained by weather conditions, contact Consultant Engineer.	Note the time, size and location of seepage area, and quantity of surface water; report to dam supervisor.	Observe at least once a day until sure that seepage does not change into one of the conditions noted below.
b. Same wet area as above, with moderate seeps of clear or relatively clear water.	Not serious. Clear seep water and rate of flow not increasing.	Measure flow rate, inspect all downstream areas, and report any new seepage locations and conditions.	Note the time, size and location of seepage area, and approximate flow rate.	During flood stages the seepage area must be monitored daily for deteriorating conditions (increase in flow or material discharge).
	Could lead to failure. Relatively clear seep water, but rate of flow increases by minutes or hours.	Same as above.	Note the time, size and location of seepage area, and approximate flow rate. **Activate EAP (Situation B)**	Same as above. Monitor condition hourly.

Observed Conditions	Potential Effects of the Observed Conditions	Guide for Action	Data to be Reported Situation Report	Remarks
c. Boils - Soil particles forming a cone deposited around water discharge point. (Boils can vary from a few inches in diameter spaced to 2 to 3 feet apart to isolated boils several feet in diameter.)	Not serious. Emerging water in developed cone is clear and rate of flow is not increasing.	Check all downstream areas for other boils or seeps.	Note that time, size and location of seepage area, and approximate flow rate or velocity.	Observe at least once a day.
d. Piping - (seepage with removal of material through abutments), moderate to active.	Could lead to failure. Emerging water is muddy and rate of flow is increasing.	Temporarily control the seepage by ringing the area with a sandbag dike (see Figures 3 and 4 for schematic on ringing a boil). The dike should be constructed to provide sufficient flow reduction to prevent loss of material at the surface. If boils become so large that it is not practical to dike around them, place a coarse, granular blanket over the area, but do not stop the flow of water.	Note that time, size and location of seepage area, and approximate flow rate. **Activate EAP. (Situation B)**	Monitor constantly.
	Failure imminent. Emerging water is turbid (muddy), rate of flow increasing, and if there is upstream swirl (whirlpool) caused by water entering at the abutments.	Control seepage on downstream side of embankment as discussed above. Plugging of the upstream entrance of the pipe should be attempted. (See Observed Condition 5 below.)	Note the time, size and location of seepage conditions and approximate size of whirlpool. **Active EAP. (Situation A).**	Observe constantly.
4. SINKHOLES a. Above piping or tunnel in abutment.	Could lead to failure if problem occurs in conjunction with piping (or boils) problem.	If in conjunction with boils problem, place inverted granular blanket material in sinkhole. Check area for other sinkholes or seeps.	Same as above plus description and size of cracks or damage and seepage into conduit. **Activate EAP. (Situation B).**	Observe constantly.
b. Above Outlet works conduit.	Could lead to failure if conduit cracks and structural damage results.	Check conduit for cracks or damage and repair as soon as possible.	Same as above plus description and size of cracks or damage and seepage into conduit. **Activate EAP. (Situation B).**	Observe constantly.

Observed Conditions	Potential Effects of the Observed Conditions	Guide for Action	Data to be Reported Situation Report	Remarks
5. RESERVOIR WHIRLPOOLS	Usually caused by water flowing through a piping tunnel through the dam or abutment.	Lower the pool. An attempt should be made to plug the entrance with cobbles/boulders or stockpiled materials or anything else that is available. If the large material placed in the hole appears to have reduced the flow, continue adding progressively smaller material. When the flow is sufficiently reduced (Whirlpool disappears) place a granular blanket over the downstream outlet of the piping as noted above for problem, i.e., piping. Inspect abutments, dam, and downstream of dam for seepage areas, sinkholes, boils, etc.	Note the time observed, condition noted, location, and approximate size of whirlpool and the exit area downstream. **Activate EAP**. **(Situation B).**	Observe constantly for changes in the pond or the exit area.
6. SLIDES Upstream slope of abutments	Not serious, if slide does not intersect the crest or extend into the embankment more than 5 feet (measure perpendicular to the slope).	Start repairs as soon as possible. Mobilize town construction equipment and manpower or private contractor to perform necessary repairs.	Note: Location, time first observed, subsidence or building, whether water is emerging from slope, whether any movement can be visually detected and pool elevation.	Observe at least once a day.
	Could lead to failure, if slide passes through the crest, and water surface within 10 feet of the slumped crest.	Have labor, materials and equipment standing by as soon as possible. Start repairs as soon as possible.	Report same data as above. **Activate EAP. (Situation B).**	Observe constantly until necessary repairs are completed.
	Failure imminent, if: (1) the slide passes through the crest; and, (2) the water surface is at or near (less than 10 feet below) the top of the slumped crest.	Start lowering the reservoir. Use every means possible to armor the crest and to restore to original crest level.	Note: the time first observed location, whether water is emerging from downstream slope, whether any movement can be visually detected. **Activate EAP (Situation A).**	Observe constantly.

Observed Conditions	Potential Effects of the Observed Conditions	Guide for Action	Data to be Reported Situation Report	Remarks
7. OVERTOPPING	Could cause failure, if water surface elevation is approaching the top of the dam and there is the potential for erosion of the downstream face or if the water surface elevation is at or above the top of the dam and erosion is occuring.	Increases releases through outlet structures if possible. Increase freeboard by building a sandbag berm, or an earthen berm or parapet wall that is covered with a membrane. Force water through the outlet structures. Fill eroded areas with sandbags acording to the pyramid placement method as soon as they begin to form. Cover large areas that have been sandbaged with a membrane to further prevent erosion.	Note the time, location and height of overtopping and the length of the crest that is being overtopped. Note the size of the area that is being eroded. **Activate EAP (Situation B)**	Observe constantly.
	Failure imminent, if significant erosion is observed on the downstream face of the dam or if a significent decrease in crest width occurs as a result of the erosion.	Construct an auxillary spillway on an abutment. Dig a channel (starting from the bottom at the abutment/ downstream channel contact). Line the channel with filter fabric and dump appropriately sized (large) riprap in the channel. Once the channel approaches five feet from the reservoir, break through the top 6 inches of the channel/ reservoir contact to allow flow to proceed through the construted channel, while placing additional riprap in the channel to minimize erosion. As the water level drops, slowly and incrementally proceed to break through the top of channel/ reservoir contact to allow additional water through the channel. Place additional riprap as needed. See general note below.	Note the time, location and height of overtopping and the length of the crest that is being eroded. **Activate EAP (Situation A)**	Observe constantly.
	General note: If riprap is depleted, sandbags may be placed. Each bag should be filled with sand and tied to prevent loss of material. Placement should be by hand, sling, or other methods that would prevent tearing of the bags. Bags filled with clay and silts may be used only if sand is not readily available and other methods of repair cannot be implemented.			

TABLE 9
UNUSUAL OR EMERGENCY EVENT LOG
(to be completed during the emergency)

Rising Pond Dam
Great Barrington, Massachusetts

When and how was the event detected? _____

_____

_____

Weather conditions: _____

_____

General description of the emergency situation: _____

_____

_____

_____

Emergency level determination: _____ Made by: _____

Actions and Event Progression

Date	Time	Action/event progression	Taken by

Report prepared by: _____ Date: _____

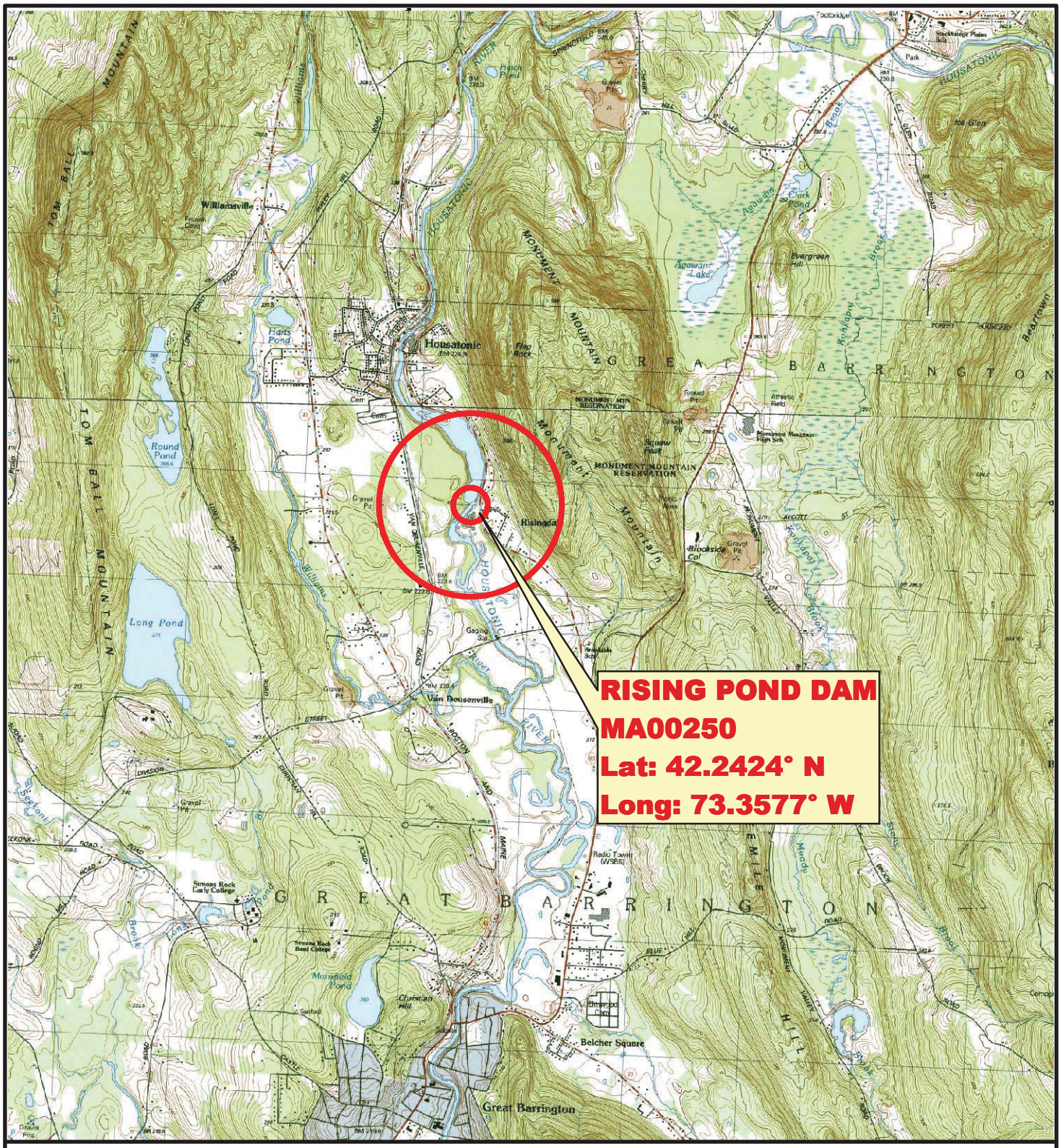
TABLE 10
EAP UPDATE LOG

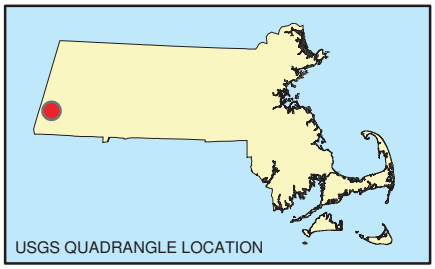
Rising Pond Dam
Great Barrington, Massachusetts

EAP Updates

Date	EAP Update Description	Updated by
10/2015	Reformatted to comply with DCR Regulations and incorporate comments	GZA
12/2017	Validated protocol and updated responsible parties' information	GZA
12/2018	Revised to address U.S. Environmental Protection Agency comments on 12/2017 update and to provide other updated information.	GZA
8/2019	Revised to address U.S. Environmental Protection Agency comments on 12/2018 update and to provide other updated information.	GZA
4/2020	2020 annual updates to the EAP, including responsible parties' information	GZA
4/2021	2021 annual updates to the EAP, including responsible parties' information	GZA
11/2022	2022 annual updates to the EAP, including responsible parties' information	GZA

FIGURE





SOURCE : SCANNED USGS TOPOGRAPHIC QUADRANGLES
SCANNED BY THE MASSACHUSETTS EXECUTIVE OFFICE OF
ENVIRONMENTAL AFFAIRS, MASSGIS. DISTRIBUTED JUNE, 2001.

GREAT BARRINGTON TOPOGRAPHIC QUAD SHOWN.

0 2,000 4,000 8,000 12,000 Feet

Data Supplied by : MASSGIS

N W E S

GZA	PROJ. MGR.: JDA DESIGNED BY: LGM REVIEWED BY: ABB OPERATOR: LGM DATE: 12-04-2013	LOCUS PLAN	JOB NO. 01.0019896.30
		RISING POND DAM, MA00250 GREAT BARRINGTON, MASSACHUSETTS	FIGURE NO. 2

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ATTACHMENT A

INVESTIGATION AND ANALYSIS OF DAM BREAK FLOODS

ATTACHMENT A

INVESTIGATION AND ANALYSIS OF DAM BREAK FLOODS

The objective of this analysis was to determine the resultant flooding depths caused by a breach of the Rising Pond Dam and to estimate the travel time of the flood wave as it progresses downstream. Rising Pond Dam is located on the Housatonic River in Risingdale (Great Barrington), Massachusetts. This analysis was performed using the National Weather Service (NWS) analytical procedure Simplified Dam Break (SMPDBK) Flood Forecasting Model. The dam break scenario consisted of a full breach of the dam while the watershed underwent a storm event equivalent to the 100-year flood.

SMPDBK first computes the peak outflow at the dam based on the reservoir size and the breach geometry. The routine then estimates how the flood wave will diminish as it progresses downstream by utilizing a set of peak flow routing curves that have been developed using a dynamic routing model. Based on this predicted flood wave reduction, the model computes peak flows at specified downstream points and then computes maximum flood depths based on channel geometry, slope, and surface roughness at these downstream locations.

The major limitations of the SMPDBK model is that it estimates maximum water surface elevations in the downstream channel by assuming normal, steady flow at the peak utilizing Manning's equation. The model does not account for the acceleration component of dam break floods which typically have a rapid rise to peak discharge. Thus, backwater effects created by downstream natural channel constrictions, bridge embankments, or dams, cannot be accounted for. In these cases, SMPDBK will predict peak depths upstream of the constriction that may be substantially lower than those actually encountered.

PROGRAM INPUT

Data input to SMPDBK include: (a) reservoir storage, surface area, and discharge, (b) breach description, and (c) downstream valley geometry. Information concerning the reservoir was obtained from the September 1979, New England Division of the Army Corps of Engineers National Dam Inspection Program Phase I Inspection Report for the Rising Paper Dam.

Full breach to the elevation of the toe of the dam was assumed. The initial water elevation was 725 feet, the depth of the water in the spillway under the 100-year flood, and the final breach width was assumed to be three times the breach height. Breach information was gathered from the January 9, 1990, Foresight Land Services "Report Describing the Hydrologic and Hydraulic Setting of Rising Paper Company Dam."

Eleven cross sections were used to describe the downstream valley geometry. These elevation-versus-top width cross sections spanned 9.9 miles downstream from the dam.

Top widths within the 100-year floodplain of the river were interpolated from information given by the Federal Emergency Management Agency (FEMA) Flood Insurance Studies for the Towns of Great Barrington (January 19, 1982) and Sheffield (March 16, 1982), Massachusetts. These floodway maps were at a scale of 1 inch equals 400 feet. The surface topography outside of the 100-year floodplain was taken from the United States Geological Survey (USGS) quadrangle maps for Great Barrington, Massachusetts, at a scale of 1 inch equals 2,000 feet. Mannings "n" roughness coefficients ranged from 0.045 in the channel to 0.085 in the overbank areas.

RESULTS

Difficulty in reproducing the magnitude of the initial floodwave at the first cross section (adjacent to the dam) was encountered. The size of the floodwave was dampened by the constrictive geometry of the cross-section and a high mannings "n" roughness coefficient. This initial cross-section was widened slightly to allow the large volume of flow through the cross-section. Mannings "n" was also adjusted from 0.045 to 0.040 in the channel topwidths, and from 0.080 to 0.040 for the first three of six overbank topwidths in the initial cross section. The force of the initial floodwave would remove vegetation such as trees and shrubs along the overbank, and thus reduce Manning's "n" in this area to a value similar to the adjusted figure. These adjustments increased the maximum flow through this cross-section from 15,760 cfs to 53,517 cfs, while the maximum possible discharge through the breach was calculated to be 63,273 cfs.

Attenuation of the floodwave within the initial two miles downstream of the dam (covered by the first four cross-sections) occurred. The wide floodplains in this region were responsible for this attenuation. By the fifth cross-section, the maximum discharge had diminished to less than the magnitude of the 100-year flood, 12,000 cfs, and the maximum discharge continued to decrease downstream; therefore, for all cross-sections with a computed maximum discharge of less than the 100-year flood (cross-sections five through eleven), an assumed value of 12,000 cfs was used. The water depth at these cross-sections under the 100-year flood were obtained from the FEMA Flood Insurance Studies.

Under this simulation, the floodwave resulting from a full breach of the Rising Pond Dam while the Housatonic River underwent a discharge equivalent to the 100-year flood would diminish within two miles. The Housatonic River at the Town of Great Barrington, which is located approximately four miles downstream of the dam, would therefore not be influenced by such an event. The maximum floodwave would reach the fourth cross-section in 1.22 hours and increase the discharge in the river at this point from the 100-year design flood of 12,000 cfs to 13,675 cfs. The maximum flood stage arrival time is presented in Figure A-1. A summary of peak discharges in shown in Figure A-2. The flood crest profile is shown in Figure A-3.

ATTACHMENT B

PLANS FOR TRAINING, EXERCISING, UPDATING, AND POSTING THE EAP

ATTACHMENT B
PLANS FOR TRAINING, EXERCISING, UPDATING, AND POSTING THE EAP

TRAINING

Training of the General Electric Company (GE) personnel and its contractors involved in the routine inspections of the dam and the implementation of the Emergency Action Plan (EAP) will be conducted to ensure their familiarity with all elements of the plan and their responsibilities under the plan. This training will include safety-related problem detection and evaluation.

Significant revisions to the EAP have been made in 2015, 2017, and 2018. Given the significant changes to EAP, Orientation Meetings will be held with the pertinent representatives of GE and the Towns of Lenox, Lee, and Stockbridge to review the new EAP.

The focus of the Orientation Meetings will be on clarifying the roles, procedures, and responsibilities associated with the implementation of the EAP for the Rising Pond Dam. The general purpose is for meeting participants to evaluate plans and procedures and to resolve questions of coordination and assignment of responsibilities. The initial training will take place at an Orientation meeting to be held within six months of EPA's approval of the revised 2018 EAP. Subsequent emergency training meetings will be conducted every two years in conjunction with the biennial Engineering Phase 1 Inspections/Evaluations. GE will be responsible for scheduling these meetings.

The key issues for discussion include, but are not necessarily limited to, the following:

- Familiarization with the overall framework and specific details of **Figure 1 - Notification Flowchart**.
- Familiarization with alternate means of communication.
- Review differences among Emergency Condition A (failure imminent), Emergency Condition B (potential hazardous situation developing), Non-Emergency Condition (unusual event, slowly developing), and Non-Failure Emergency Condition (no danger of dam failure, only flooding concerns) and notification procedures for each situation.
- Identification and differentiation of problem conditions at the dam observed during routine surveillance and maintenance.
- The Incident Commanders (the Great Barrington Emergency Management Director) will function as "Incident Commander" as per the Incident Command System (ICS).
- Review of general Emergency Repair Procedures and Guidelines for Rising Pond Dam EAP.
- Review of emergency operation procedures at the Rising Pond Dam.
- Review duties of other key emergency agencies.

EXERCISING

The need to test the EAP through tabletop exercises or field drills will be determined by the Incident Commander identified in the EAP (the Great Barrington Emergency Management Director). GE will fully cooperate in any tabletop exercises of field drills determined to be necessary

Should the Incident Commander determine that exercising the EAP is required, the Federal Guidelines for Emergency Action Planning for Dams (FEMA 64) recommends a combination of discussion-based and operations-based exercises. Descriptions of each, from FEMA 64, are provided below.

Discussion-based exercises familiarize participants with current plans, policies, agreements, and procedures, or may be used to develop new plans, policies, agreements, and procedures. The following are types of discussion-based exercises:

- ***Seminar.*** A seminar is an informal discussion designed to orient participants to new or updated plans, policies, or procedures (e.g., a seminar to review a new Evacuation Standard Operating Procedure). Seminars should include internal discussions as well as coordination with emergency management authorities and other organizations with a role in EAP implementation.
- ***Workshop.*** A workshop resembles a seminar but is used to build specific products such as a draft plan or policy. For example, a Training and Exercise Plan Workshop is used to develop a Multi-Year Training and Exercise Plan.
- ***Tabletop Exercise.*** A tabletop exercise involves key personnel discussing simulated scenarios in an informal setting. Tabletop exercises can be used to assess plans, policies, and procedures.
- ***Games.*** A game is a simulation of operations that often involves two or more teams, usually in a competitive environment, using rules, data, and procedures designed to depict an actual or assumed real-life situation.

Operations-based exercises validate plans, policies, agreements and procedures; clarify roles and responsibilities; and identify resource gaps in an operational environment. Types of operations-based exercises are:

- ***Drill.*** A drill is a coordinated, supervised activity usually employed to test a single operation or function within a single entity, such as testing sirens and warning systems, calling suppliers, checking material on hand, and conducting a call-down drill of those listed on the Notification Flowchart.
- ***Functional Exercise.*** A functional exercise examines and/or validates the coordination, command, and control between various multi-agency coordination centers, such as Emergency Operation Centers (EOCs) and Joint Field Offices. A functional exercise does not involve any "boots on the ground" such as first responders or emergency officials responding to an incident in real time.
- ***Full-Scale Exercises.*** A full-scale exercise is a multi-agency, multi-jurisdictional, multi-discipline exercise involving functional (e.g., Joint Field Office, EOC, "boots on the ground" response to a simulated event, such as activation of the EOC and role-playing to simulate an

actual dam failure). Functional and full-scale exercises are considered comprehensive exercises that provide the necessary verification, training, and practice to improve the EAP and the operational readiness and coordination efforts of all parties responsible for responding to emergencies at a dam. The basic difference between these two exercise types is that a full-scale exercise involves actual field movement and mobilization, whereas in a functional exercise, field activity is simulated.

UPDATING

The Rising Pond Dam EAP will be periodically updated to reflect changes in names or titles of project operations, attendants, and other personnel with specific, designated responsibilities for actions in an emergency. The EAP will be annually reviewed and updated, as necessary. This may include changes in **Figure 1 - Notification Flowchart**, contact lists on **Tables 1** through **7**, or other information critical to providing notification to affected persons, federal, state, and local agencies. In addition, any input from federal, state, or local agencies will also be incorporated into the updated EAP document. GE will be responsible for updating the EAP.

GE has continuing responsibility to review the adequacy of the Rising Pond Dam EAP in light of any significant changes in upstream or downstream circumstances which might affect water flows or the location or extent of the areas, persons, or property that might be harmed due to a sudden release of water from Rising Pond Dam. Promptly after becoming aware of necessary changes to keep the EAP workable, GE will consult and cooperate with appropriate federal, state, and local agencies responsible for public safety/emergency management to determine any advisable revision to the EAP.

GE will provide all holders of the EAP with copies of all revisions. Revised pages, maps, etc. will be marked, "Revision month/day/year" and revised material will be highlighted.

POSTING OF THE NOTIFICATION FLOWCHART

Figure 1 - Notification Flowchart will be posted and a 3-ring bound copy of the completed EAP will be available to each of the entities listed in the flowchart and contact lists.

The following have copies of the EAP:

- GE
- Town of Great Barrington Police and Emergency Management
- Town of Sheffield Emergency Management
- MEMA
- DCR Office of Dam Safety
- Consulting Dam Safety Engineer

ATTACHMENT C

SITE-SPECIFIC CONCERNS

ATTACHMENT C
SITE-SPECIFIC CONCERNS

Each dam and downstream area are unique. Rising Pond Dam is accessible at both abutments, but as a run-of-the-river dam, those abutments are not accessible from each other. The right (west) abutment is accessible via an access road from Van Deusenville Road over a set of train tracks. The left (east) abutment is located at a mill building.

ATTACHMENT D

EMERGENCY REPAIR

ATTACHMENT D
EMERGENCY REPAIR

GENERAL

In this section, potential emergency conditions that may affect the function of the Rising Pond Dam are identified and appropriate remedial actions are discussed herein. The intent is to facilitate emergency repair in cases where response time is critical and/or communications are disrupted which may delay the on-site arrival of the General Electric Company's dam safety engineer.

Potential natural phenomena and manmade forces which could affect the stability or function of the Rising Pond Dam include floods, earthquakes, inherent instability, aging and deterioration, accidents and sabotage.

While the cause of the damage is important, the remedial action to be undertaken is mostly dependent on certain characteristic signs of distress which indicate particular types of problems in earthen embankment dams. The following is a general description of conditions and corresponding corrective actions to be undertaken in emergency conditions to mitigate or delay the collapse of the dam. An action guide is presented in Table 8 of the Emergency Action Plan, entitled "Emergency Repair Guidelines." This table was originally developed by the Army Corps of Engineers and has been modified to incorporate site-specific conditions at the dam." The Town of Great Barrington personnel should become familiar with these procedures to reduce response time in the event of an emergency.

The emergency repair procedures outlined in Table 8 are to be supervised by the Town. The following document potential remedial systems:

Figure D-1 Boil Ring
Figure D-2 Boil Ring Maintenance Instructions
Figure D-3 Granular Blanket
Figure D-4 Temporary Erosion Protection
Figure D-5 Sandbag Berm Construction

At all times, utmost care should be given to the safety of personnel engaged in the remedial activities. If failure is imminent or cannot be effectively delayed, then remedial activities should cease and all personnel ordered out of the unsafe area by the senior staff at the scene. For observed conditions that are out of the norm, a qualified dam safety engineer (Massachusetts Registered Professional Engineer) should be consulted immediately, to assess the severity of the problem and recommended corrective measures.

EXCESS SEEPAGE

One of the leading causes of failures of embankment dams is embankment or foundation seepage/piping. Excess seepage leading to embankment failure may be caused by malfunctioning toe drains, presence of vegetative growth and extensive root systems within the embankment, burrowing of small animals, or high reservoir pool levels creating high hydrostatic heads.

Controlled seepage through the toe of an earthen dam embankment is normal. However, rapid or significant increases in flow through the toe may begin to carry out fine soil materials, create sand boils, and produce new seep areas along the downstream face. Normal toe discharge is generally clear. Remedial actions should be taken if toe seepage quantities suddenly increase and become turbid (cloudy or muddy).

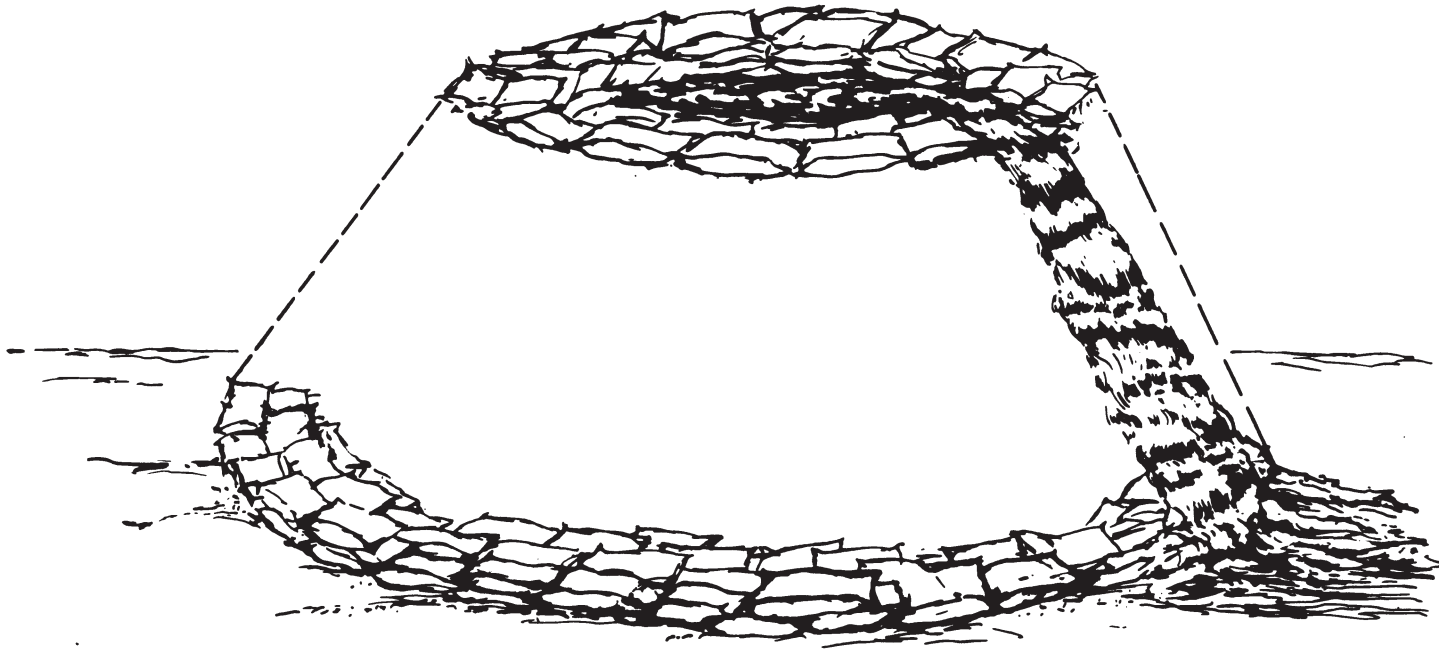
Piping is a process in which seepage dislodges and transports soil particles as it daylights on the downstream face of an embankment. An open channel forms at the point of seepage exit and works its way progressively into the embankment as erosion continues. Eventually, a completely open channel is formed through the embankment. Piping may also originate inside an embankment from any internal voids into which water can flow. Abandoned conduits could initiate piping if cracks develop in these structures. Cracks could form as a result of structural deterioration or settlement under static or earthquake loads. Slope failures extending through an embankment's core create another potential source of piping. The soils along the failure plane will be weakened and will likely be more permeable.

Internal erosion is defined as flow seeking and eroding a preferential flow path within or below the dam. This mode of failure is a soil removal process from within the embankment, and, if not corrected, will accelerate over time and ultimately lead to the collapse of the earth embankment structure. Individual “boils” downstream of the embankment dam can be an indicator that this type of failure mechanism is developing.

Individual boils or small areas of seepage can be controlled on a temporary basis by ringing them with sandbags, stone, or other materials. Refer to Figures D-4 and D-5 for schematics of "ringing a boil" including estimated quantities of required personnel and material.

SAND BAGS / OVERTOPPING

Sand bag berms are one of the most common methods for temporarily increasing freeboard to reduce overtopping of a dam during a flood event. Figure D-5 provides information on proper methods for constructing sandbag berms. Sandbag berm construction can be highly effective but requires appropriate material and is labor intensive. The maximum effective height should be limited to approximately three feet. (Source: Flood Fighting: How To Use Sandbags, US Army Corps of Engineers) It is expected that the Town of Great Barrington will either stockpile sandbags at a Town facility or make arrangements with a local supplier to obtain sandbags in the event of an overtopping emergency. Sand to fill the sand bags will be obtained from a local sand and gravel pit.



APPROXIMATE CONSTRUCTION REQUIREMENTS

BOIL DIA. (ft)	2			4			6			8			10		
RING HEIGHT (ft)	2	4	6	2	4	6	2	4	6	2	4	6	2	4	6
VOL. SAND REQ. ($yd.^3$)	1	7	18	2	9	21	3	11	25	3	13	29	4	14	33
SANDBAGS REQUIRED	124	475	1150	160	600	1400	197	707	1600	233	824	1850	270	921	2100
PERSONNEL REQUIRED	5	5	5	10	10	10	20	20	20	25	25	25	30	30	30
TIME TO COMPLETE (hrs.)	1	3	7	1	3	5	2	3	4	2	3	4	2	3	4

SOURCE: NEW ENGLAND DIVISION ARMY CORPS OF ENGINEERS

FIGURE NO. D-1

JOB NO. 19896.30

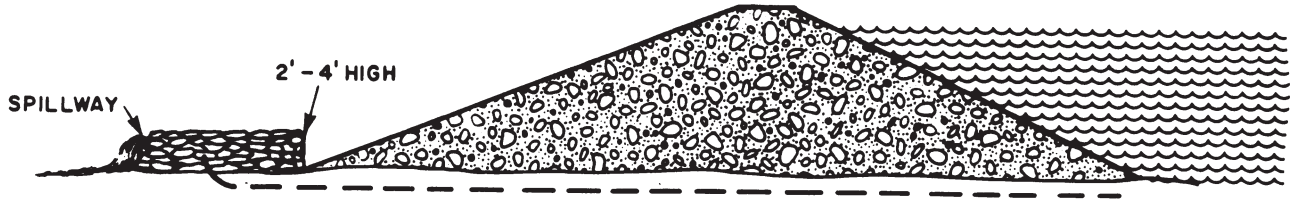
RISING POND DAM
EMERGENCY ACTION PLAN
GENERAL ELECTRIC COMPANY
GREAT BARRINGTON, MASSACHUSETTS

BOIL RING

PROJ MGR: JDA
DESIGNED BY: DML
REVIEWED BY: ABB
OPERATOR: LGM
DATE: DEC 2013

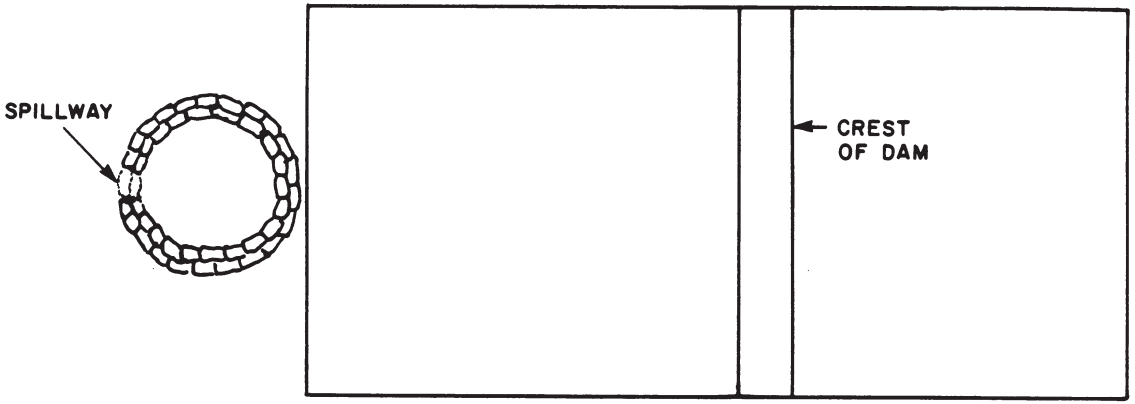
NOT TO SCALE

GZA GeoEnvironmental, Inc.
249 VANDERBILT AVENUE
NORWOOD, MA 02062
Ph.: (781) 278–3700
Fax: (781) 278–5701



ELEVATION

WALL SHOULD BE BUILT ON FIRM FOUNDATION, WITH WIDTH OF BASE AT LEAST 1 1/2 TIMES THE HEIGHT. BE SURE TO PLACE SACKS ON GROUND CLEAR OF SAND DISCHARGE. TIE INTO DAM IF BOIL IS NEAR TOE.



PLAN

DO NOT SACK BOIL WHICH DOES NOT PUT OUT MATERIAL. HEIGHT OF SACK LOOP OR RING SHOULD BE ONLY SUFFCIENT TO CREATE ENOUGH HEAD TO SLOW DOWN FLOW THROUGH BOIL SO THAT NO MORE MATERIAL IS DISPLACED AND BOIL RUNS CLEAR. DO NOT TRY TO STOP FULLY, FLOW THROUGH BOIL.

FIGURE NO. D-2

JOB NO. 19896.30

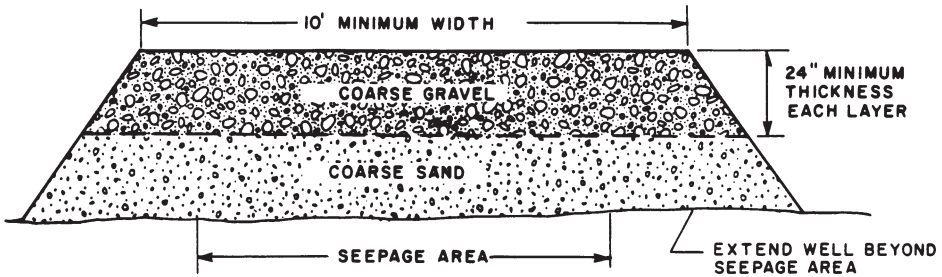
RISING POND DAM
EMERGENCY ACTION PLAN
GENERAL ELECTRIC COMPANY
GREAT BARRINGTON, MASSACHUSETTS

BOIL RING MAINTENANCE INSTRUCTIONS

PROJ MGR: JDA
DESIGNED BY: DML
REVIEWED BY: ABB
OPERATOR: LGM
DATE: DEC 2013

NOT TO SCALE

GZA GeoEnvironmental, Inc.
249 VANDERBILT AVENUE
NORWOOD, MA 02062
Ph.: (781) 278–3700
Fax: (781) 278–5701



GRANULAR BLANKET

APPROXIMATE CONSTUCTION REQUIREMENTS

BLANKET AREA ($ft.^2$)	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
MATERIAL REQUIRED PER LAYER ($yd.^3$)	40	80	120	150	190	225	270	300	330	370
NO. TRUCKS & DRIVERS	3	3	6	6	6	8	10	10	12	12
NO. GRADERS & OPERATORS	5	5	10	10	15	15	15	20	20	20
TOTAL TIME REQUIRED (hrs)	4	8	6	8	8	8	8	8	9	10

SOURCE: NEW ENGLAND DIVISION ARMY CORPS OF ENGINEERS

FIGURE NO. D-3

JOB NO. 19896.30

RISING POND DAM
EMERGENCY ACTION PLAN
GENERAL ELECTRIC COMPANY
GREAT BARRINGTON, MASSACHUSETTS

GRANULAR BLANKET

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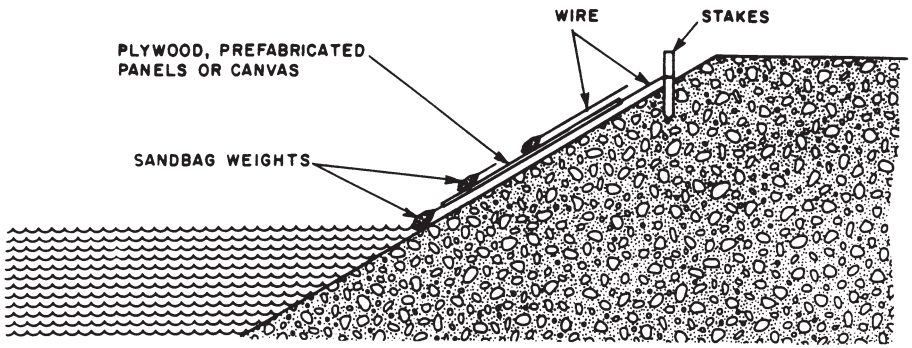
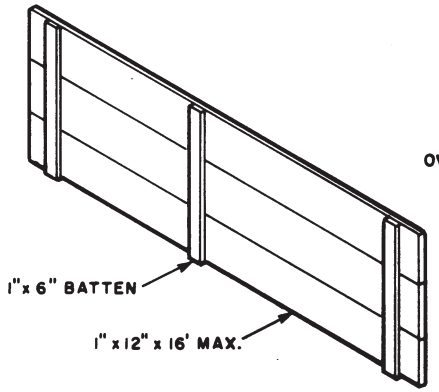
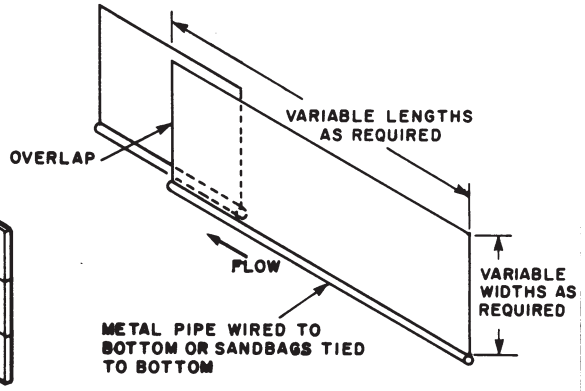




PREFABRICATED PANELS



COTTON BAGGING, CANVAS OR PLASTIC SHEETS

SOURCE: NEW ENGLAND DIVISION ARMY CORPS OF ENGINEERS

FIGURE NO. D-4

JOB NO. 19896.30

RISING POND DAM
EMERGENCY ACTION PLAN
GENERAL ELECTRIC COMPANY
GREAT BARRINGTON, MASSACHUSETTS

TEMPORARY EROSION PROTECTION

PROJ MGR: JDA
DESIGNED BY: DML
REVIEWED BY: ABB
OPERATOR: LGM
DATE: DEC 2013

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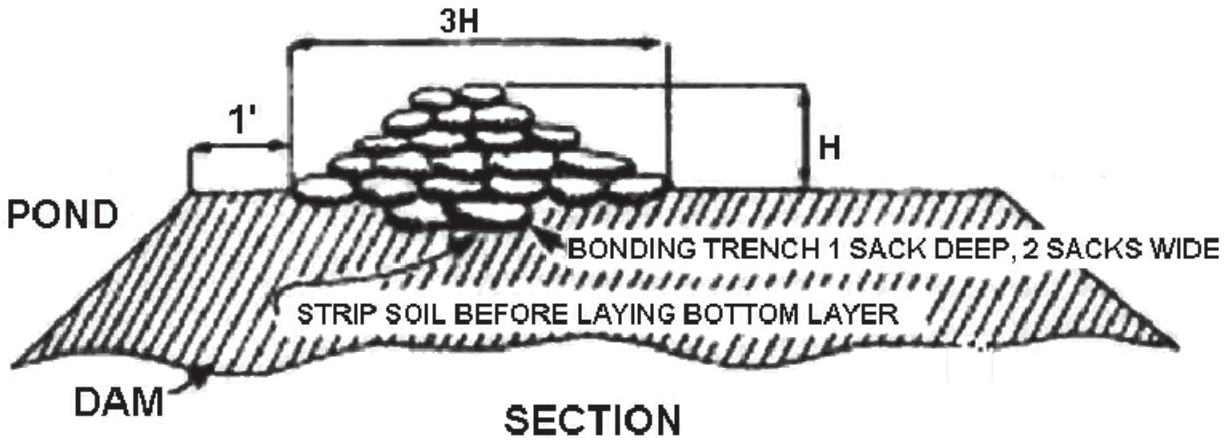

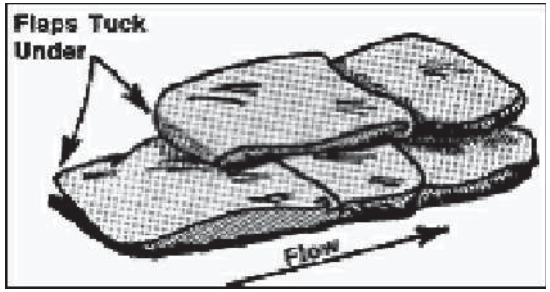

HEIGHT OF BERM	BAGS/100FEET
1 FOOT	800
2 FEET	2000
3 FEET	3400

Notes:

1) **Sandbag Preparation**
   a. Utilize polypropylene or burlap bags about 14" - 18" wide and 30" -36" deep.
   b. A heavy bodied or sandy soil is most desirable for filling sandbags. On-site soil sources may be utilized, as appropriate.
   c. Bags should be filled between one-third (1/3) to one-half (1/2) of their capacity. This keeps the bag from getting too heavy, and permits the bags to be stacked with a good seal.
   d. Untied sandbags are recommended for most situations. Tied sandbags should be used only for special situations when pre-filling and stockpiling may be required, or for specific purposes such as filling holes, holding objects in position, or to form barriers backed by supportive planks. Tied sandbags are generally easier to handle and stockpile.

2) **Sandbag Placement**
   a. Remove any debris from the area where the bags are to be placed.
   b. Fold the open end of the unfilled portion of the bag to form a triangle. If tied bags are used, flatten or flare the tied end.
   c. Place the partially filled bags lengthwise and parallel to the direction of flow, with the open end facing against the water flow.
   d. Tuck the flaps under, keeping the unfilled portion under the weight of the sack.
   e. Place succeeding bags on top, offsetting by one-half (1/2) filled length of the previous bag, and stamp into place to eliminate voids, and form a tight seal.
   f. Stagger the joint connections when multiple layers are necessary. For unsupported layers over three (3) courses high, use the pyramid placement method.

3) **Pyramid Placement Method**

The pyramid placement is used to increase the height of sandbag protection.
   a. Place the sandbags to form a pyramid by alternating header courses (bags placed crosswise) and stretcher courses (bags placed lengthwise).
   b. Stamp each bag in place, overlap sacks, maintain staggered joint placement, and tuck in any loose ends.
   c. Use the table on this Figure to estimate the number of bags required

SOURCE: NEW ENGLAND DIVISION ARMY CORPS OF ENGINEERS

FIGURE NO. D-5

JOB NO. 19896.30

RISING POND DAM
EMERGENCY ACTION PLAN
GENERAL ELECTRIC COMPANY
GREAT BARRINGTON, MASSACHUSETTS

SANDBAG BERM CONSTRUCTION

PROJ MGR: JDA
DESIGNED BY: DML
REVIEWED BY: ABB
OPERATOR: LGM
DATE: DEC 2013

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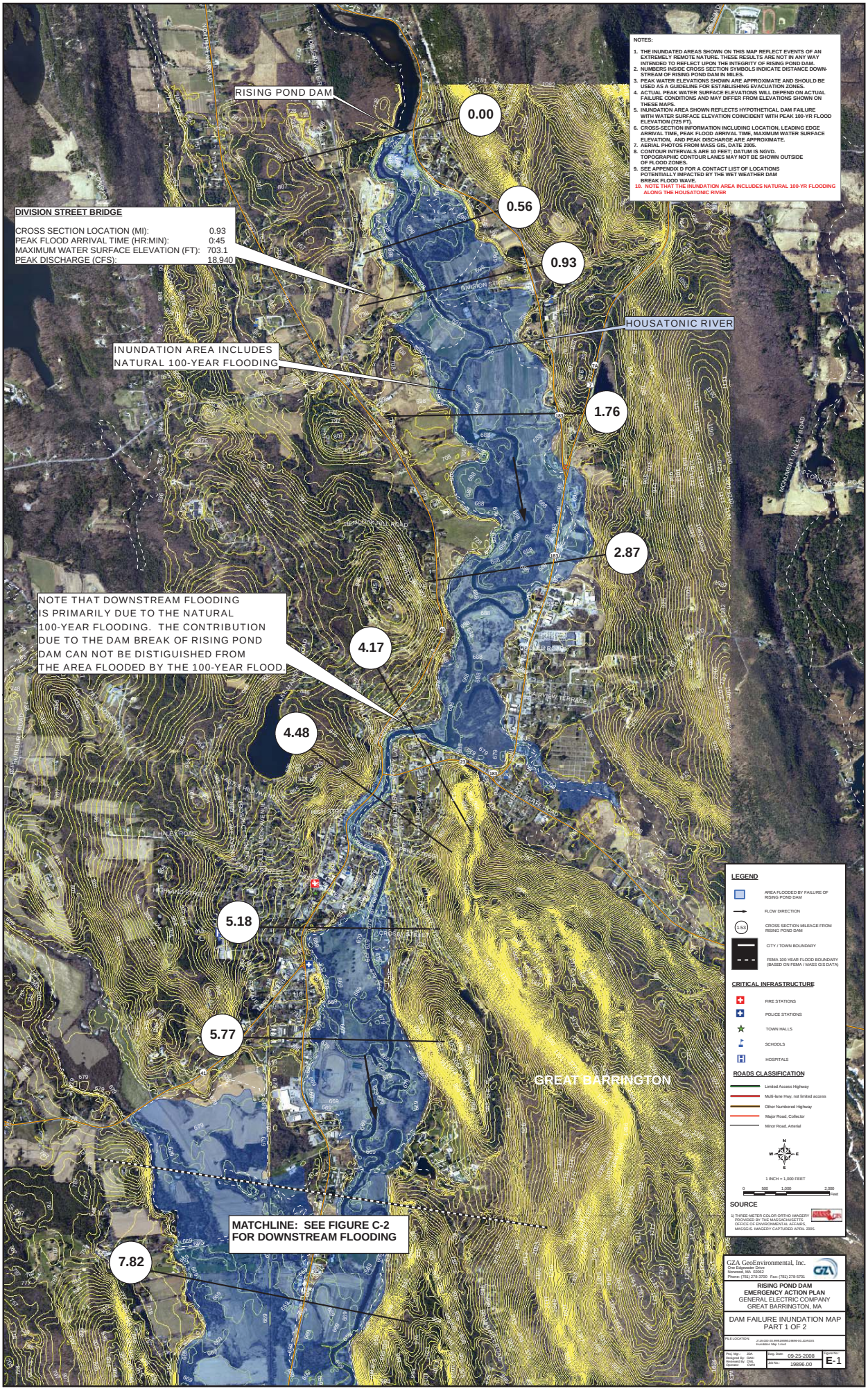
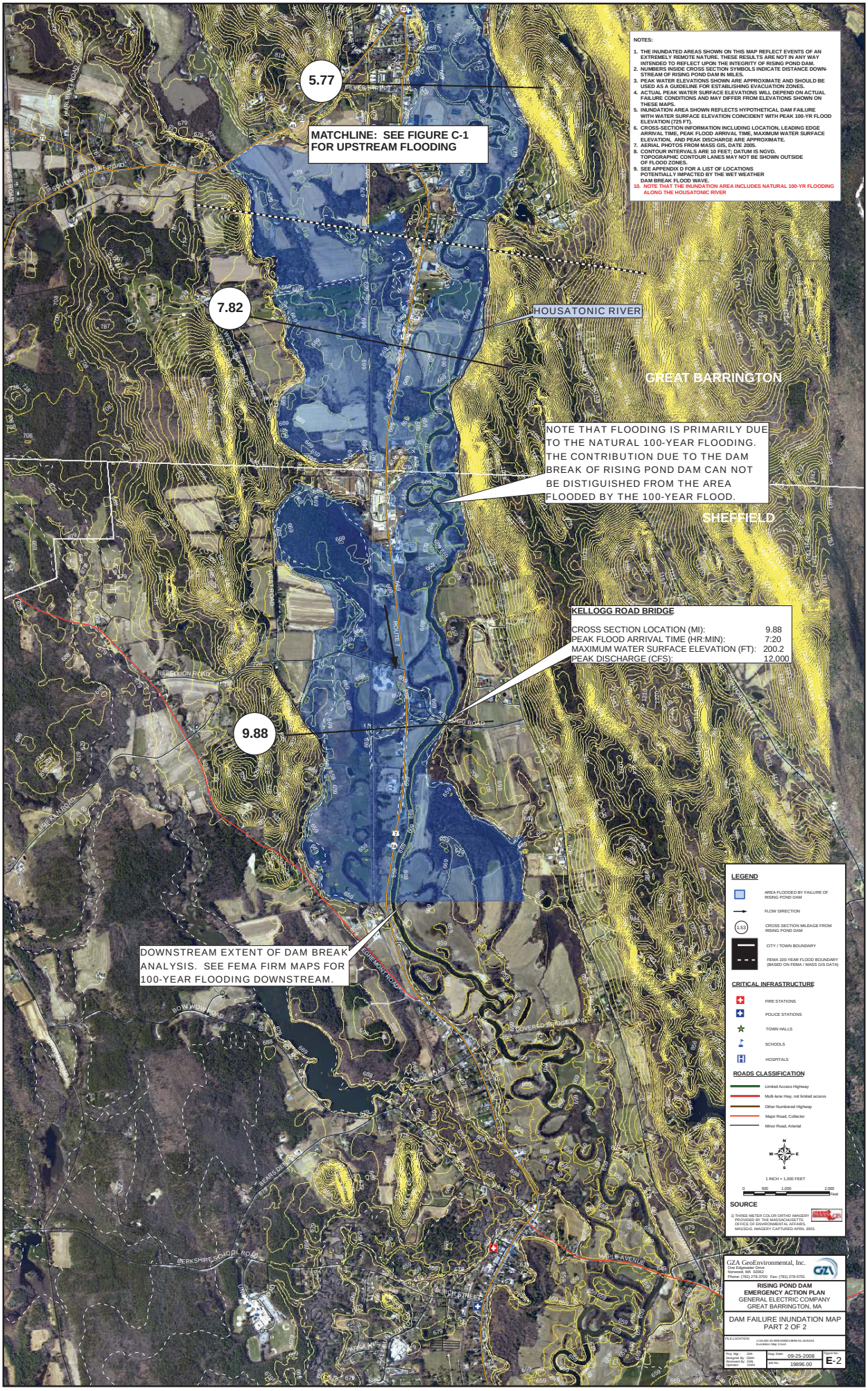
ATTACHMENT E

INUNDATION MAPS


NOTES:
1. THE INUNDATED AREAS SHOWN ON THIS MAP REFLECT EVENTS OF AN EXTREMELY REMOTE NATURE. THESE RESULTS ARE NOT IN ANY WAY INTENDED TO REFLECT UPON THE INTEGRITY OF RISING POND DAM.
2. NUMBERS INSIDE CROSS SECTION SYMBOLS INDICATE DISTANCE DOWN-STREAM OF RISING POND DAM IN MILES.
3. PEAK WATER ELEVATIONS SHOWN ARE APPROXIMATE AND SHOULD BE USED AS A GUIDELINE FOR ESTABLISHING EVACUATION ZONES.
4. ACTUAL PEAK WATER SURFACE ELEVATIONS WILL DEPEND ON ACTUAL FAILURE CONDITIONS AND MAY DIFFER FROM ELEVATIONS SHOWN ON THESE MAPS.
5. INUNDATION AREA SHOWN REFLECTS HYPOTHETICAL DAM FAILURE WITH WATER SURFACE ELEVATION COINCIDENT WITH PEAK 100-YR FLOOD ELEVATION (725 FT).
6. CROSS-SECTION INFORMATION INCLUDING LOCATION, LEADING EDGE ARRIVAL TIME, PEAK FLOOD ARRIVAL TIME, MAXIMUM WATER SURFACE ELEVATION, AND PEAK DISCHARGE ARE APPROXIMATE.
7. AERIAL PHOTOS FROM MASS GIS, DATE 2005.
8. CONTOUR INTERVALS ARE 10 FEET; DATUM IS NGVD. TOPOGRAPHIC CONTOUR LANES MAY NOT BE SHOWN OUTSIDE OF FLOOD ZONES.
9. SEE APPENDIX D FOR A CONTACT LIST OF LOCATIONS POTENTIALLY IMPACTED BY THE WET WEATHER DAM BREAK FLOOD WAVE.
10. NOTE THAT THE INUNDATION AREA INCLUDES NATURAL 100-YR FLOODING ALONG THE HOUSATONIC RIVER
RISING POND DAM
0.00
0.56
0.93
DIVISION STREET BRIDGE
CROSS SECTION LOCATION (MI): 0.93
PEAK FLOOD ARRIVAL TIME (HR:MIN): 0:45
MAXIMUM WATER SURFACE ELEVATION (FT): 703.1
PEAK DISCHARGE (CFS): 18,940
HOUSATONIC RIVER
INUNDATION AREA INCLUDES NATURAL 100-YEAR FLOODING
1.76
2.87
NOTE THAT DOWNSTREAM FLOODING IS PRIMARILY DUE TO THE NATURAL 100-YEAR FLOODING. THE CONTRIBUTION DUE TO THE DAM BREAK OF RISING POND DAM CAN NOT BE DISTIGUISHED FROM THE AREA FLOODED BY THE 100-YEAR FLOOD.
4.17
4.48
5.18
5.77
GREAT BARRINGTON
MATCHLINE: SEE FIGURE C-2 FOR DOWNSTREAM FLOODING
7.82
LEGEND
AREA FLOODED BY FAILURE OF RISING POND DAM
FLOW DIRECTION
1.53
CROSS SECTION MILEAGE FROM RISING POND DAM
CITY / TOWN BOUNDARY
FEMA 100-YEAR FLOOD BOUNDARY (BASED ON FEMA / MASS GIS DATA)
CRITICAL INFRASTRUCTURE
FIRE STATIONS
POLICE STATIONS
TOWN HALLS
SCHOOLS
HOSPITALS
ROADS CLASSIFICATION
Limited Access Highway
Multi-lane Hwy, not limited access
Other Numbered Highway
Major Road, Collector
Minor Road, Arterial
1 INCH = 1,000 FEET
0 500 1,000 2,000 Feet
SOURCE
1) THREE-METER COLOR ORTHO IMAGERY PROVIDED BY THE MASSACHUSETTS OFFICE OF ENVIRONMENTAL AFFAIRS, MASSGIS. IMAGERY CAPTURED APRIL 2005.
GZA GeoEnvironmental, Inc.
One Edgewater Drive
Norwood, MA 02062
Phone: (781) 278-3700 Fax: (781) 278-5701
RISING POND DAM
EMERGENCY ACTION PLAN
GENERAL ELECTRIC COMPANY
GREAT BARRINGTON, MA
DAM FAILURE INUNDATION MAP
PART 1 OF 2
FILE LOCATION:
Proj. Mgr.: JSA
Designed By: GMH
Reviewed By: DWL
Operator: GMH
Dwg. Date: 09-25-2008
Job No.: 19896.00
Figure No.: E-1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1. THE INUNDATED AREAS SHOWN ON THIS MAP REFLECT EVENTS OF AN EXTREMELY REMOTE NATURE. THESE RESULTS ARE NOT IN ANY WAY INTENDED TO REFLECT UPON THE INTEGRITY OF RISING POND DAM.
2. NUMBERS INSIDE CROSS SECTION SYMBOLS INDICATE DISTANCE DOWN-STREAM OF RISING POND DAM IN MILES.
3. PEAK WATER ELEVATIONS SHOWN ARE APPROXIMATE AND SHOULD BE USED AS A GUIDELINE FOR ESTABLISHING EVACUATION ZONES.
4. ACTUAL PEAK WATER SURFACE ELEVATIONS WILL DEPEND ON ACTUAL FAILURE CONDITIONS AND MAY DIFFER FROM ELEVATIONS SHOWN ON THESE MAPS.
5. INUNDATION AREA SHOWN REFLECTS HYPOTHETICAL DAM FAILURE WITH WATER SURFACE ELEVATION COINCIDENT WITH PEAK 100-YR FLOOD ELEVATION (725 FT).
6. CROSS-SECTION INFORMATION INCLUDING LOCATION, LEADING EDGE ARRIVAL TIME, PEAK FLOOD ARRIVAL TIME, MAXIMUM WATER SURFACE ELEVATION, AND PEAK DISCHARGE ARE APPROXIMATE.
7. AERIAL PHOTOS FROM MASS GIS, DATE 2005.
8. CONTOUR INTERVALS ARE 10 FEET; DATUM IS NGVD. TOPOGRAPHIC CONTOUR LANES MAY NOT BE SHOWN OUTSIDE OF FLOOD ZONES.
9. SEE APPENDIX D FOR A LIST OF LOCATIONS POTENTIALLY IMPACTED BY THE WET WEATHER DAM BREAK FLOOD WAVE.
10. NOTE THAT THE INUNDATION AREA INCLUDES NATURAL 100-YR FLOODING ALONG THE HOUSATONIC RIVER
5.77
MATCHLINE: SEE FIGURE C-1 FOR UPSTREAM FLOODING
7.82
HOUSATONIC RIVER
GREAT BARRINGTON
NOTE THAT FLOODING IS PRIMARILY DUE TO THE NATURAL 100-YEAR FLOODING. THE CONTRIBUTION DUE TO THE DAM BREAK OF RISING POND DAM CAN NOT BE DISTIGUISHED FROM THE AREA FLOODED BY THE 100-YEAR FLOOD.
SHEFFIELD
KELLOGG ROAD BRIDGE
CROSS SECTION LOCATION (MI): 9.88
PEAK FLOOD ARRIVAL TIME (HR:MIN): 7:20
MAXIMUM WATER SURFACE ELEVATION (FT): 200.2
PEAK DISCHARGE (CFS): 12,000
9.88
DOWNSTREAM EXTENT OF DAM BREAK ANALYSIS. SEE FEMA FIRM MAPS FOR 100-YEAR FLOODING DOWNSTREAM.
LEGEND
AREA FLOODED BY FAILURE OF RISING POND DAM
FLOW DIRECTION
CROSS SECTION MILEAGE FROM RISING POND DAM
CITY / TOWN BOUNDARY
FEMA 100-YEAR FLOOD BOUNDARY (BASED ON FEMA / MASS GIS DATA)
CRITICAL INFRASTRUCTURE
FIRE STATIONS
POLICE STATIONS
TOWN HALLS
SCHOOLS
HOSPITALS
ROADS CLASSIFICATION
Limited Access Highway
Multi-lane Hwy, not limited access
Other Numbered Highway
Major Road, Collector
Minor Road, Arterial
1 INCH = 1,000 FEET
0 500 1,000 2,000 Feet
SOURCE
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RISING POND DAM
EMERGENCY ACTION PLAN
GENERAL ELECTRIC COMPANY
GREAT BARRINGTON, MA
DAM FAILURE INUNDATION MAP
PART 2 OF 2
Proj. Mgr: JDA
Designed By: GMH
Reviewed By: DWL
Operator: GMH
Dwg. Date: 09-25-2008
Job No.: 19896.00
Figure No.: E-2

ATTACHMENT F

INSPECTION GUIDELINES
(from Texas Commission on Environmental Quality)

Figure 5.1
Inspection Guidelines - Upstream Slope

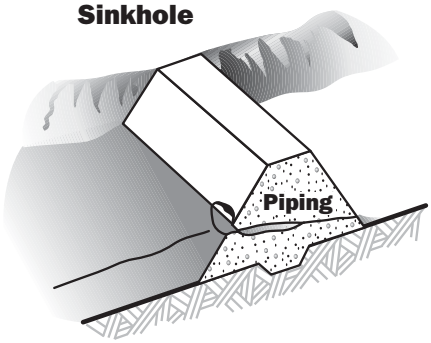

Figure 5.1a

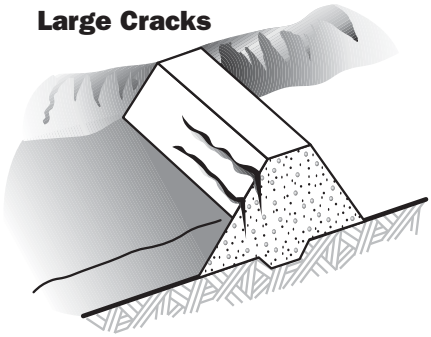

Figure 5.1b

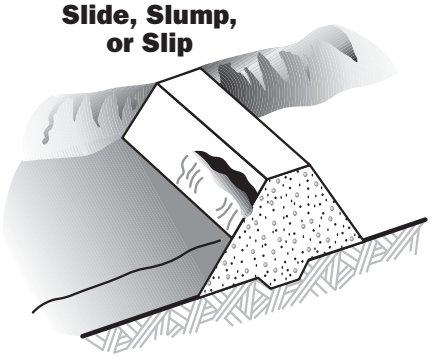

Figure 5.1c

Problem	Probable Cause and Possible Consequences	Recommended Actions
Sinkhole *(Figure 5.1a)*	Piping or internal erosion of embankment materials or foundation causes a sinkhole. The cave-in of an eroded cavern can result in a sinkhole. A small hole in the wall of an outlet pipe can develop into a sinkhole. Dirty water at the exit indicates erosion of the dam. Piping can empty a reservoir through a small hole in the wall or can lead to failure of a dam as soil pipes erode through the foundation or a pervious part of the dam. Dispersive soils are particularly susceptible to sinkholes.	Inspect other parts of the dam for seepage or more sinkholes. Check seepage and leakage outflows for dirty water. A qualified engineer should inspect the conditions, identify the exact cause of sinkholes, and recommend further actions. Depending on the location in the embankment, the reservoir may need to be drawn down. ENGINEER REQUIRED
Large Cracks *(Figure 5.1b)*	A portion of the embankment has moved because of loss of strength, or the foundation may have moved, causing embankment movement. Indicates onset of massive slide or settlement caused by foundation failure.	Depending on embankment involved, draw reservoir level down. A qualified engineer should inspect the condition and recommend further actions. ENGINEER REQUIRED
Slide, Slump, or Slip *(Figure 5.1c)*	Earth or rocks move down the slope along a slippage surface because of too steep a slope, or the foundation moves. Also, look for slide movements in reservoir basin. A series of slides can lead to obstruction of the inlet or failure of the dam.	Evaluate extent of the slide. Monitor slide. (See Chapter 6.) Draw the reservoir level down if safety of dam is threatened. A qualified engineer should inspect the conditions and recommend further actions. ENGINEER REQUIRED

Figure 5.1 *(cont.)*
Inspection Guidelines - Upstream Slope

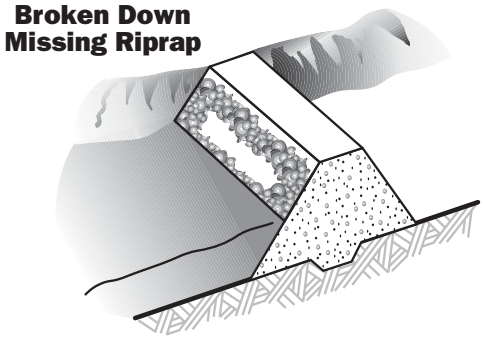

Figure 5.1d

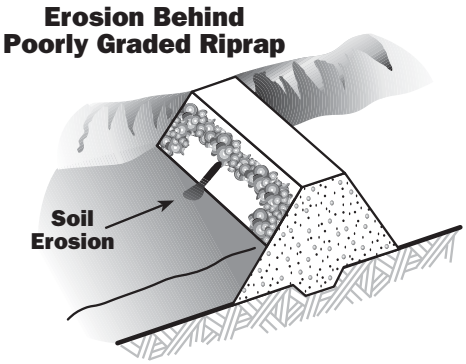

Figure 5.1e

Problem	Probable Cause and Possible Consequences	Recommended Actions
Scarps, Benches, Oversteep Areas	Wave action, local settlement, or ice action cause soil and rock to erode and slide to the lower part of the slope, forming a bench. Erosion lessens the width and possible height of the embankment and could lead to seepage or overtopping of the dam.	Determine exact cause of scarps. Do necessary earthwork, restore embankment to original slope, and supply adequate protection (bedding and riprap). (See Chapter 7.)
Broken Down, Missing Riprap ***(Figure 5.1d)***	Poor-quality riprap has deteriorated. Wave action or ice action has displaced riprap. Round and similar-sized rocks have rolled downhill. Wave action against these unprotected areas decreases embankment width.	Reestablish normal slope. Place bedding and competent riprap. (See Chapter 7.)
Erosion Behind Poorly Graded Riprap ***(Figure 5.1e)***	Similar-sized rocks allow waves to pass between them and erode small gravel particles and soil. Soil is eroded away from behind the riprap. This allows riprap to settle, offering less protection and decreased embankment width.	Reestablish effective slope protection. Place bedding material. ENGINEER REQUIRED for design—for graduation and size for rock for bedding and riprap. A qualified engineer should inspect the conditions and recommend further actions.

Figure 5.2
Inspection Guidelines - Downstream Slope

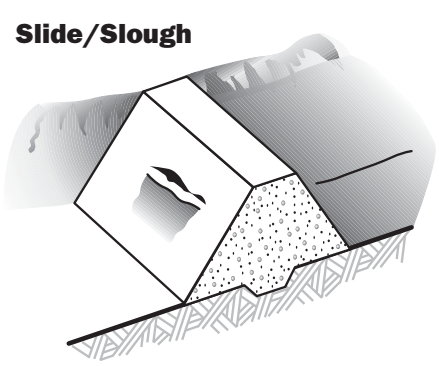

Figure 5.2a

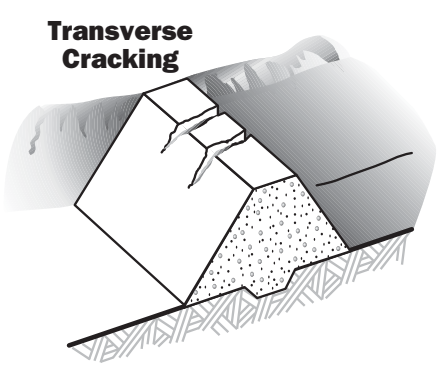

Figure 5.2b

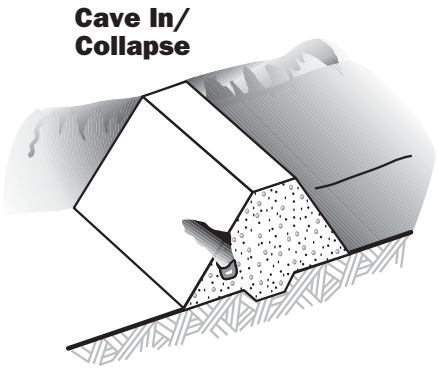

Figure 5.2c

Problem	Probable Cause and Possible Consequences	Recommended Actions
Slide or Slough *(Figure 5.2a)*	Lack loss of strength of embankment material. Loss of strength can be attributed to infiltration of water into the embankment or loss of support by the foundation. Massive slide cuts through crest or upstream slope reducing freeboard and cross-section. Structural collapse or overtopping can result	1. Measure extent and displacement of slide. If continued movement is seen, begin lowering water level until movement stops. 2. Have a qualified engineer inspect the condition and recommend further action. ENGINEER REQUIRED
Transverse Cracking *(Figure 5.2b)*	1. Uneven movement between adjacent segments of the embankment. 2. Deformation caused by structural stress or instability. 1. Can provide a path for seepage through the embankment cross-section. 2. Provides local area of low strength within embankment. Future structural movement, deformation or failure could begin. 3. Provides entrance point for surface runoff to enter embankment	1. Inspect crack and carefully record crack location, length, depth, width and other pertinent physical features. Stake out limits of cracking. Engineer should determine cause of cracking and supervise all steps necessary to reduce danger to dam and correct condition. 2. Excavate slope along crack to a point below the bottom of the crack. Then, backfill excavation using competent material and correct construction techniques. This will seal the crack against seepage and surface runoff. This should be supervised by engineer. Continue to monitor crest routinely for evidence of future cracking. ENGINEER REQUIRED
Cave-in or Collapse *(Figure 5.2c)*	1. Lack of adequate compaction. 2. Rodent hole below. 3. Piping through embankment or foundation. 4. Presence of dispersive soils. Indicates possible washout of embankment.	1. Inspect for and immediately repair rodent holes. Control rodents to prevent future damage. 2. Have a qualified engineer inspect the condition and recommend further action. ENGINEER REQUIRED

Figure 5.2 *(cont.)*
Inspection Guidelines - Downstream Slope

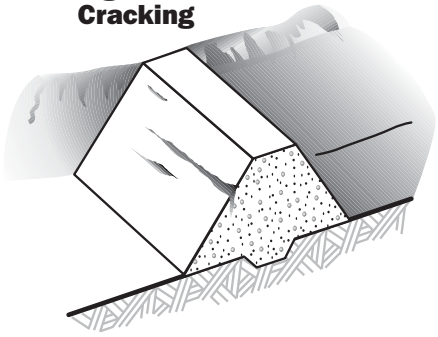

Figure 5.2d

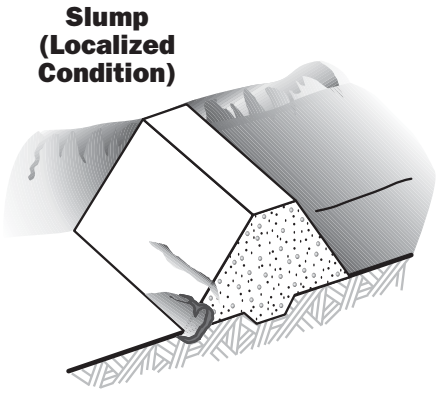

Figure 5.2e

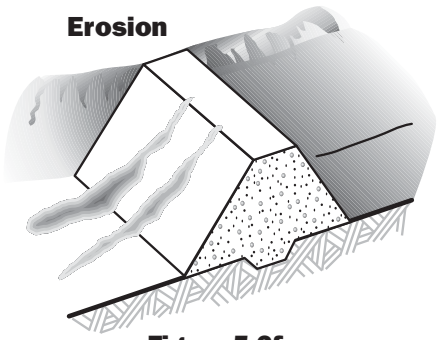

Figure 5.2f

Problem	Probable Cause and Possible Consequences	Recommended Actions
Longitudinal Cracking ***(Figure 5.2d)***	1. Drying and shrinkage of surface material. 2. Downstream movement or settlement of embankment. 1. Can be an early warning of a potential slide. 2. Shrinkage cracks allow water to enter the embankment and freezing will further crack the embankment. 3. Settlement or slide, showing loss of strength in embankment that can lead to failure.	1. If cracks are from drying, dress area with well-compacted material to keep surface water out and natural moisture in. 2. If cracks are extensive, a qualified engineer should inspect the condition and recommend further actions. ENGINEER REQUIRED
Slump *(localized condition)* ***(Figure 5.2e)***	Preceded by erosion undercutting a portion of the slope. Can also be found on steep slopes. Can expose impervious zone to erosion and lead to additional slumps.	1. Inspect area for seepage. 2. Monitor for progressive failure. 3. Have a qualified engineer inspect the condition and recommend further action. ENGINEER REQUIRED
Erosion ***(Figure 5.2f)***	Water from intense rainstorms or snowmelt carries surface material down the slope, resulting in continuous troughs. Can be hazardous if allowed to continue. Erosion can lead to eventual deterioration of the downstream slope and failure of the structure.	1. The preferred method to protect eroded areas is rock or riprap. 2. Reestablishing protective grasses can be adequate if the problem is detected early.

Figure 5.2 *(cont.)*
Inspection Guidelines - Downstream Slope

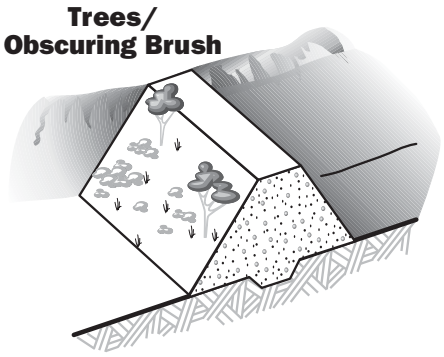

Figure 5.2g

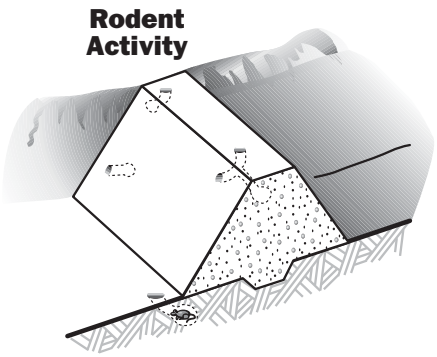

Figure 5.2h

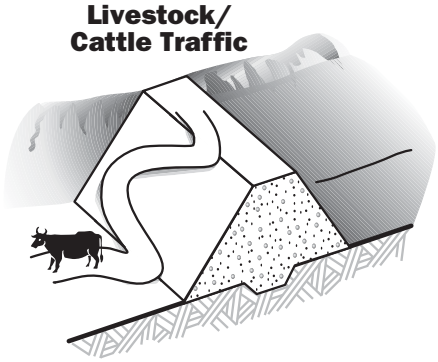

Figure 5.2i

Problem	Probable Cause and Possible Consequences	Recommended Actions
Trees, Obscuring Brush *(Figure 5.2g)*	Natural vegetation in area. Large tree roots can create seepage paths. Large trees can blow over during storms and damage dam or cause breach. Bushes can obscure visual inspection and harbor rodents.	1. Remove all brush and trees less than 4" in diameter. Larger trees may be allowed to stay until they die. At that time, the tree, with its root system, should be removed and the void properly filled with compacted soil. (See Chapter 7.) 2. Control vegetation on the embankment that obscures visual inspection. (See Chapter 7.)
Rodent Activity *(Figure 5.2h)*	Overabundance of rodents. Animal burrowing creates holes, tunnels, and caverns. Certain habitats, such as cattail-filled areas and trees close to the reservoir encourage these animals. Can reduce length of seepage path and lead to piping failure. If tunnel runs through most of the dam, it can lead to collapse.	1. Control rodents to prevent more damage. 2. Backfill existing rodent holes. 3. Remove rodents. Determine exact location and extent of tunneling. Remove habitat and repair damages. (See Chapter 7.)
Livestock *(such as cattle)* Traffic *(Figure 5.2i)*	Excessive travel by livestock especially harmful to slope when wet. Creates areas bare of erosion protection and causes erosion channels. Allows water to stand. Area susceptible to drying cracks.	1. Fence livestock outside embankment area. 2. Repair erosion protection, i.e. riprap, grass.

Figure 5.3
Inspection Guidelines - Embankment Crest

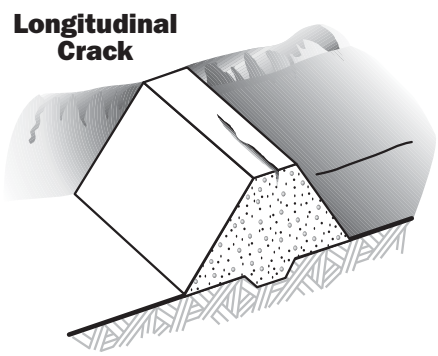

Figure 5.3a

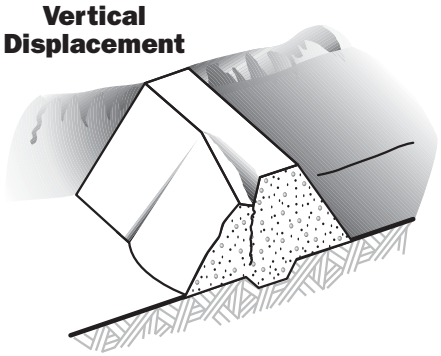

Figure 5.3b

Problem	Probable Cause and Possible Consequences	Recommended Actions
Longitudinal Crack *(Figure 5.3a)*	1. Uneven settlement between adjacent sections or zones within the embankment. 2. Foundation failure causing loss of support to embankment. 3. Initial stages of embankment slide. 1. Creates local area of low strength within an embankment. Could be the point of initiation of future structural movement, deformation or failure. 2. Provides entrance point for surface runoff into embankment, allowing saturation of adjacent embankment area and possible lubrication which could lead to localized failure.	1. Inspect crack and carefully record location, length, depth, width, alignment, and other pertinent physical features. Immediately stake out limits of cracking. Monitor frequently. 2. Engineer should determine cause of cracking and supervise steps necessary to reduce danger to dam and correct condition. 3. Effectively seal the cracks at the crest surface to prevent infiltration by surface water. 4. Continue to routinely monitor crest for evidence of further cracking. ENGINEER REQUIRED
Vertical Displacement *(Figure 5.3b)*	1. Vertical movement between adjacent sections of the embankment. 2. Structural deformation or failure caused by structure stress or instability, or by failure of the foundation. 1. Creates local area of low strength within embankment which could cause future movement. 2. Leads to structural instability or failure. 3. Creates entrance point for surface water that could further lubricate failure plane. 4. Reduces available embankment cross-section.	1. Carefully inspect displacement and record its location, vertical and horizontal displacement, length and other physical features. Immediately stake out limits of cracking. 2. Engineer should determine cause of displacement and supervise all steps necessary to reduce danger to dam and correct condition. 3. Excavate area to the bottom of the displacement. Backfill excavation using competent material and correct construction techniques, under supervision of engineer. 4. Continue to monitor areas routinely for evidence of cracking or movement. (See Chapter 6.) ENGINEER REQUIRED

Figure 5.3 *(cont.)*
Inspection Guidelines - Embankment Crest

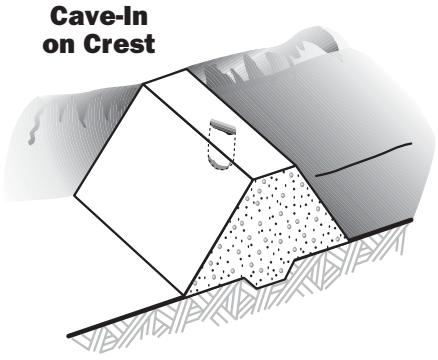

Figure 5.3c

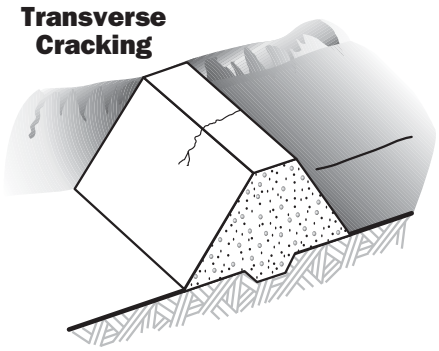

Figure 5.3d

Problem	Probable Cause and Possible Consequences	Recommended Actions
Cave-in On Crest *(Figure 5.3c)*	1. Rodent activity. 2. Hole in outlet conduit is causing erosion of embankment material. 3. Internal erosion or piping of embankment material by seepage. 4. Breakdown of dispersive clays within embankment by seepage waters. 1. Void within dam could cause localized caving, sloughing, instability or reduced embankment cross-section. 2. Entrance point for surface water.	1. Carefully inspect and record location and physical characteristics (depth, width, length) of cave-in. 2. Engineer should determine cause of cave-in and supervise all steps necessary to reduce threat to dam and correct condition. 3. Excavate cave-in, slope sides of excavation and backfill hole with competent material using proper construction techniques. (See Chapter 7.) This should be supervised by engineer. ENGINEER REQUIRED
Transverse Cracking *(Figure 5.3d)*	1. Uneven movement between adjacent segments of the embankment. 2. Deformation caused by structural stress or instability. 1. Can provide a path for seepage through the embankment cross-section. 2. Provides local area of low strength within embankment. Future structural movement, deformation or failure could begin. 3. Provides entrance point for surface runoff to enter embankment.	1. Inspect crack and carefully record crack location, length, depth, width and other pertinent physical features. Stake out limits of cracking. 2. Engineer should determine cause of cracking and supervise all steps necessary to reduce danger to dam and correct condition. 3. Excavate crest along crack to a point below the bottom of the crack. Then backfilling excavation using competent material and correct construction techniques. This will seal the crack against seepage and surface runoff. (See Chapter 7.) This should be supervised by engineer. 4. Continue to monitor crest routinely for evidence of future cracking. (See Chapter 4.) ENGINEER REQUIRED

Figure 5.3 *(cont.)*
Inspection Guidelines - Embankment Crest

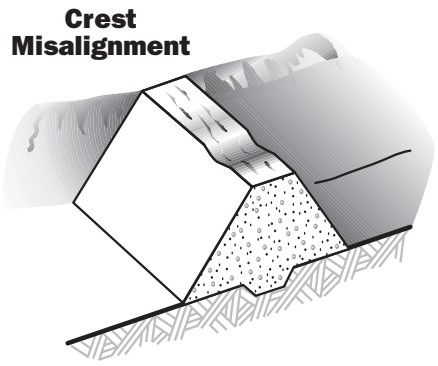

Figure 5.3e

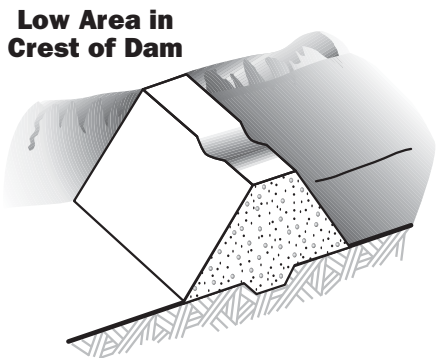

Figure 5.3f

Problem	Probable Cause and Possible Consequences	Recommended Actions
Crest Misalignment ***(Figure 5.3e)***	1. Movement between adjacent parts of the structure. 2. Uneven deflection of dam under loading by reservoir. 3. Structural deformation or failure near area of misalignment. 1. Area of misalignment is usually accompanied by low area in crest which reduces freeboard. 2. Can produce local areas of low embankment strength which may lead to failure.	1. Establish monuments across crest to determine exact amount, location, and extent of misalignment. 2. Engineer should determine cause of misalignment and supervise all steps necessary to reduce threat to dam and correct condition. 3. Following remedial action, monitor crest monuments according to a schedule to detect any movement. (See Chapter 6.) ENGINEER REQUIRED
Low Area in Crest ***(Figure 5.3f)***	1. Excessive settlement in the embankment or foundation directly beneath the low area in the crest. 2. Internal erosion of embankment material. 3. Foundation spreading to upstream and/or downstream direction. 4. Prolonged wind erosion of crest area. 5. Improper final grading following construction. Reduces freeboard available to pass flood flows safely through spillway.	1. Establish monuments along length of crest to determine exact amount, location, and extent of settlement in crest. 2. Engineer should determine cause of low area and supervise all steps necessary to reduce possible threat to the dam and correct condition. 3. Reestablish uniform crest elevation over crest length by filling in low area using proper construction techniques. This should be supervised by engineer. 4. Reestablish monuments across crest of dam and routinely monitor monuments to detect any settlement. ENGINEER REQUIRED

Figure 5.3 *(cont.)*
Inspection Guidelines - Embankment Crest

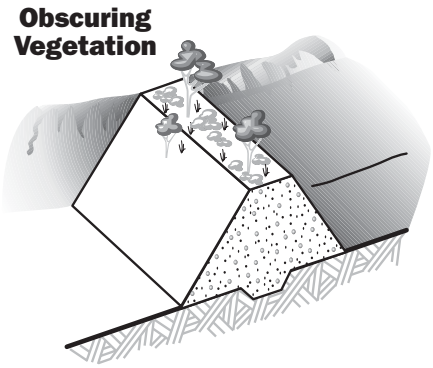

Figure 5.3g

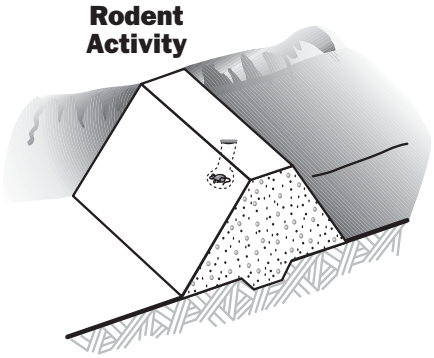

Figure 5.3h

Problem	Probable Cause and Possible Consequences	Recommended Actions
Obscuring Vegetation *(Figure 5.3g)*	Neglect of dam and lack of proper maintenance procedures. 1. Obscures large parts of the dam, preventing adequate, accurate visual inspection of all parts of the dam. Problems which threaten the integrity of the dam can develop and remain undetected until they progress to a point that threatens the dam's safety. 2. Associated root systems develop and penetrate into the dam's cross-section. When the vegetation dies, the decaying root systems can provide paths for seepage. This reduces the effective seepage path through the embankment and could lead to possible piping situations. 3. Prevents easy access to all parts of the dam for operation, maintenance and inspection. 4. Provides habitat for rodents. 5. Large trees can blow over during storms, resulting in damage and possible breach of the dam.	1. Remove all damaging growth from the dam. This would include removal of trees (4-inches or less in diameter), bushes, brush, conifers and growth other than grass. Grass should be encouraged on all segments of the dam to prevent erosion by surface runoff. Root systems should also be removed to the maximum practical extent. The void which results from removing the root system should backfilled with well-competent, well-compacted material. 2. Future undesirable growth should be removed by cutting or spraying, as part of an annual maintenance program. (See Chapter 7.) 3. All cutting or debris resulting from the vegetative removal should be immediately taken from the dam and properly disposed of outside the reservoir basin. An engineer should be involved if the tree removal process poses a threat to the dam.
Rodent Activity *(Figure 5.3h)*	Burrowing animals. 1. Entrance point for surface runoff to enter dam. Could saturate adjacent portions of the dam. 2. Especially dangerous if hole penetrates dam below phreatic line. During periods of high storage, seepage path through the dam would be greatly reduced and a piping situation could develop. Tunnels can lead to collapse of crest and possible failure.	1. Completely backfill the hole with competent well-compacted material. 2. Initiate a rodent control program to reduce the burrowing animal population and to prevent future damage to the dam. (See Chapter 7.)

Figure 5.3 *(cont.)*
Inspection Guidelines - Embankment Crest

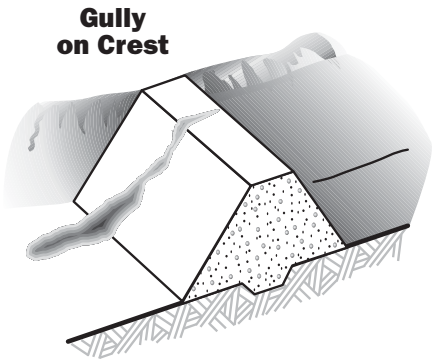

Figure 5.3i

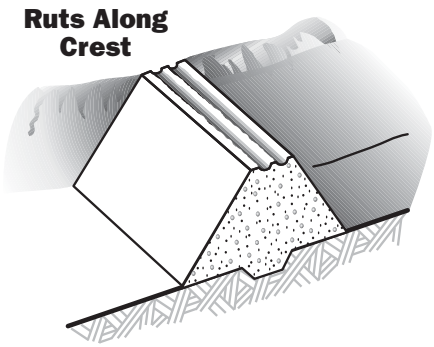

Figure 5.3j

Problem	Probable Cause and Possible Consequences	Recommended Actions
Gully on Crest *(Figure 5.3i)*	1. Poor grading and improper drainage of crest. Improper drainage causes surface runoff to collect and drain off crest at low point in upstream or downstream shoulder. 2. Inadequate spillway capacity which has caused dam to overtop. 1. Can reduce available freeboard. 2. Reduces cross-sectional area of dam. 3. Inhibits access to all parts of the crest and dam. 4. Can result in a hazardous condition if due to overtopping.	1. Restore freeboard to dam by adding fill material to low area, using proper construction techniques. (See Chapter 7.) 2. Regrading crest to provide proper drainage of surface runoff. 3. If gully was caused by overtopping, create adequate spillway that meets current design standards. This should be done by engineer. 4. Reestablish protective cover.
Ruts Along Crest *(Figure 5.3j)*	Heavy vehicle traffic without adequate or proper maintenance or proper crest surfacing 1. Inhibits easy access to all parts of crest. 2. Allows continued development of rutting. 3. Allows standing water to collect and saturate crest of dam. 4. Operating and maintenance vehicles can get stuck.	1. Drain standing water from ruts. 2. Regrade and re-compact crest to restore integrity and provide proper drainage to upstream slope. (See Chapter 7.) 3. Provide gravel or roadbase material to accommodate traffic. 4. Periodically maintain and regrade to prevent ruts reforming.

Figure 5.3 *(cont.)*
Inspection Guidelines - Embankment Crest

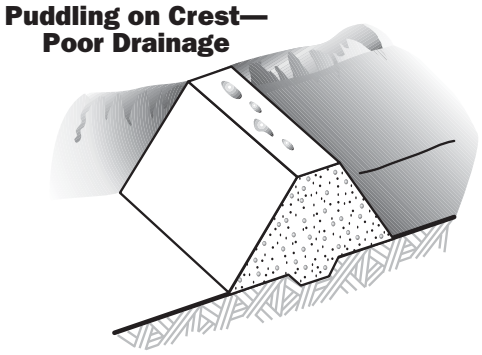

Figure 5.3k

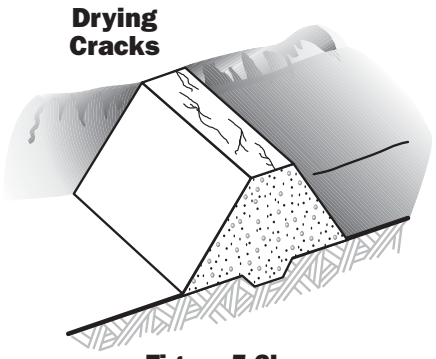

Figure 5.3l

Problem	Probable Cause and Possible Consequences	Recommended Actions
Puddling on Crest—Poor Drainage *(Figure 5.3k)*	1. Poor grading and improper drainage of crest. 2. Localized consolidation or settlement on crest allows puddles to develop. 1. Causes localized saturation of the crest. 2. Inhibits access to all parts of the dam and crest. 3. Becomes progressively worse if not corrected.	1. Drain standing water from puddles. 2. Regrade and re-compact crest to restore integrity and provide proper drainage to upstream slope. (See Chapter 7.) 3. Provide gravel or roadbase material to accommodate traffic. 4. Periodically maintain and regrade to prevent low areas reforming.
Drying Cracks *(Figure 5.3l)*	Material on the crest of dam expands and contracts with alternate wetting and drying of weather cycles. Drying cracks are usually short, shallow, narrow, and numerous. Point of entry for surface runoff and surface moisture, causing saturation of adjacent embankment areas. This saturation, and later drying of the dam, could cause further cracking.	1. Seal surface cracks with a tight, impervious material. (See Chapter 7.) 2. Routinely grade crest to proper drainage and fill cracks. 3. Cover crest with non-plastic material (not clay) to prevent large variations in moisture content.

Figure 5.4
Inspection Guidelines - Embankment Seepage Areas

Excessive Quantity and/or Muddy Water Exiting From a Point

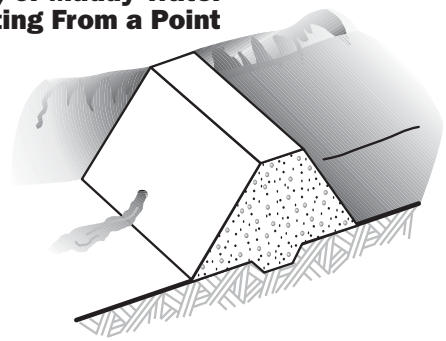

Figure 5.4a

Stream of Water Exiting Through Cracks Near the Crest

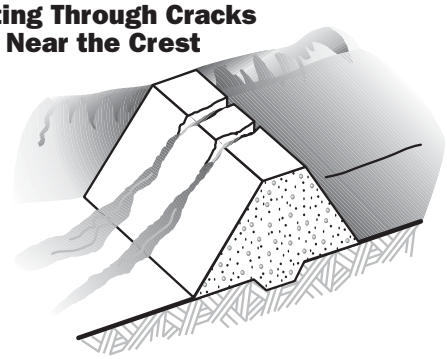

Figure 5.4b

Problem	Probable Cause and Possible Consequences	Recommended Actions
Excessive Quantity and/or Muddy Water Exiting From a Point *(Figure 5.4a)*	1. Water has created an open pathway, channel or pipe through the dam. The water is eroding and carrying embankment material. 2. Large amounts of water have accumulated in the downstream slope. Water and embankment materials are exiting at one point. Surface agitation may be causing the muddy water. 3. Rodents, frost action or poor construction have allowed water to create an open pathway or pipe through the embankment. 1. Continued flows can saturate parts of the embankment and lead to slides in the area. 2. Continued flows can further erode embankment materials and lead to failure of the dam.	1. Begin measuring outflow quantity and establishing whether water is getting muddier, staying the same or clearing up. 2. If quantity of flow is increasing, water level in reservoir should be lowered until flow stabilizes or stops. 3. Search for opening on upstream side and plug if possible. 4. A qualified engineer should inspect the condition and recommend further actions to be taken. ENGINEER REQUIRED
Stream of Water Exiting Through Cracks Near the Crest *(Figure 5.4b)*	1. Severe drying has caused shrinkage of embankment material. 2. Settlement in the embankment or foundation is causing the transverse cracks. Flow through the crack can cause failure of the dam.	1. Plug upstream side of crack to stop flow. 2. Lower water level in the reservoir should be lowered until below level of cracks. 3. A qualified engineer should inspect the condition and recommend further actions. ENGINEER REQUIRED

Figure 5.4 *(cont.)*
Inspection Guidelines - Embankment Seepage Areas

Seepage Water Exiting as a Boil in the Foundation

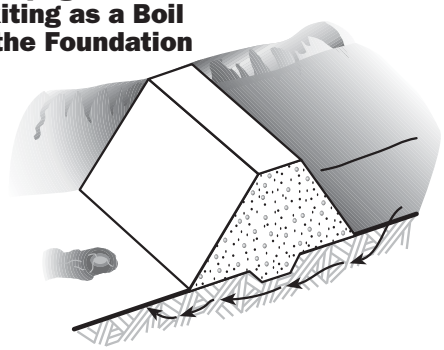

Figure 5.4c

Seepage Exiting at Abutment Contact

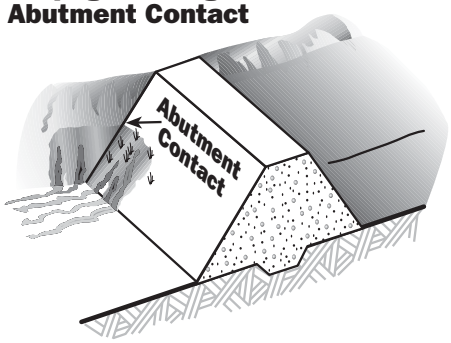

Figure 5.4d

Problem	Probable Cause and Possible Consequences	Recommended Actions
Seepage Water Exiting as a Boil in the Foundation ***(Figure 5.4c)***	Some part of the foundation material is supplying a flow path. This could be caused by a sand or gravel layer in the foundation. Increased flows can lead to erosion of the foundation and failure of the dam.	1. Examine the boil for transportation of foundation materials. 2. If soil particles are moving downstream, sandbags or earth should be used to create a dike around the boil. The pressures created by the water level with the dike may control flow velocities and temporarily prevent further erosion. 3. If erosion is becoming greater, the reservoir level should be lowered. 4. A qualified engineer should inspect the condition and recommend further actions. ENGINEER REQUIRED
Seepage Exiting at Abutment Contact ***(Figure 5.4d)***	1. Water flowing through pathways in the abutment. 2. Water flowing through the embankment. Can lead to erosion of embankment materials and failure of the dam.	1. Study leakage area to determine quantity of flow and extent of saturation. 2. Inspect daily for developing slides. 3. Water level in reservoir may need to be lowered to assure the safety of the embankment. 4. A qualified engineer should inspect the condition and recommend further actions. ENGINEER REQUIRED

Figure 5.4 *(cont.)*
Inspection Guidelines - Embankment Seepage Areas

Large Area Wet or Producing Flow

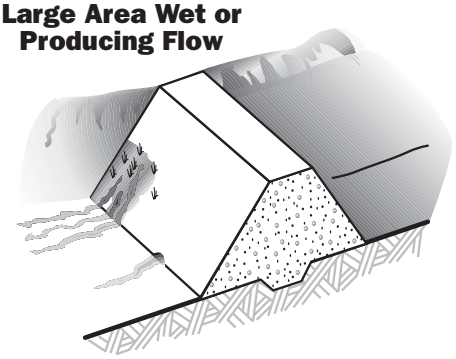

Figure 5.4e

Marked Change in Vegetation

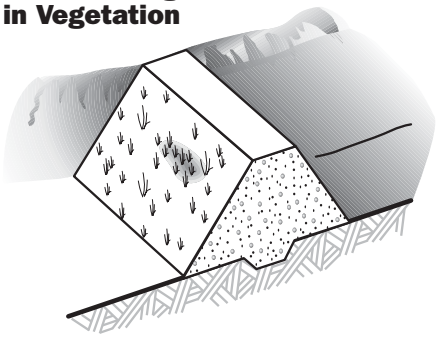

Figure 5.4f

Bulge in Large Wet Area

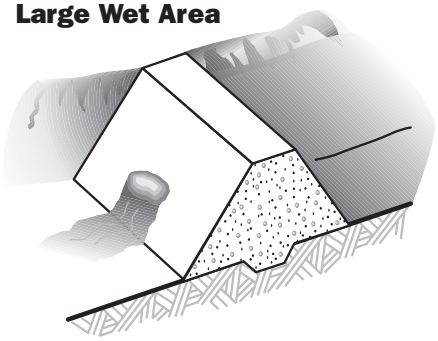

Figure 5.4g

Problem	Probable Cause and Possible Consequences	Recommended Actions
Large Area Wet or Producing Flow ***(Figure 5.4e)***	A seepage path has developed through the abutment or embankment materials and failure of the dam can occur. 1. Increased flows could lead to erosion of embankment material and failure of the dam. 2. Saturation of the embankment can lead to local slides which could cause failure of the dam.	1. Stake out the saturated area and monitor for growth or shrinking. 2. Measure any outflows as accurately as possible. 3. Reservoir level may need to be lowered if saturated areas grow at a fixed storage level or if flow increases. 4. A qualified engineer should inspect the condition and recommend further actions. ENGINEER REQUIRED
Marked Change in Vegetation ***(Figure 5.4f)***	1. Embankment materials are supplying flow paths. 2. Natural seeding by wind. 3. Change in seed type during early post-construction seeding. Can show a saturated area.	1. Use probe and shovel to establish if the materials in this area are wetter than surrounding areas. 2. If area shows wetness, when surrounding areas are dry or drier, a qualified engineer should inspect the condition and recommend further actions. ENGINEER REQUIRED
Bulge in Large Wet Area ***(Figure 5.4g)***	Downstream embankment materials have begun to move. Failure of the embankment resulting from massive sliding can follow these early movements.	1. Compare embankment cross-section to the end of construction condition to see if observed condition may reflect end of construction. 2. Stake out affected area and accurately measure outflow. 3. A qualified engineer should inspect the condition and recommend further actions. ENGINEER REQUIRED

Figure 5.4 *(cont.)*
Inspection Guidelines - Embankment Seepage Areas

Trampoline Effect in Large Soggy Area

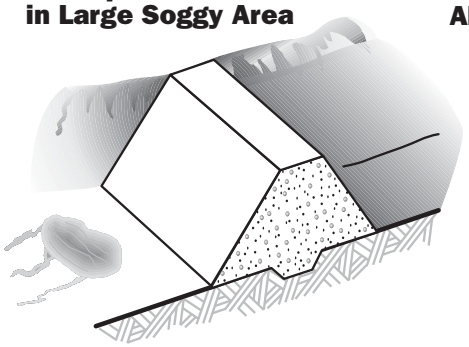

Figure 5.4h

Leakage From Abutments Beyond the Dam

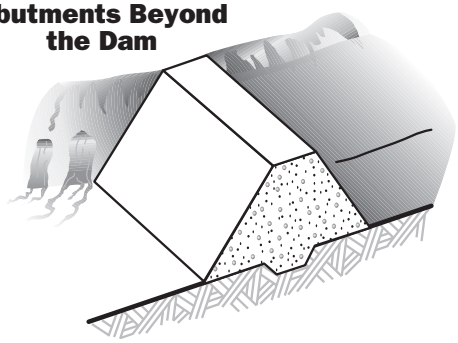

Figure 5.4i

Wet Area in Horizontal Band

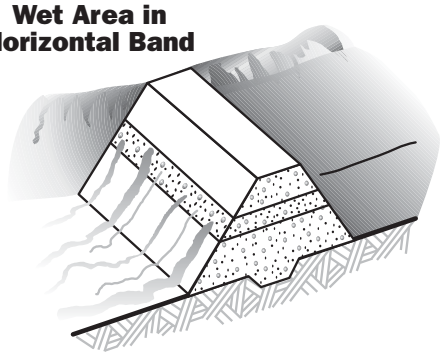

Figure 5.4j

Problem	Probable Cause and Possible Consequences	Recommended Actions
Trampoline Effect ***(bouncy when jumped on)*** **in Large Soggy Area** ***(Figure 5.4h)***	Water moving rapidly through the embankment or foundation is being controlled or contained by a well- established turf root system. Condition shows excessive seepage in the area. If control layer of turf is destroyed, rapid erosion of foundation materials could result in failure of the dam.	1. Carefully inspect the area for outflow quantity and any transported material. 2. A qualified engineer should inspect the condition and recommend further actions. ENGINEER REQUIRED
Leakage From Abutments Beyond the Dam ***(Figure 5.4i)***	Water moving through cracks and fissures in the abutment materials. Can lead to rapid erosion of abutment and evacuation of the reservoir. Can lead to massive slides near or downstream from the dam.	1. Carefully inspect the area to determine quantity of flow and amount of transported material. 2. A qualified engineer or geologist should inspect the condition and recommend further actions. ENGINEER REQUIRED
Wet Area in Horizontal Band ***(Figure 5.4j)***	Frost layer or layer of sandy material in original construction. 1. Wetting of areas below the area of excessive seepage can lead to localized instability of the embankment, resulting in slides. 2. Excessive flows can lead to accelerated erosion of embankment materials and failure of the dam.	1. Determine as closely as possible the flow being produced. 2. If flow increases, reservoir level should be reduced until flow stabilizes or stops. 3. Stake out the exact area involved. 4. Using hand tools, try to identify the material allowing the flow. 5. A qualified engineer should inspect the condition and recommend further actions. ENGINEER REQUIRED

Figure 5.5
Inspection Guidelines - Concrete Upstream Slope

Large Increase in Flow or Sediment in Drain Outfall

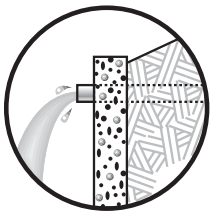

Figure 5.5a

Cracked Deteriorated Concrete Face

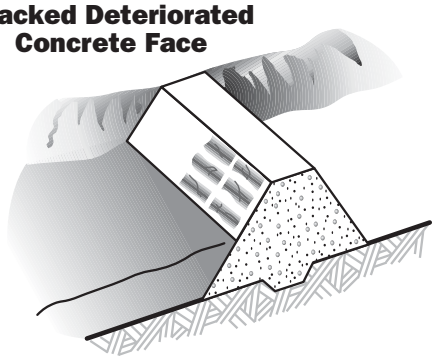

Figure 5.5b

Cracks Due to Drying

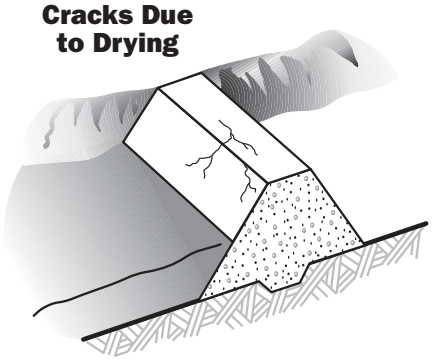

Figure 5.5c

Problem	Probable Cause and Possible Consequences	Recommended Actions
Large Increase in Flow or Sediment in Drain Outfall *(Figure 5.5a)*	Shortened seepage path or increased storage levels. 1. Higher-velocity flows can cause erosion of drain, then embankment materials. 2. Can lead to piping failure.	1. Accurately measure outflow quantity and determine amount of increase over previous flow. 2. Collect jar samples to compare turbidity. 3. If either quantity or turbidity has increased by 25%, a qualified engineer should evaluate the condition and recommend further actions. ENGINEER REQUIRED
Cracked Deteriorated Concrete Face *(Figure 5.5b)*	Concrete deteriorated from weathering. Joint filler deteriorated or displaced. Soil is eroded behind the face and caverns can be formed. Unsupported sections of concrete crack. Ice action may displace concrete.	1. Determine cause. Either patch with grout or contact engineer for permanent repair method. 2. If damage is extensive, a qualified engineer should inspect the condition and recommend further actions. ENGINEER REQUIRED
Cracks Due to Drying *(Figure 5.5c)*	Soil loses its moisture and shrinks, causing cracks. *Note:* Usually limited to crest and downstream slope. Heavy rains can fill cracks and cause small parts of embankment to move along internal slip surface.	1. Monitor cracks for increases in width, depth , or length. 2. A qualified engineer should inspect condition and recommend further actions. ENGINEER REQUIRED

Figure 5.6
Inspection Guidelines - Spillways

Excessive Vegetation or Debris in Channel

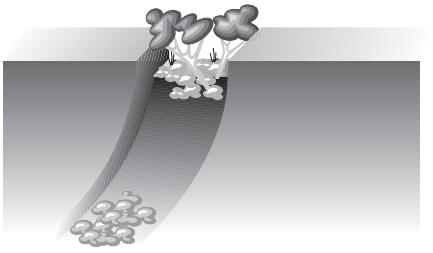

Figure 5.6a

Erosion Channels

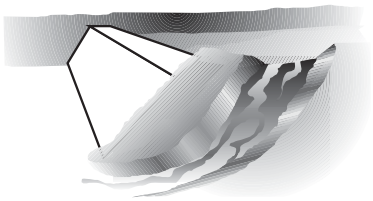

Figure 5.6b

Excessive Erosion in Earth-Slide Causes Concentrated Flows

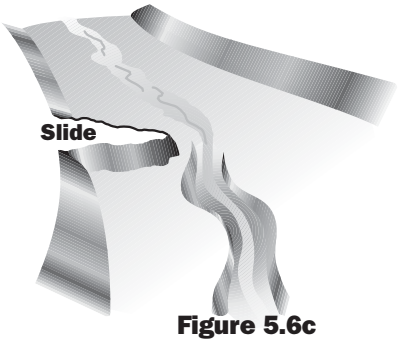

Figure 5.6c

Problem	Probable Cause and Possible Consequences	Recommended Actions
Excessive Vegetation or Debris in Channel *(Figure 5.6a)*	Accumulation of slide materials, dead trees, excessive vegetative growth, etc., in spillway channel. Reduced discharge capacity; overflow of spillway, overcropping of dam. Prolonged overtopping can cause failure of the dam.	Clean out debris periodically; control vegetative growth in spillway channel. Install log boom in front of spillway entrance to intercept debris.
Erosion Channels *(Figure 5.6b)*	Surface runoff from intense rainstorms or flow from spillway carries surface material down the slope, resulting in continuous troughs. Livestock traffic creates gullies where flow concentrates varies. Unabated erosion can lead to slides, slumps or slips which can result in reduced spillway capacity. Inadequate spillway capacity can lead to embankment overtopping and result in dam failure.	Photograph condition. Repair damaged areas by replacing eroded material with compacted fill. Protect areas against future erosion by installing suitable rock riprap. Re-vegetate area if appropriate. Bring condition to the attention of the engineer during next inspection.
Excessive Erosion in Earth-Slide Causes Concentrated Flows *(Figure 5.6c)*	Discharge velocity too high; bottom and slope material loose or deteriorated; channel and bank slopes too steep; bare soil unprotected; poor construction protective surface failed. Disturbed flow pattern; loss of material, increased sediment load downstream, collapse of banks; failure of spillway; can lead to rapid evacuation of the reservoir through the severely eroded spillway.	Minimize flow velocity by proper design. Use sound material. Keep channel and bank slopes mild. Encourage growth of grass on soil surface. Construct smooth and well- compacted surfaces. Protect surface with riprap, asphalt or concrete. Repair eroded portion using sound construction practices.

Figure 5.6 *(cont.)*
Inspection Guidelines - Spillways

End of Spillway Chute Undercut

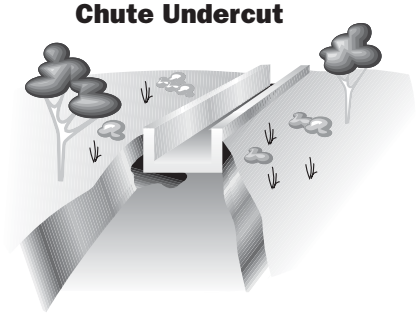

Figure 5.6d

Wall Displacement

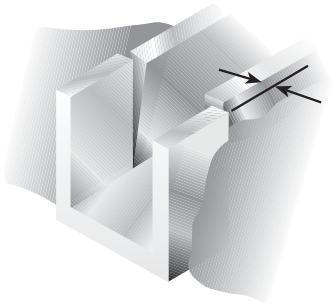

Figure 5.6e

Large Cracks

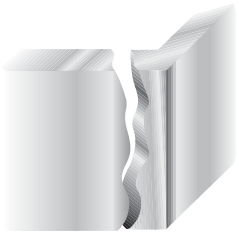

Figure 5.6f

Problem	Probable Cause and Possible Consequences	Recommended Actions
End of Spillway Chute Undercut *(Figure 5.6d)*	Poor configuration of stilling basin area. Highly erodible materials. Absence of cut-off wall at end of chute. Structural damage to spillway structure; collapse of slab and wall lead to costly repair.	Dewater affected area; clean out eroded area and properly backfill. Improve stream channel below chute; provide properly sized riprap in stilling basin area. Install cutoff wall.
Wall Displacement *(Figure 5.6e)*	Poor workmanship; uneven settlement of foundation; excessive earth and water pressure; insufficient steel bar reinforcement of concrete. Minor displacement will create eddies and turbulence in the flow, causing erosion of the soil behind the wall. Major displacement will cause severe cracks and eventual failure of the structure.	Reconstruction should be done according to sound engineering practices. Foundation should be carefully prepared. Adequate weep holes should be installed to relieve water pressure behind wall. Use enough reinforcement in the concrete. Anchor walls to present further displacement. Install struts between spillway walls. Clean out and backflush drains to assure proper operations. Consult an engineer before actions are taken. ENGINEER REQUIRED
Large Cracks *(Figure 5.6f)*	Construction defect; local concentrated stress; local material deterioration; foundation failure, excessive backfill pressure. Disturbance in flow patterns; erosion of foundation and backfill; eventual collapse of structure.	Large cracks without large displacement should be repaired by patching. Surrounding areas should be cleaned or cut out before patching material is applied. (See Chapter 7.) Installation of weep holes or other actions may be needed.

Figure 5.6 *(cont.)*
Inspection Guidelines - Spillways

Open or Displaced Joints

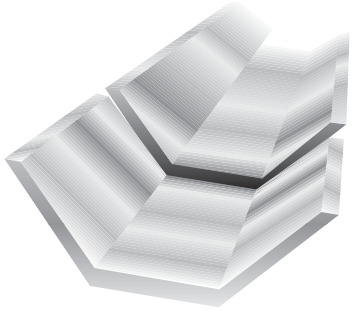

Figure 5.6g

Breakdown and Loss of Riprap

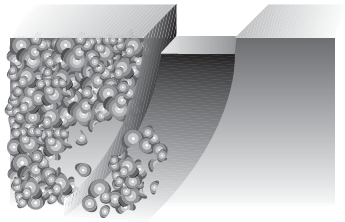

Figure 5.6h

Material Deterioration—Spalling and Disintegration of Riprap, Concrete, Etc.

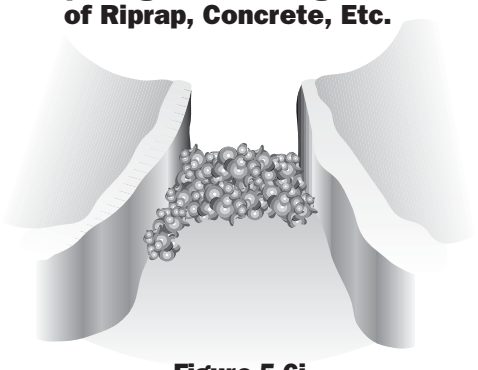

Figure 5.6i

Problem	Probable Cause and Possible Consequences	Recommended Actions
Open or Displaced Joints *(Figure 5.6g)*	Excessive and uneven settlement of foundation; sliding of concrete slab; construction joint too wide and left unsealed. Sealant deteriorated and washed away. Erosion of foundation material may weaken support and cause further cracks; pressure induced by water flowing over displaced joints may wash away wall or slab, or cause extensive undermining.	Construction joint should be no wider than 1/2". All joints should be sealed with asphalt or other flexible materials. Water stops should be used where feasible. Clean the joint, replace eroded materials, and seal the joint. Foundations should be properly drained and prepared. Underside of chute slabs should have ribs of enough depth to prevent sliding. Avoid steep chute slope. ENGINEER REQUIRED
Breakdown and Loss of Riprap *(Figure 5.6h)*	Slope too steep; material poorly graded; failure of subgrade; flow velocity too high; improper placement of material; bedding material or foundation washed away. Erosion of channel bottom and banks; failure of spillway.	Design a stable slope for channel bottom and banks. Riprap material should be well-graded (the material should contain small, medium and large particles). Subgrade should be properly prepared before placement of riprap. Install filter fabric if necessary. Control flow velocity in the spillway by proper design. Riprap should be placed according to specification. ENGINEER REQUIRED
Material Deterioration—Spalling and Disintiegration of Riprap, Concrete, Etc. *(Figure 5.6i)*	Use of unsound or defective materials; structures subject to freeze-thaw cycles; improper maintenance practices; harmful chemicals. Structure life will be shortened; premature failure.	Avoid using shale or sandstone for riprap. Add air-entraining agent when mixing concrete. Use only clean, good-quality aggregates in the concrete. Steel bars should have at least 1" of concrete cover. Concrete should be kept damp and protected from freezing during curing.