

BROOKER ENGINEERING, P.L.L.C.

**Town of Clarkstown
Lake Lucille Dam**

Emergency Action Plan

Prepared by: Brooker Engineering PLLC
76 Lafayette Avenue
Suffern, New York 10901

May 2, 2000

Revised: June 26, 2000

Revised: November 6, 2002

Revised: April 15, 2004

Revised: May 31, 2005

BBE #: 96080.1

I. PURPOSE AND SCOPE

The purpose of this Emergency Action Plan (EAP) is to develop a course of action to be followed in the event of flooding caused by large runoff or failure of the Lake Lucille Dam, and which would help to safeguard lives and reduce property damage to citizens of Rockland County living along Lake Lucille of the tributary of the Hackensack River. This plan was developed pursuant to the New York State Department of Environmental Conservation (NYSDEC) Guideline for Design of Dams. This plan will be under periodic review and updated annually. These updates will be sent to all recipients whenever changes are made.

II. DESCRIPTION OF DAM

The Lake Lucille Dam is located on Lucille Boulevard in the Town of Clarkstown. The lake is 2.1 miles upstream of Lake Deforest on the west branch of the Hackensack River. The Dam is a reinforced concrete structure with a 24' wide roadway on top. The spillway consists of a concrete weir with triple box culvert discharge culverts under the roadway. The emergency spillway consists of the roadway and reinforced overflow channel. Energy dissipation is by plunge pool with a concrete check dam. The Dam was built in the early 1900's, there is no record of the exact date available. The Dam was completely rehabilitated in the year 2000. The drain is by 30" pipe with a sluice gate valve. The lake contains 62 acre-ft of storage. The Dam is approximately 12 feet high and 100 feet wide, with a drainage area of 4.68 square miles.

III. HAZARD AREA

In the event of a large runoff or of failure of the Dam, the affected area would be immediately downstream of the Dam. Two dwellings between the Dam and Zukor Road, four houses below Zukor Road, to the swamp below Zukor Road. Figure 1 is a map of the area of inundation. The intent of the map is to help in the identification of areas that may be affected by a catastrophic event at Lake Lucille Dam, however it should not be construed as all-inclusive. Areas outside the highlighted zone could be affected under such circumstances.

IV. RESPONSIBILITY AND AUTHORITY

The governing body overseeing the Lake Lucille Dam is the Town of Clarkstown. Maintenance and operation of the Dam are the responsibility of and are carried out by the personnel of

the Department of Environment Control, under the authority of the Director. An Engineer in the employ of the Department of Environmental Control conducts periodic inspections of the Dam.

Development and implementation of the EAP is the responsibility of the Town of Clarkstown. In addition, it is the obligation of each EAP participant to be fully knowledgeable of his/her duties, and to execute them to the best of his/her ability.

Under New York State Law, Article 2B, the Chief Executive or Administrative Head of a County, City, Town, Village or District has the power to declare a State of Emergency and to issue local emergency orders for natural and man-made disaster operations in his jurisdiction. The Town Supervisor for the Town of Clarkstown and/or the Rockland County Office of Emergency Services, or their designees, have such powers with regard to emergency situations at the Dam.

A. Basic Procedure

In the event of an emergency situation as defined in subsequent Sections V and VI, an efficient and well-structured crisis management program will play a major role in minimizing loss of life and property. The Town of Clarkstown Emergency Management Coordinator (TEMC) shall provide the overall coordination of the emergency procedures, using local officials, personnel, and volunteers for fast action.

Figure 2 - Emergency Action Plan Flow Chart presents the basic notification procedure among the primary participants of the EAP. Specific actions may vary depending on the severity of the emergency, and on the availability of the participants.

B. Sequence of Events

- i. The emergency situation is discovered by or reported to the Town Emergency Management Coordinator Engineer or the Town Emergency Management Coordinator (TEMC) who contacts the Town of Clarkstown Director of the Department of Environmental Control (DDEC).

- ii. The (DDEC) assesses the emergency and contacts the Town of Clarkstown Supervisor and notifies the Town Emergency Management Coordinator (TEMC) of nature of the emergency and coordinates the procurement of materials and equipment needed to repair the Dam and begins work to contain the emergency.
- iii. (TEAC) contacts the Town of Clarkstown Police Department which becomes the EAP Command Center. If the (TEMC) cannot be contacted, (DDEC) contacts the Rockland County Emergency Services (RCES), which then becomes the EAP Command Center.
- iv. The (TEMC) coordinates public safety agencies in the efforts to warn and/or evacuate residents or businesses.

The (TEMC) or (RCES) contacts:

	<u>Number</u>
a. Rockland County Emergency Services (RCES).	911
b. Town of Clarkstown Police Department.	845-639-5800
c. New City Fire Department	911
d. Town of Clarkstown Highway Department	845-623-7500
e. Residences within the Inundation Hazard Area	Leavitt 634-8202 Silver 639-4619 Fishbein 634-5840 Amsel 638-1286 Flechsigg 623-5035 Colett 639-0023
f. Rockland County Sheriff Department	845-638-5400
g. New York State Police	845-353-1100
h. New York State Department of Environmental Conservation (which provides technical support to TEMC).	518-402-8127

- i. New York State Emergency Management Office 518-457-2222
- j. National Weather Service 845-540-1717 for weather information.

The Clarkstown Highway Departments above assist in Emergency containment efforts and in the procurement of emergency materials and equipment.

- v. After contacting Rockland County Emergency Services, The (TEMC) or (RCES) contacts
 - a. Rockland County Drainage Agency, (845) 638-5039
 - b. Orange and Rockland Utilities (845) 577-3432
 - c. Lake Lucille Home Owners Association (845) 268-4884
 - d. United Water Company of New York (845)-623-7504

Depending on the state of the emergency declared being a watch alert or (less serious) warning alert (most serious) the (TEMC) will coordinate the appropriate response.

V. WATCH ALERT

A. Definition

A **Watch Alert** situation exists when conditions are such that ultimate failure or overtopping of the Dam's structure may occur. Under **Watch Alert** status, the Dam's structure is not in imminent danger of failure. Lake Lucille Dam should be put under **Watch Alert** when the following conditions occur:

- i. Water Surface Elevation is within six (6) inches of overtopping the roadway over the dam, and there is no threat of severe weather or wind.
- ii. Water Surface Elevation is within one (1) foot of overtopping the roadway over the Dam, and a severe weather warning has been issued by the National Weather Service, or rainfall is occurring or imminent.

- iii. Water Surface Elevation is within 1.5 feet of overtopping the roadway over the Dam, heavy snow is present, and a severe weather warning has been issued by the National Weather Service or rainfall is occurring or imminent.
- iv. Dangerous ice loads on the upstream face of the spillway or earth embankments are suspected.
- v. Warning for a potential earthquake has been issued.

B. IMPLEMENTATION

If any of the conditions listed above are observed, the (DDEC) is responsible for declaring the **Watch Alert** and initiating the implementation of the EAP. If the (DDEC) is not present, the (TEMC) is responsible for declaring the **Watch Alert** and for taking appropriate actions. The emergency actions to be taken include the following:

- i. The (DDEC) determines the Lake Lucille Dam to be in a state of **Watch Alert**, and notifies the (TEMC), and the Town of Clarkstown Supervisor of the nature of the emergency. The Supervisor declares a state of emergency.
- ii. The (TEMC) establishes a communication and coordination center, manned by an experienced Communication Coordinator skilled in short-wave radio and telephone dispatching, who maintains communication with the Town Engineer to monitor the conditions at the Dam; and notifies all EAP public safety agencies of the alert status.
- iii. All plan participants verify that all emergency equipment is fully operable, and prepare to act immediately in the event that the alert is upgraded to a Warning Alert status.
- iv. The Town Engineer continuously monitors the Dam until conditions return to normal. At such time, the Town Engineer notifies the (DDEC), which then cancels the **Watch Alert** and notifies the other agencies of the cancellation.

- v. If conditions at the dam worsen, the (DDEC) determines the dam to be under a **Warning Alert**, and notifies the (TEMC) and Town Supervisor immediately of the worsening nature of the emergency.

VI. WARNING ALERT

A. Definition

A **Warning Alert** situation exists when the Dam is in imminent danger of failing, is overtopping, or has already failed. Lake Lucille Dam should be put under **Warning Alert** when the following conditions occur:

- i. Water Surface Elevation above the top of the roadway over the Dam (overtopping the Dam).
- ii. Severe seepage is observed along the Dam's structure.
- iii. Cracks are developing within the spillways and/or along the Dam's structure.
- iv. Earthquakes are occurring near the Dam.

B. IMPLEMENTATION

If any of the conditions listed above are observed, the (DDEC) is responsible for declaring the **Warning Alert** and initiating the implementation of the EAP. If the (DDEC) is not present, the (TEMC) is responsible for declaring the **Warning Alert** and for taking appropriate actions. The emergency actions to be taken include the following:

- i. The (DDEC) determines the Lake Lucille Dam to be in a state of **Warning Alert**, and notifies the (TEMC), and the Town Supervisor of the nature of the emergency.
- ii. The (TEMC) establishes a communication and coordination center, manned by an experienced Communication Coordinator skilled in short-wave radio and telephone

dispatching, who maintains communication with the Town Engineer to monitor the conditions at the Dam and notifies all EAP public safety agencies of the alert status. The (TEMC) initiates and coordinates all emergency operations, which include:

- a. quick-call alert to notify all EAP participants,
 - b. dispatch of emergency personnel to the scene,
 - c. initiation of search and rescue operations in hazard area outlined in Figure 1,
 - d. notification and evacuation of residents and businesses located within the hazard area,
 - e. set-up of roadblocks on all roads entering the hazard area.
- iii. The Town Engineer provides continuous update of the situation at the Dam to the (TEMC), and coordinates and directs the Dam status reports.
- iv. The New York State Department of Conservation Dam Safety Office and U.S. Corp of Engineers Dam Safety Coordinator in New York provide advice to the (DDEC) for its containment efforts.
- v. If the Dam does not fail and conditions recede to the **Watch Alert** situation as described above, the (DDEC) shall downgrade the alert to a **Watch Alert** and notify the (TEMC), which then cancels the **Warning Alert** and notifies the involved agencies of the cancellation.
- vi. All news media inquiries are directed to the Town Supervisor who issues all official news releases.
- vii. Telephone List

APPENDIX A

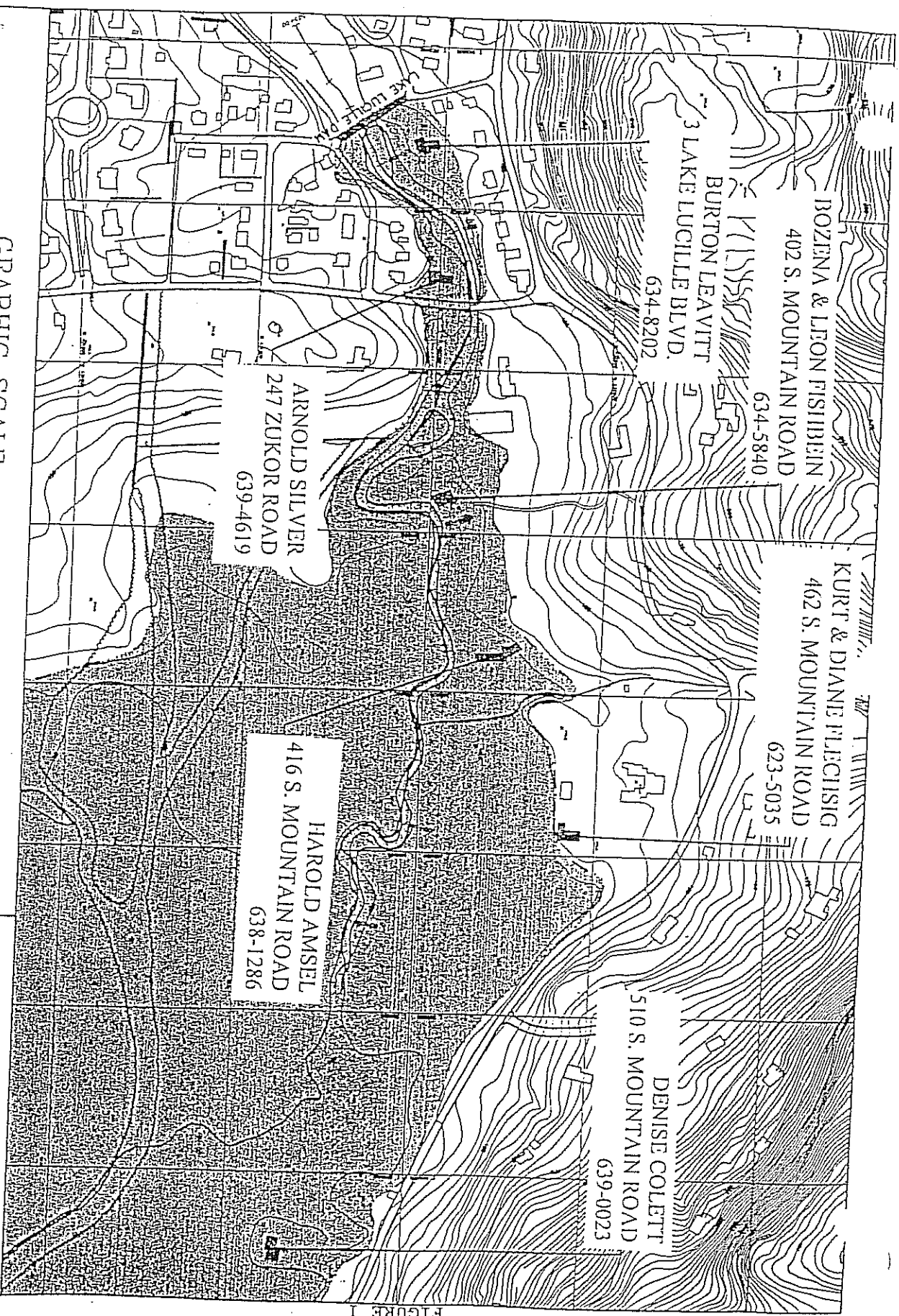
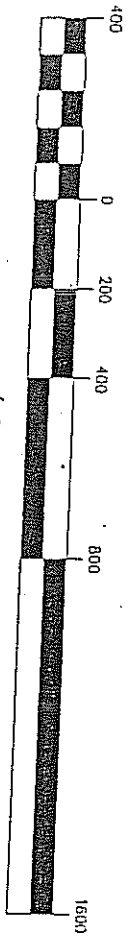
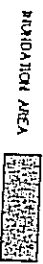


FIGURE 1

GRAPHIC SCALE



LEGEND



LAKE LUCILLE DAM
REHABILITATION PROJECT
TOWN OF CLARKSTOWN
ROCKLAND COUNTY, NEW YORK

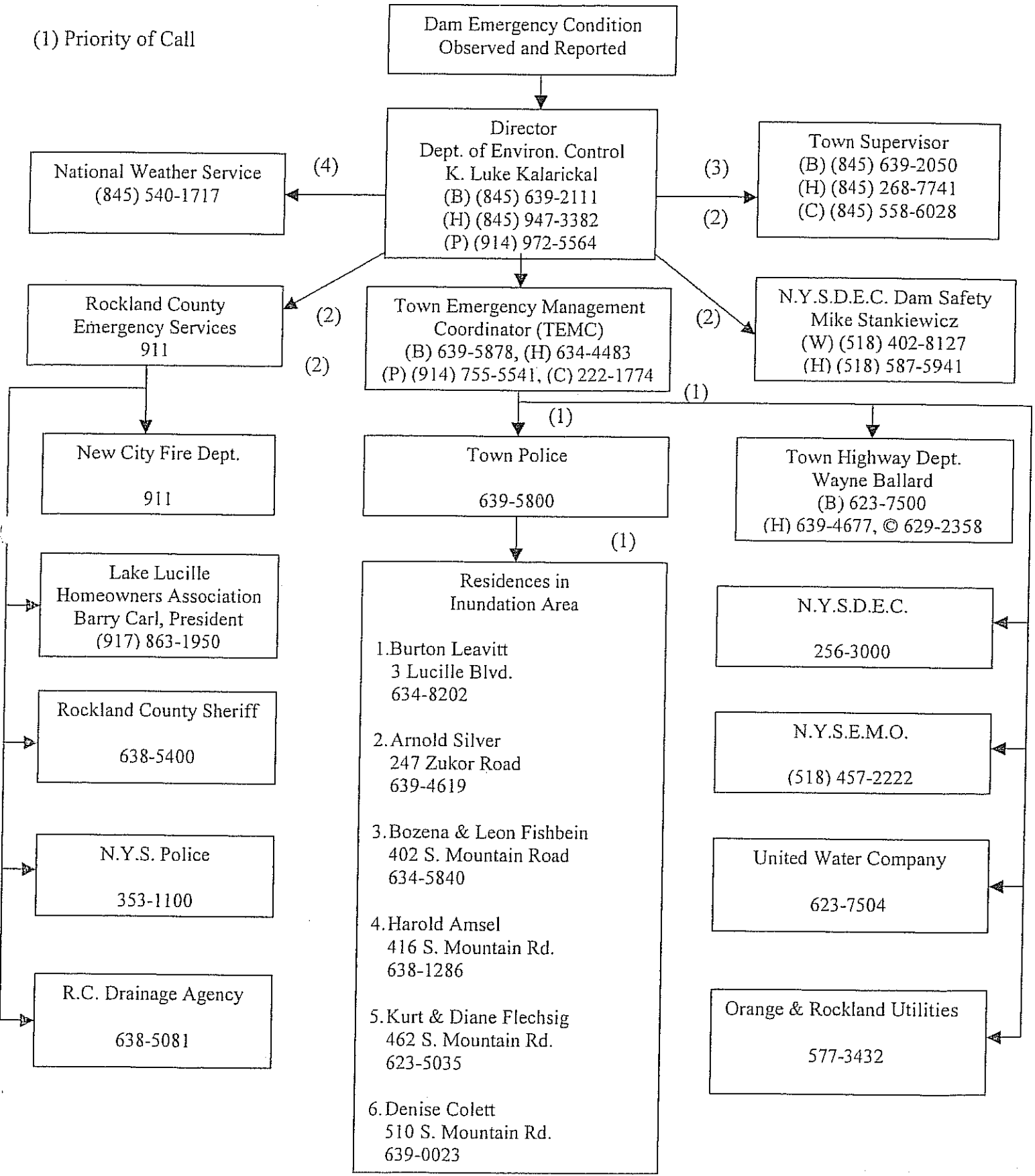
LAKE LUCILLE DAM INUNDATION AREA

BRIAN BROOKER ASSOCIATES

DATE	SCALE	DRAWN BY	JOB NO.	DWG. NO.
	1" = 400'	CM	960001	DAM

CONSULTING ENGINEER 28 LEBEL LANE, SUITE 401, ROCKY HILL, CT 06154 (860) 366-1313

Figure 2 – Notification Flow Chart



Appendix B
NOTIFICATION RECORD FORM

NOTIFICATION RECORD FORM

<u>Department or Agency</u>	<u>Phone Number</u>	<u>Person Contacted</u>	<u>Time</u>
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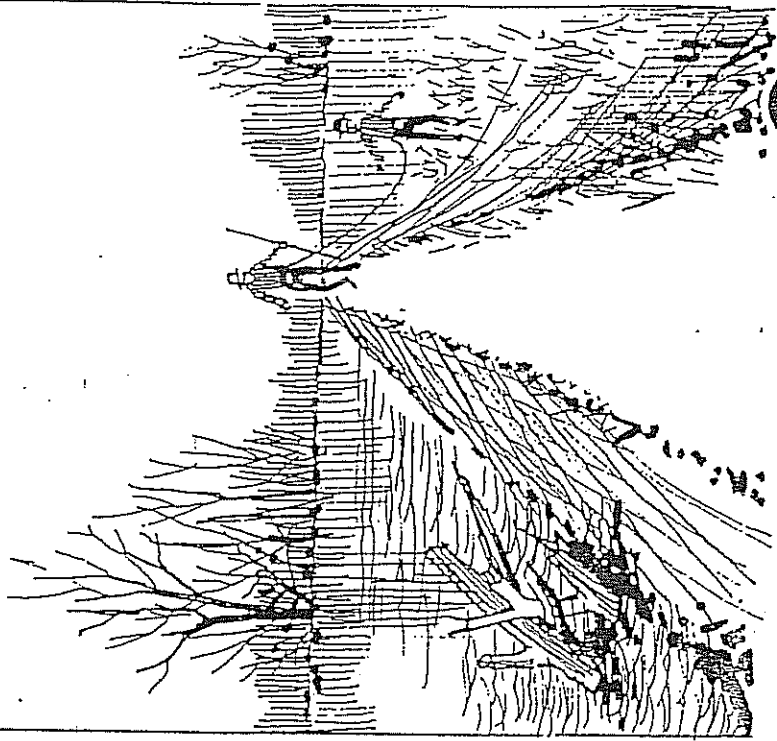
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Appendix C
NYSDEC PAMPHLET ON
PATROLLING AND TREATING FLOOD PROBLEMS

PATROLLING
AND TREATING
FLOOD PROBLEMS



New York State
Department of Environmental Conservation

Organizing Patrols

Description

When it is determined that the water surface will be on the levee slopes and flood walls, it is time to begin patrolling. A patrol is a team of two or three people, usually volunteers, continuously walking along the levee or flood wall watching for and reporting potential flood problems. Each patrol is assigned to a specific area. If more than one patrol is assigned to a specific area, one is designated. This leader will maintain contact with the Community Emergency Operations Center.

Equipment

Patrol Leader

Rain gear, boots and gloves
Flashlight or lantern
Patrolling instructions
Portable radio, if available
Watch, log book and pencils

Patrol Team - 2 or 3 people

Rain gear, boots and gloves
Flashlight or lantern
25 feet of 1/2 inch nylon safety line
One 4 to 6 foot stake
Life Jacket
Stakes or lath

each person
each person
each team
each team
each person
each team

General Instructions For Patrols

Safety Precautions

The members of the patrol team should walk along side by side with one person on the water side of the levee near the water surface, one at the top of the levee and if available, one on the land side toe of the levee. The team should move slow enough to enable the member closest to the water to probe below the surface with the stake. The person closest to the water should be wearing a safety line.

The person walking closest to the water should be especially careful of floating objects. The limbs and roots of a floating tree that has been uprooted can extend above the water surface and strike anyone walking along the edge. To increase the chances of seeing floating objects it is best to walk upstream when patrolling the water side of levees.

When patrolling flood walls, the patrol team should not attempt to walk the top of the wall, but should concentrate on potential problem areas on the land side of the wall. To observe the water side of flood walls in areas where the wall is more than five feet above the land side ground level, it is recommended that observation points be selected (about 100 yards apart) and a ladder placed at each of these points.

The patrol team can expect to see observers on the levees and at the flood walls. If there are many observers, it is recommended that an additional person be assigned to each patrol team. This additional person will act as a safety officer explaining to observers the dangers that are present. It is recommended that each team carry and pass out instruction cards describing the community evacuation plan.

It should be kept in mind that the object is to pass out information, so observers are aware of the danger. The patrol team will accomplish nothing by ordering people off the levees and flood walls.

Each patrol leader and patrol team member should be thoroughly familiar with the community evacuation plan and signals. If evacuation is necessary, the patrolling organization should move to a pre-designated location or locations and keep the organization intact.

When returning to the levees and flood walls, physical conditions may be considerably different than those witnessed prior to evacuation, especially if overtopping occurred. If overtopping occurred during darkness it is recommended that patrolling not be resumed until daylight. There may be some special cases where this recommendation cannot be followed.

Problems to look for:

Each patrol is to be instructed to watch for the following:

- Backflow through a drainage structure
- Sand boils
- Indications of sloughs
- Scour
- Leakage through a closure structure
- Low reaches of levees or flood walls that may be overtopped
- Vehicular traffic problems
- Hazardous materials such as floating gasoline tanks, etc.
- High water marks after a crest has been reached

Explanation of and treatment for flood problems:

Backflow through a drainage structure

Many of the sluice ways and pipes through the levee system are at a relatively low elevation. Because of their low elevation, probably several of the automatic flap gates will already be under water when they are checked for closure. If the automatic flap gate is not sealing, there will be a backflow through the drainage structure into a ponding area or ditch. This will cause internal flooding unless action is taken. Run the sluice gate down to stop the backflow. Plate 1 illustrates the typical drainage structure showing the riverward automatic flap gate and the back-up sluice gate.

Sand Boils

When flood waters are on the levee, a condition may occur where muddy water is oozing or bubbling out of the ground in the vicinity of the levee. Such a condition is called a "sand boil" and represents a serious danger to the project. A "blow out" under the levee can occur causing failure of the project and flooding of the community.

A sand boil is shown in Plate 2 and Plate 3.

When sand boils are observed, immediately begin to build a sandbag ring as shown in Plate 4, to counteract the water head from the river. Make the sandbag ring only of sufficient height to stop the movement of the earth particles in the erupting area. The muddy, bubbling water into the sandbag ring will clear when the earth particles cease movement. DO NOT ATTEMPT TO STOP ALL WATER FLOW as other sand boils may occur outside of the sandbag ring. Discharge from the sandbag ring should be diverted to the nearest drainage ditch or other facility, when practical, in a direction away from the levee or wall.

Sloughs

Seepage through a levee is not uncommon as the levees become saturated due to extensive high water stages. An example of seepage is seen on Plate 5. Areas of seepage should be checked often to insure that seepage flow is not substantially increasing or beginning to carry particles of earth. If the seepage is carrying earth particles or if longitudinal cracks begin to occur on the levee slopes or levee crown, a slough may be imminent. An illustration of an advanced slough is seen on Plate 6. Such conditions are very dangerous as river pressure against the levee can blow the levee out. Corrective actions must be started immediately. Suggested measures can be seen on Plate 7.

The purpose of the brush or snow fence is to allow drainage under the weighing material. DO NOT place weight on the levee top as this may accelerate levee slippage and failure.

Scour

If signs of scour occur, soundings with a long stick or pole should be taken to observe the extent and progress of the scour. Deflection dikes, snow fencing and other material as indicated on Plate 8, may be used to arrest the scour.

Leakage through a Stop-Log Closure Structure

Leakage under or through a stop-log closure is a common occurrence. Leakage results from an uneven seat under the bottom stop-log and small openings between stop-logs. Experience indicates that people tend to become very upset observing, or having reported to them, that water is coming through the closure. Such leakage is not dangerous and the person in charge should emphasize this point to the workers and to the public as the need arises. Plates 9 and 10 illustrate a typical stop-log closure and sandbag closure respectively.

Overtopping

The possibility always exists for storms to occur that will cause a water surface higher than the protection level. If there are indications that the project will be subject to extension overtopping, the protected areas of the community should be evacuated. Evacuation decisions are a community responsibility. However, limited overtopping may occur due to debris dams or minor levee settlement. Methods of combating limited overtopping are illustrated on Plates 11, 12, 13 and 14.

Vehicular traffic problems

The community emergency plan will contain a section on traffic control. It is inevitable, however, that a traffic problem will arise that was not planned for. The patrol teams will be in a good position to observe traffic flow. At the first sign of a problem, it should be reported immediately to the Community Emergency Operation Center.

Hazardous materials

With high velocity flow across normally dry land, there is a potential for hazardous materials of many kinds to be carried downstream. The materials may still be in their containers such as portable gasoline tanks, or may have been spilled onto the surface of the water.

If the presence of hazardous materials is observed or suspected it should be reported immediately to the Community Emergency Operations Center. Expect to receive a number of questions from the emergency center. An attempt will be made to identify the substance, so downstream areas can be prepared.

High water marks

Although it may appear to be a useless exercise, establishment of high marks is critical in locating problem areas on the flood protection projects, so improvements can be made before the next flood. As soon as practical while water levels are receding, the patrol teams should mark evidence of high water. This evidence will show up as a debris line along the levees and riprap. On the flood walls, the only evidence may be the wet mark which will last an hour or two.

If there are enough concrete structures along the levees (say not more than 100 yards apart) high water marks on the levees can be preserved by painting, scratching or otherwise marking a horizontal line on the concrete at the highest elevation the water reached. If there aren't enough concrete structures, stakes should be driven into the levee at the high water mark spaced about 100 yards apart. The stake should enter the ground at the high water mark.

As stated above, high water marks on flood walls will not remain long. It is recommended, when it is evident that the rise is over, that measurements be taken with a ruler from the top of the flood wall down to the wet mark for each observation point. Marking the flood wall on the landside with the observation point number will help determine the location later. The observation point and the vertical measurement should be recorded in the patrol's log book. When the patrols are released, this information should be given to the patrol leader.

TYPICAL DRAINAGE STRUCTURE

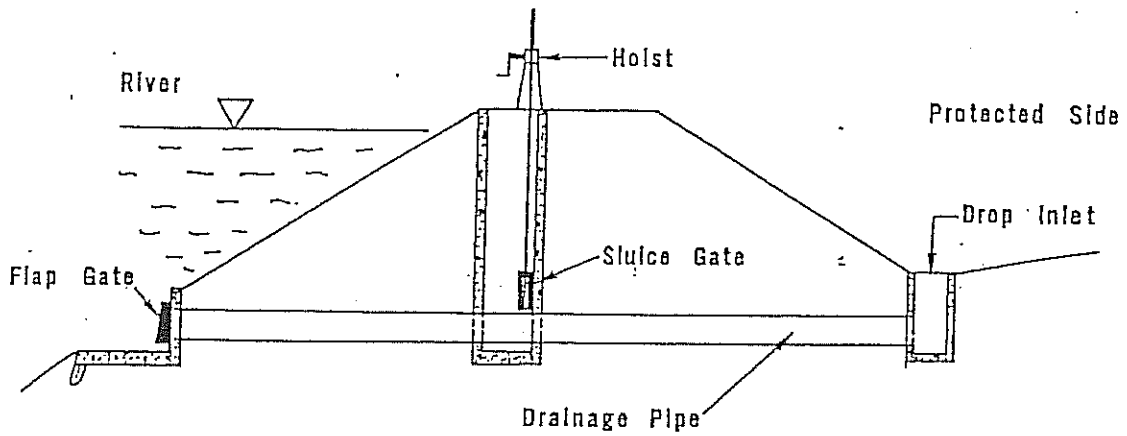


PLATE 1

SAND BOIL

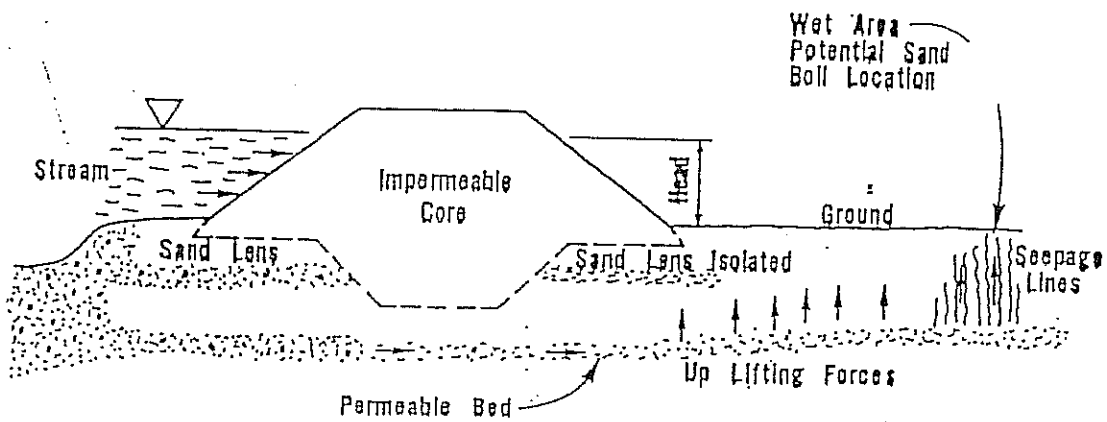


PLATE 2

SAND BOIL

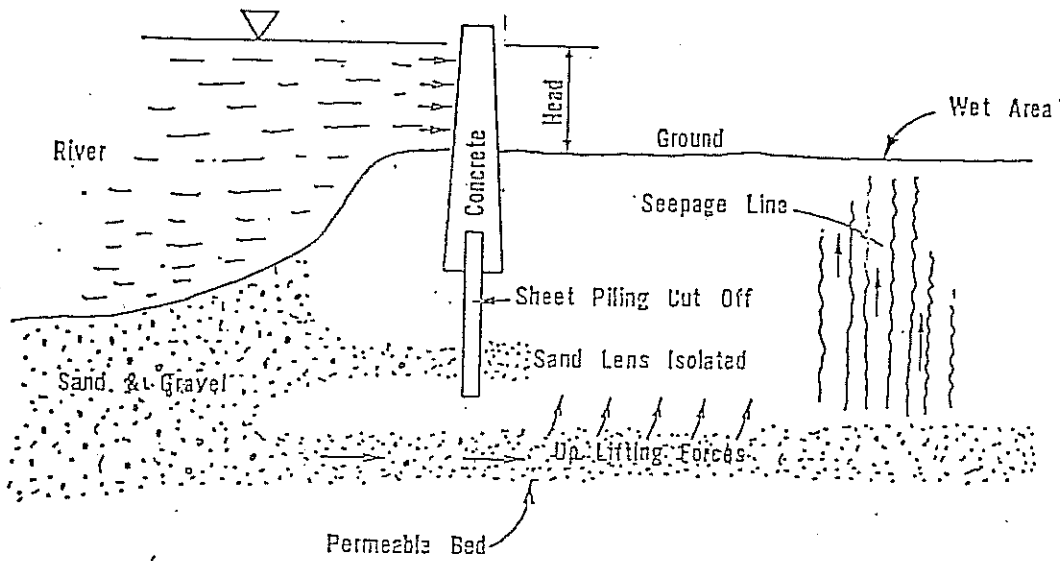
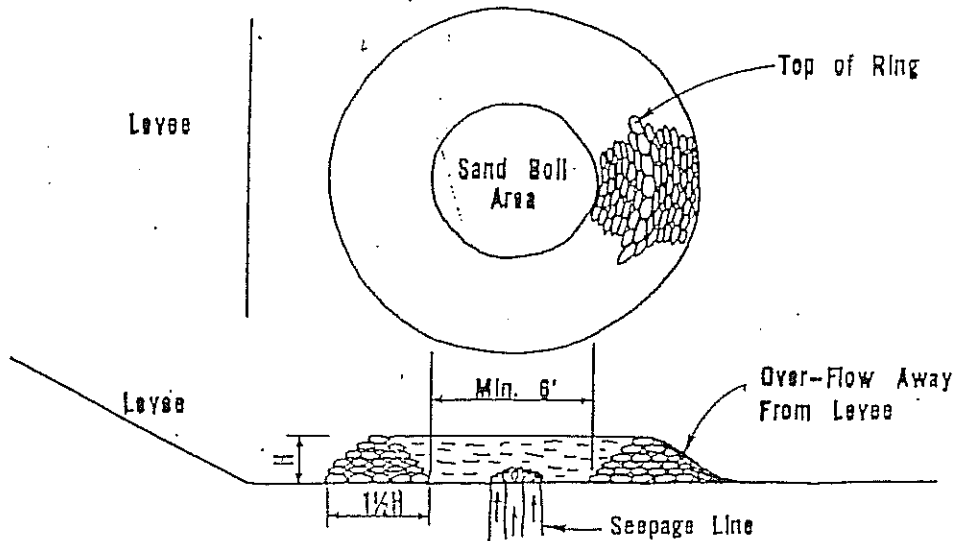


PLATE 3

SAND BOIL CONTAINMENT



Build Sand Bag Ring Until Sand Has Stopped Flowing.
DO NOT ATTEMPT TO STOP THE WATER FLOW.

PLATE 4

SEEPAGE

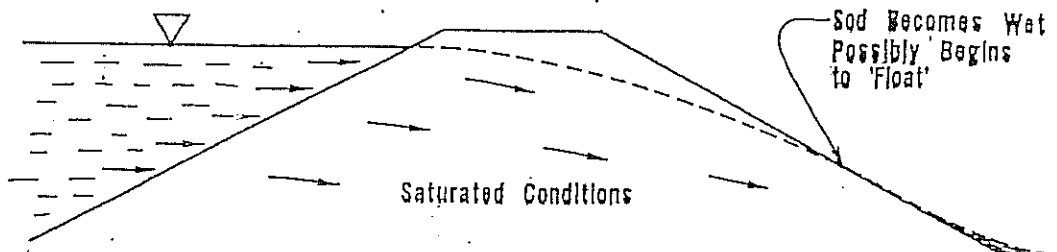


PLATE 5

SLOUGHS

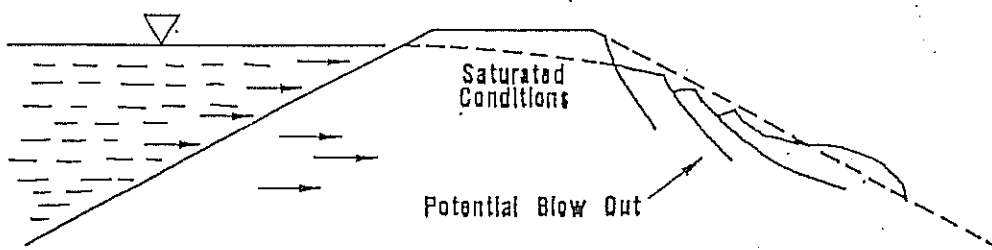


PLATE 6

SEEPAGE & SLOUGHS

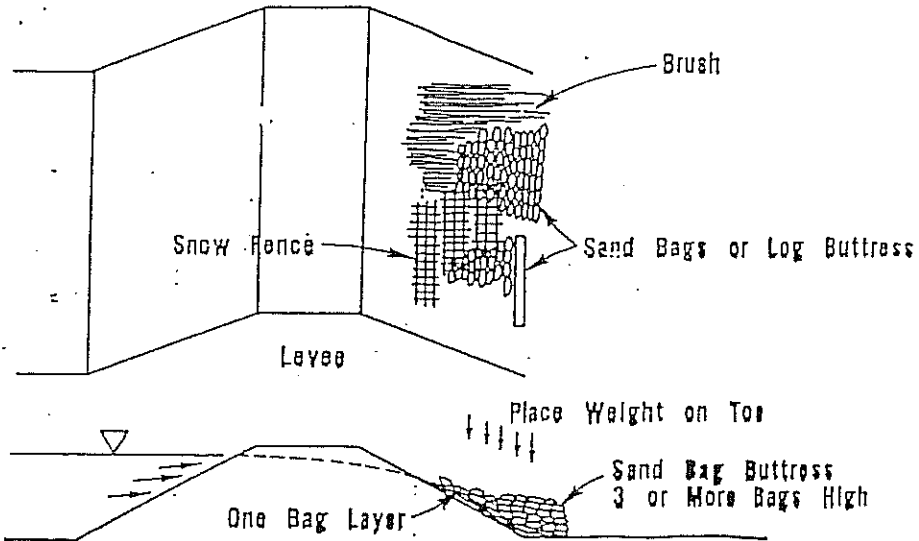


PLATE 7

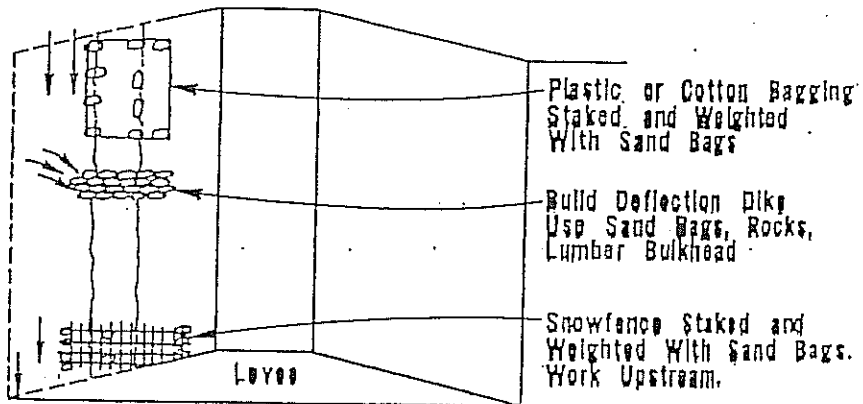
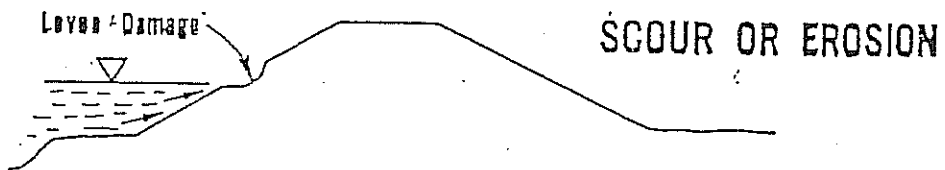


PLATE 8