

# SANDBAGGING AND DIKE CONSTRUCTION

Disclaimer: This document is for information purposes only

## SAFETY TIPS

- Individuals with a medical condition that would make it dangerous for him/her to participate should avoid taking part.
- Wear protective gear such as steel toe boots, hat, safety glasses, gloves, sunscreen, etc.
- Be attentive of large equipment moving in the area.
- Be aware of floodwater dangers:
  - Contamination
  - Varying water flow and strong undercurrents
  - Floating debris
- Adhere to proper sandbag handling technique:
  - Do not bend more than 20 degrees in any direction while handling sandbags.



- Keep heavy weights below shoulder height, above knees and close to the body. Limit reaching with arms when passing the sandbags.



- Pivot feet and do not twist through the back while handling sandbags.
- Do not throw sandbags.

## SHOVELLING TECHNIQUE

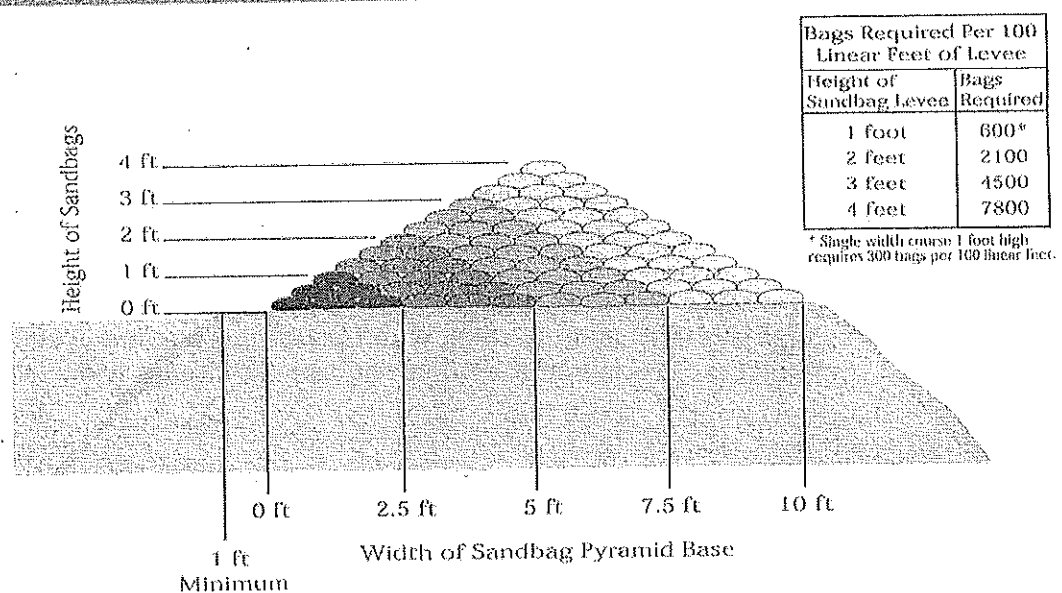
- Choose the proper shovel and use it correctly to reduce the risk of injury when shoveling fill into sandbags
- The shovel should meet the following criteria:
  - Weight – between 1.5-3 kg
  - Length – between elbow and chest height
  - Shape – triangular or round blades
  - Handles can be added to shovels to keep the back and wrist straighter
  - Do not shovel more than 22-33 kg of fill per minute

## FILLING SANDBAGS

- Fill sandbag to half its capacity (no more than 40 lbs) with sand, clay or silt.
- Fold or tie the flap (tying or sewing is not necessary).
- The open ends of the sandbags should be facing upstream and/or uphill so that the moving water will not remove the sand from the bags.
- Do not drag the bags (this could cause lower back injury and bag to weaken).
- When forming a line to pass sandbags, face each other and stand no more than one to two feet apart. If there are not enough people to form a continuous line, use a wheelbarrow to move sandbags.

*The number of sandbags needed to protect a home or building varies depending on the local topography and the anticipated depth of water*

## TYPICAL PYRAMID SANDBAG PLACEMENT



The pyramid placement method is used to increase the height of sandbag protection. Use this rule of thumb in determining dimensions of the pyramid:

- 1 bag in length equals about 1 foot.
- 3 bags in width equals about 2-1/2 feet.
- 3 bags in height equals about 1 foot.

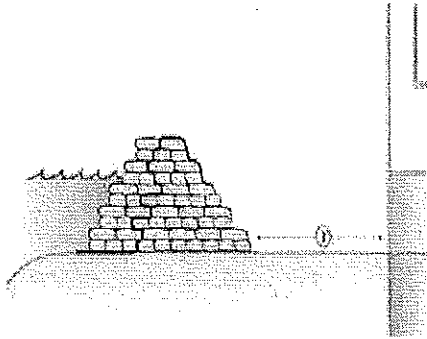
Place the sandbags by laying an equal number of horizontal rows on the bottom as there are vertical layers. It's important to compact each bag in place by walking on it, butting the ends of the sacks together, maintaining a staggered joint placement and folding under loose ends.

## BUILDING A SANDBAG DIKE

- > Construct the sandbag dike on high ground, as close as possible to your home or building. By being closer to your home or building, fewer bags will be needed, and the sandbag dike will be less exposed to the stream.
- > Sandbagging should also focus along existing flood works or any low spots along dikes for maximum protection.

### Location:

- > Base area of dike should be clear of snow and ice.
- > To avoid flood water moving under a dike, do not build a dike on porous land or on a septic field.
- > The dike should be at least eight feet from building foundation. This prevents foundation damage and allows room for people and equipment to move. As well, this space allows more dike base width to be constructed should additional dike height be required.



- To create a more secure dike, when possible, create a trench in the soil that is one sandbag deep by two sandbags wide.

### Construction:

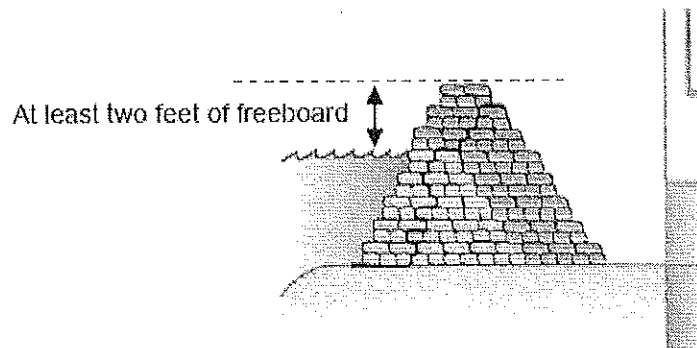
- To be effective, a dike must be three times as wide at its base as it is high

### Dike size:

- **Height:** Sandbag dikes require at least two feet of freeboard. Freeboard is the area of the dike between the highest floodwater level and the top of the dike:

$$\text{predicted floodwater rise above ground level} + \text{two feet of freeboard} = \text{required dike height}$$

For example, if floodwater is predicted to rise four feet above ground level, the required dike height is at least six feet. (4' + 2' of freeboard = 6' high dike)

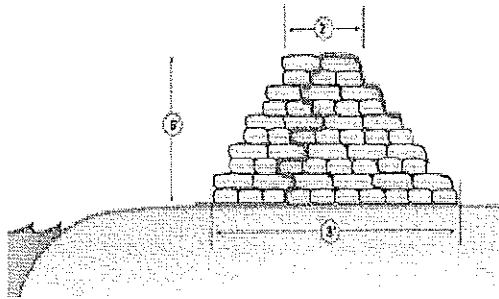


Sandbag dikes will compact when they get wet, which can reduce the available freeboard. The amount of compaction due to wetting increases with the size of the dike. Add at least five per cent to the required height of the dike to account for compaction. For example, add 3 - 4 inches for a six foot dike to account for compaction due to wetting.

- **Width:** The base of a sandbag dike is two feet wider than it's required height:

$$\text{height} + \text{two feet} = \text{width at base}$$

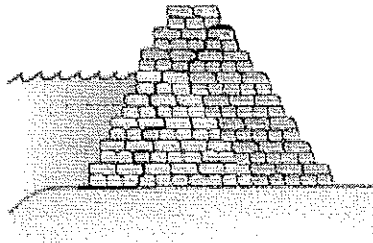
For example, a dike with a required height of six feet would have to be eight feet at its base. (6' + 2' = 8' wide at base)



- Sandbag dikes must be at least two feet wide across the top of dike.
- Due to the high pressure water can exert, consult your local authority for additional advice for dikes higher than six feet.

○ **Polyethylene sheets**

- Proper use and placement of polyethylene sheets is important to reduce the rate of water seeping through the dike. Use six mil polyethylene in three metre wide rolls on the river side of the dike. Have the polyethylene sheet protrude over the ground on the river side of the dike. Be careful not to puncture the polyethylene sheet. (The polyethylene sheet will be weaved between the courses of sandbags.)

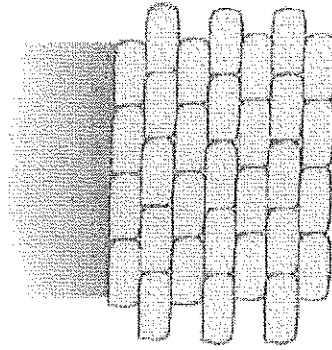


○ **First course/bottom layer:**

- Lay first course/bottom layer of bags parallel to river/water with the closed side of bag against river flow direction.
- The filled portion of the second bag sits over the empty portion of the previously placed bag. This is known as lapping.

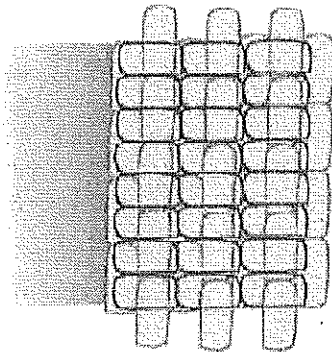


- Drop the bags into place and tamp bags with feet to lodge them into place.
- Offset the bags from the previous row in the same course to form a brick pattern.

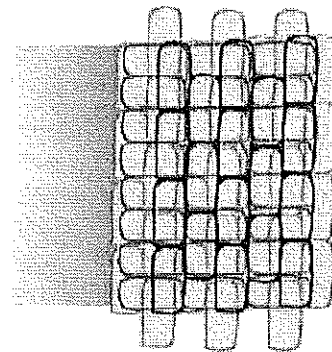


o **Second and remaining courses:**

- Rotate bags 90 degrees when laying second course of sandbags. Keep seal side of bag towards water/river. Ensure sandbags are well packed against each other and firmly in place.



- Change direction of bag from parallel to perpendicular to the river for each course of bags.
- Every second course of sandbags should be set back a quarter (1/4) of a sandbag width, both on the river side and the land side of the dike, producing a step-like appearance.



- Weave the polyethylene sheet between the courses of sandbags as to have at least two layers of sandbags protecting the polyethylene sheet from debris punctures. Maximum depth of the polyethylene sheet should be 3 sandbags or a quarter (1/4) of the cross section of the dike, whichever is less.
- If more height of polyethylene sheet is required, make polyethylene sheets overlap at least two feet.

- No matter how well you build a dike, extreme water pressure may cause water to seep through the dike or bubble up through the ground. It is advisable to have pumps with sufficient fuel and oil readily available to last the duration of the flood event and an escape plan.

#### SANDBAG DIKE REMOVAL

- Sandbags should be removed with the same precautions as they were laid.
- Sand from sandbags should not be used for children's sand boxes or play areas, but could be used for landscaping purposes.