FLOOD FIGHTING EQUIPMENT

Curtis Miller
Hydraulic Engineer
USACE, Omaha District
12 & 14 March 2019

“The views, opinions and findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation.”

US Army Corps of Engineers
U.S. Army
FLOOD FIGHTING – WHAT IS THE NEED AND WHAT ARE MY OPTIONS?

**Need**
- Sand Boils/Seepage
- Closure Structures
- Drainage Structures
- Levee Raise
- New levee segment
- Erosion

**Options**
- Sandbags
- Seepage Berm
- Earthen levees
- Innovative flood fight products
  - HESCO Bastions
  - RDFW
  - Portadam
  - Others
- Riprap (rock)

**Things to consider:**
- How much lead time?
- Placement location?
- Available resources?
TIME AND PLACE

Earthen Levee
HESCO Bastions
Sandbags
Earthen Levee
Earthen Levee
SANDBAGS
USACE Recommendations

- 1V:2.5H (1 foot high for 2.5 foot width)
- 5 foot max (3 foot or less preferred)
- Typically used for low/short barrier, transitions, constricted areas, directing flows, closures, around sand boils, and to weigh down plastic.

A typical sandbag is 14 inches wide and 26 inches long.

- Polypropylene (most common)
- Burlap
- Filled 1/2 to 2/3 with sand.
SANDBAG FLOOD STRUCTURE

- WIDTH = 3 times HEIGHT
- Bonding Trench 1 sandbag deep x 2 sandbags wide
- Strip sod before laying bottom layer, if possible

**Direction of Flow**

**Correct**
- 1/2 to 2/3 FULL
- WEIGHT 35-40 LBS.

**Both Incorrect**
- TOO FULL
- WEIGHT 70-75 LBS.
- TIED TOO LOW
- 1/2 FULL
SANDBAG FLOOD STRUCTURE
SANDBAG FLOOD STRUCTURE

- Very labor intensive
- Filled sandbags must be kept from freezing prior to placement
- Store preferably inside and away from critters.
SANDBAG FLOOD STRUCTURE
USACE SANDBAG FILLING MACHINE

- New sandbag filling machine
  - Production: 20 sandbags per minute (1200-1500 bags per hour minimum)
  - Functions in all weather conditions
  - Custom built by Express Scale in Lenexa, KS

- Applicant provides sand, diesel fuel, sandbags, and personnel/equipment to fill hopper and sandbags
  - Sandbags may also be requested from USACE through State

- USACE provides two machine operators and transport
TREATING ISOLATED BOILS

- **Do NOT** ring a sand boil if its not moving material (i.e. water is clear)
- **Do NOT** stop the water flow, it can cause the seepage path/boil to move.
- **Do NOT** place sandbags directly on top of sand boils.
- Height of ring levee should be only sufficient enough to create enough head to reduce flow through the boil so that no more material is displaced and the boil runs clear.

![Lacking overflow section.](image1.png)
![Height is too high.](image2.png)
TREATING ISOLATED BOILS
TREATING ISOLATED BOILS
TREATING MULTIPLE BOILS
SANDBAG FLOOD STRUCTURE
EARTHEN LEVEES

Why Plastic?

Notice anything?
TYPICAL SECTION - EARTHEN LEVEE
NO SCALE
EARTHEN LEVEES
EARTHEN LEVEES – RIPRAP PROTECTION
EARTHEN LEVEES – RIPRAP PROTECTION
HESCO BASTION STRUCTURE

PORTADAM STRUCTURE

www.portadam.com
TRAPBAG STRUCTURE

www.trapbag.com
http://defencell.com/environmental_home.html
COMBINATIONS / TRANSITIONS

RDFW to Earthen Levee
RDFW & Sandbags
HESCO, RDFW & Sandbags
Sandbags to Earthen Levee

Transition Concerns?
PL 84-99 – THE USACE EMERGENCY MANAGEMENT AUTHORITY
FLOOD FIGHT SUPPLIES

Equipment & Supplies
• Sandbags, Pumps, Poly, & Innovative Flood Fight Products

• Supplemental to state, tribal, and local efforts
• State sends request for supplies
• Reimbursement of materials used
• Locals responsible for providing sand, pump power supply (tractor), O&M, & manpower
• Sign equipment loan agreement

Omaha District
• 5.13 million Sandbags throughout the District
• 2,690 Super Sandbags
• 1,350 LF of Portadam
• 16,020 LF of HESCO Bastion
• 2,153 Rolls of Poly
• 4 Sandbag filling machines
• 28 Pumps (22 Trailer-mounted PTO-driven pumps (10”-16”) and 6 Gas Operated Trash Pumps (2”-6”))
  • 10 in Omaha
  • 3 each at Garrison and Fort Randall
  • 4 each at Fort Peck and Gavins Point
  • 2 each at Oahe and Big Bend

• Additional quantities available from the National Flood Fight Material Center in Rock Island (MVR)

*Additional quantities available from the National Flood Fight Material Center in Rock Island (MVR)*
QUESTIONS?