Flood Fighting Structures Demonstration And Evaluation Program (FFSD)

Tri-Service Infrastructure Systems Conference
August 3, 2005

US Army Corps of Engineers

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Coastal and Hydraulics Laboratory
Geotechnical and Structures Laboratory

Flood Fighting Structures Demonstration And Evaluation Program (FFSD)

1. Background
2. Product Selections
3. Laboratory Testing
4. Field Testing
5. Product Summaries
6. Remaining Work

Flood Fighting Structures Demonstration And Evaluation Program (FFSD)

Authorization

2004 Energy and Water Development Bill

"The conferees therefore direct the Corps of Engineers to act immediately to devise real world testing procedures for Rapid Deployment Flood Wall (RDFW) and other promising alternative flood fighting technologies."

Product Selections

Congressional Directive

Rapid Deployment Flood Wall (RDFW)

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Product Selections

Standard for Comparison
Sandbags

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Product Selections

1. Develop Evaluation / Selection Criteria
2. Issue Solicitation for Technical Proposals
   - 9 Proposals Received
   - Categories - Product Type

   Impermeable Liner (with or without frame)

   Granular Filled Container

   Water Filled Bladder
3. Evaluate Proposals and Make Selections Based on Technical Merit

Product Selections

Competitive Technical Proposals

Portadam

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Product Selections

Competitive Technical Proposals

Hesco Bastion

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Evaluation Parameters

1. Product Requirements

- Footprint and ROW requirements
- Durability
- Ease of Construction and Removal
  - Time / Manpower/ Equipment
- Adaptability to Varying Terrain
- Seepage
- Fill Requirements
- Cost
- Repair and Reusability
- Ability to Raise During Flood

2. Tests

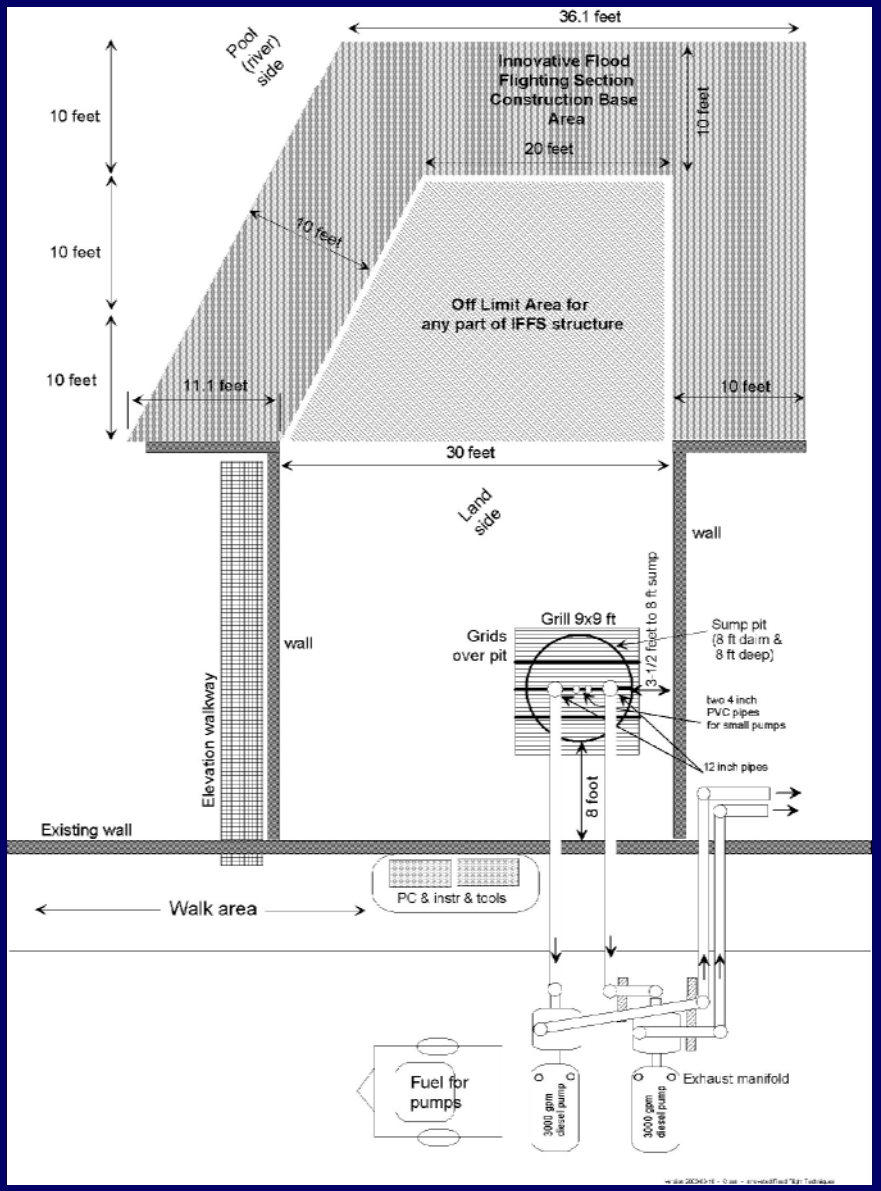
- Static Loading
- Overtopping
- Wave Impact
- Debris Impact

3. Performance on Various Surfaces

- Freshly Graded
- Grass / Weeds
- Finished Concrete

Laboratory Testing

Construction Footprint



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Laboratory Testing

Sandbag Structure

RDFW

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Laboratory Testing

Debris Impact

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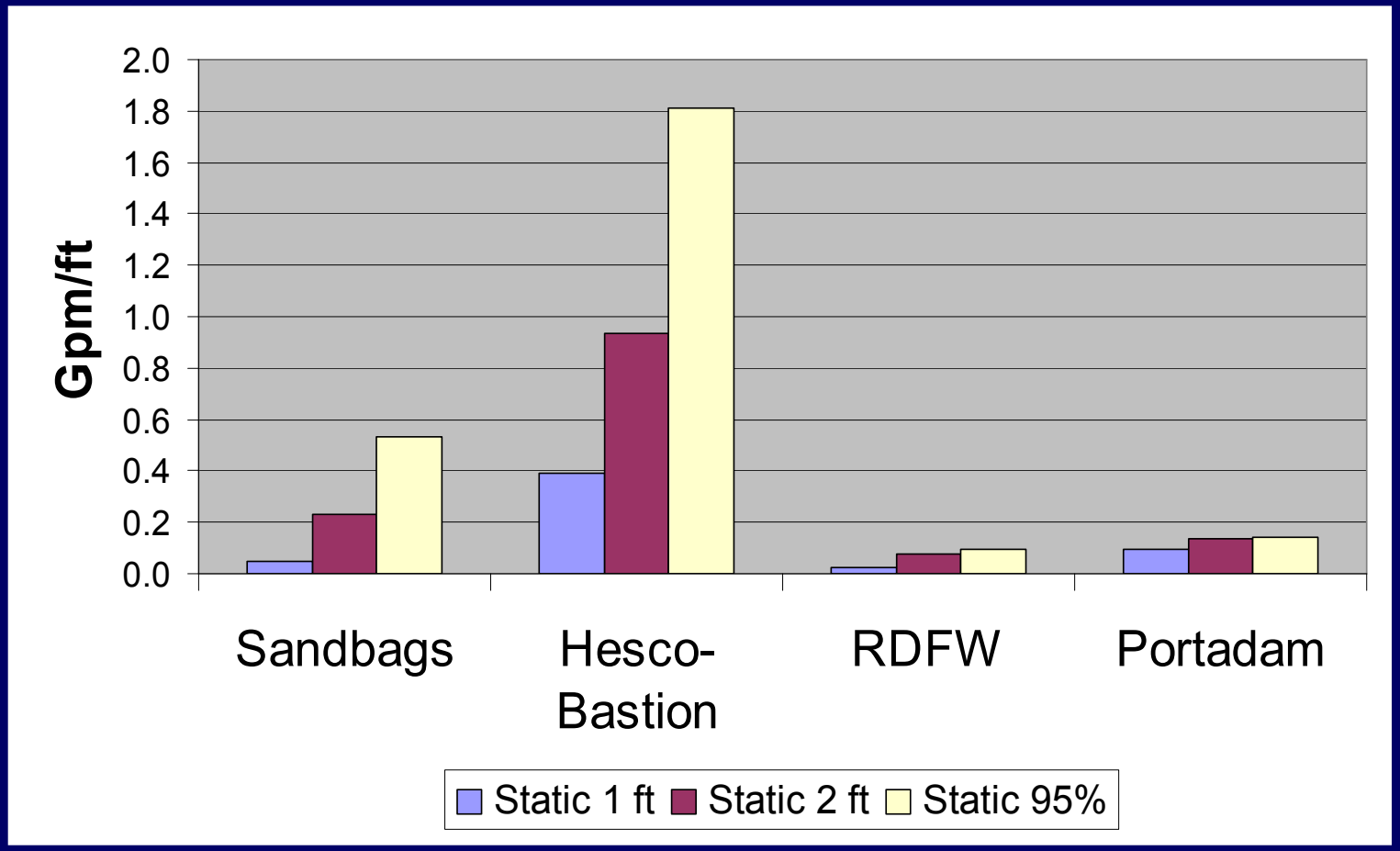
Laboratory Results

Structure	Construction Effort (man hours)	Removal Effort (man hours)
Portadam	24.4	4.4
Hesco	20.8	13.4
Sandbags	205.1	9.0
RDFW	32.8	42.0

Laboratory Results

Seepage



Laboratory Results - Damage

Sandbag Structure

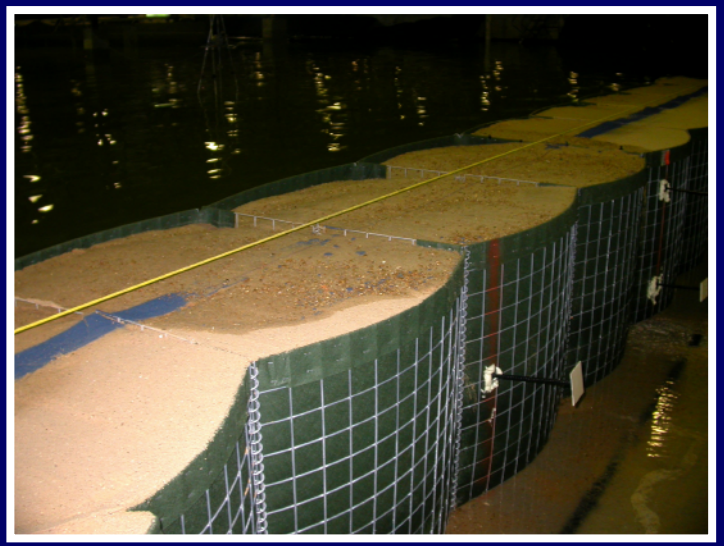
Repeatedly damaged by waves

Failed during overtopping

Hesco-Bastion

Minor sand settling and washout

Wire bent during debris impact tests



Laboratory Results - Damage

RDFW

Minor sand settling

Significant washout along edges and toe

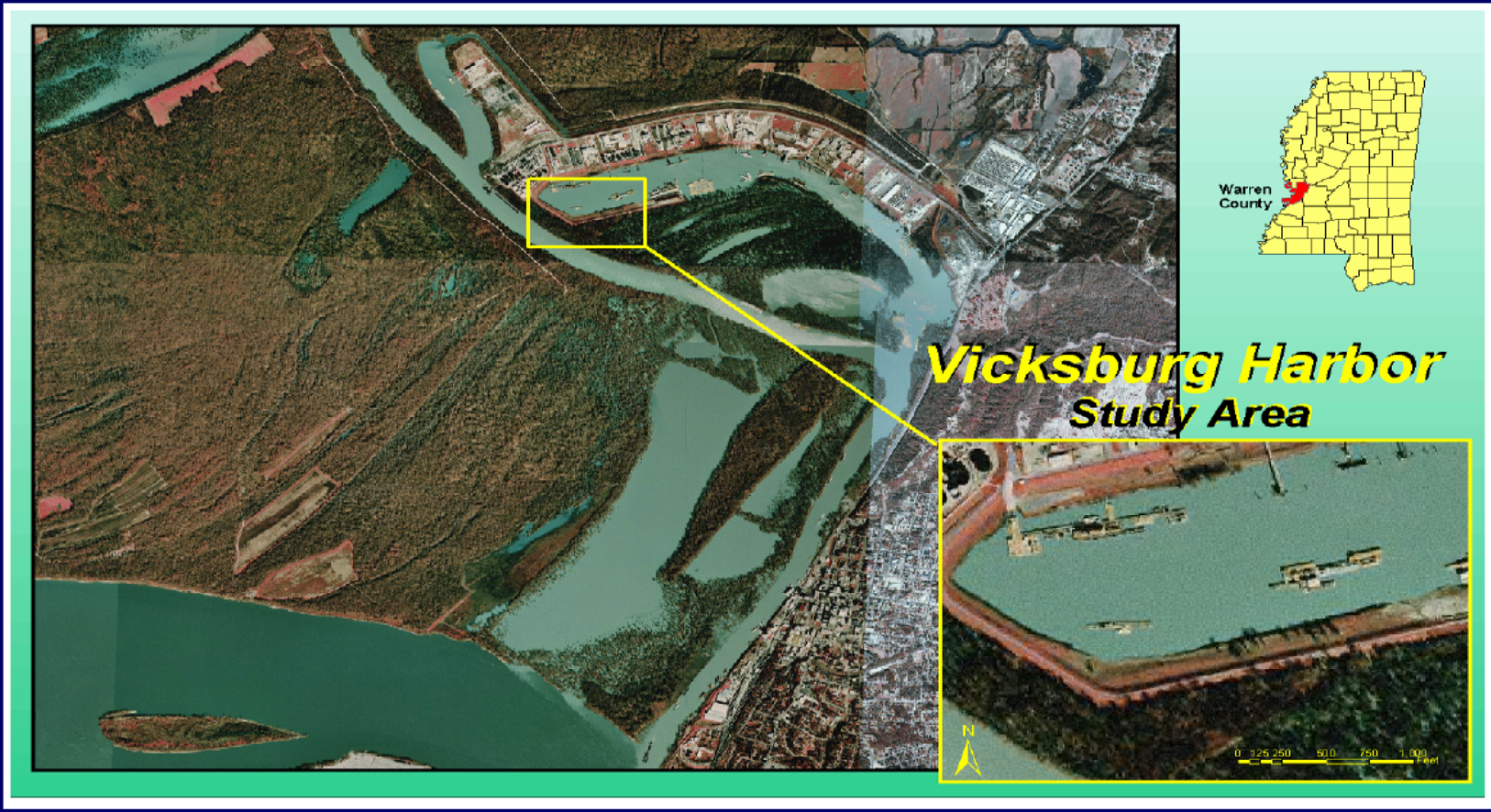
Toe damaged during large waves or overtopping

10% of structure broken

Portadam

Liner torn during debris impact test

Field Testing
Site Selection



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Field Testing
As Constructed

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Portadam – As Delivered

Portadam Structure

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Hesco Bastion – As Delivered

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Hesco Bastion Structure

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Hesco Bastion
Installation Modification

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Sandbag Structure

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RDFW – As Delivered

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RDFW Structure

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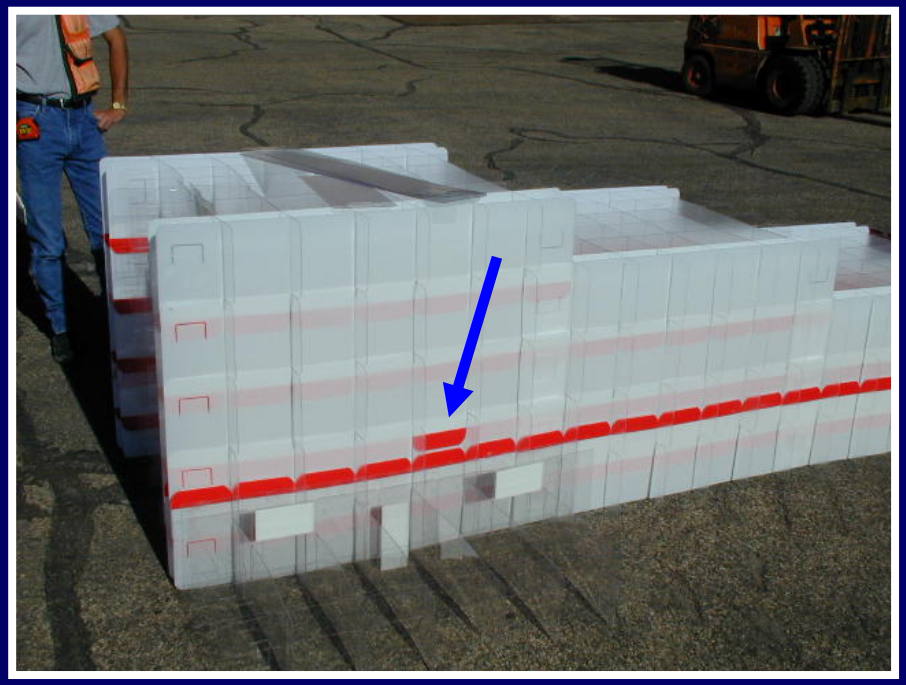
RDFW

Post Testing Modifications



- Color Coded for Accurate Installation
- Rounded Corners
- Suction Trailer Available to Expedite Removal

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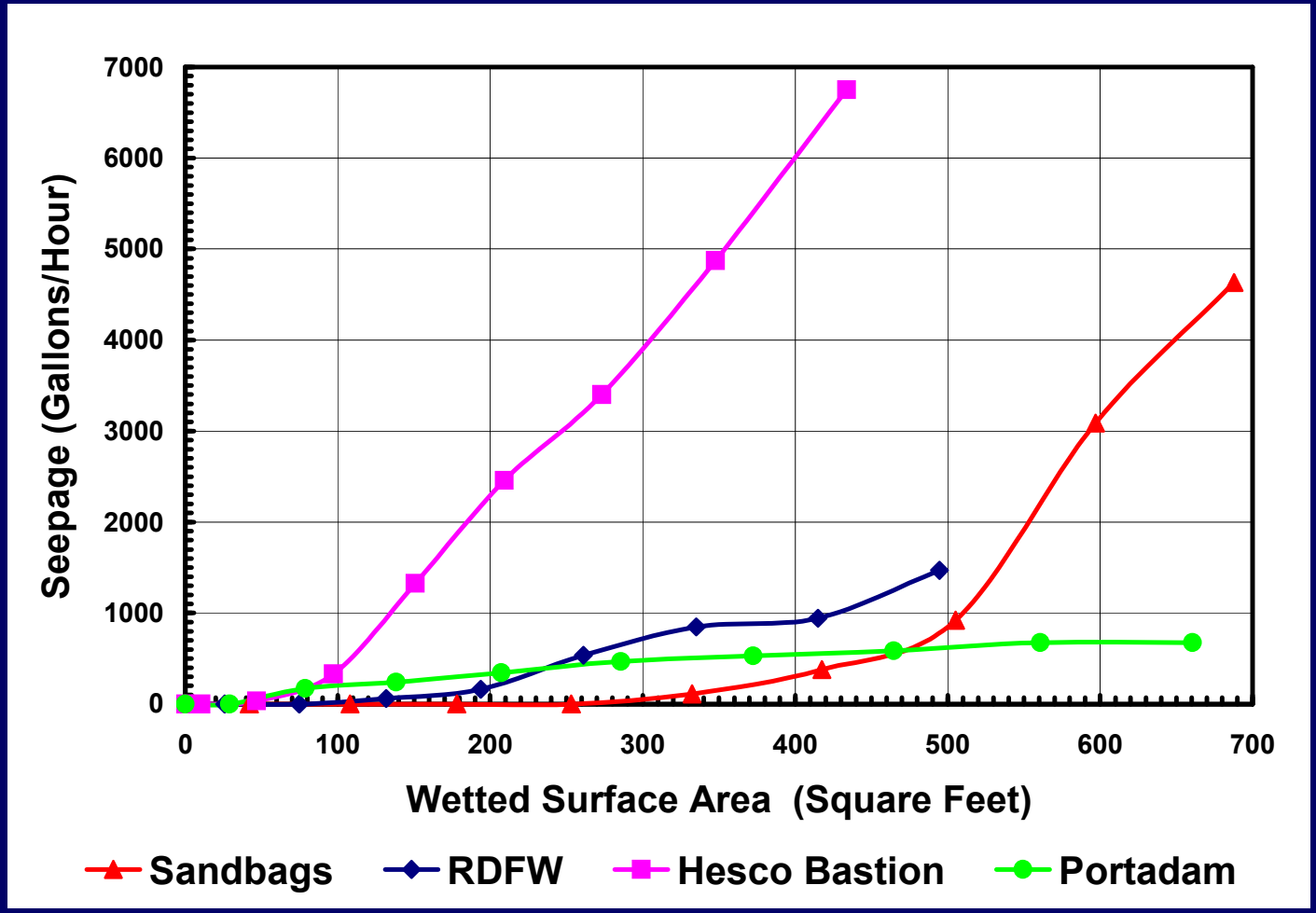
Field Testing
Construction and Removal

Structure	Construction Time (hours)	Construction Effort (man hours)	Removal Time (hours)	Removal Effort (man hours)
Portadam	5.1	26.2	2.9	12.6
Hesco Bastion	8.9	57.5	8.7	36.3
Sandbags	30.5	453.1	2.6	3.5
RDFW	7.5	48.4	17.3	113.4

Field Testing

Seepage



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Field Testing - Damage

Portadam

None - 100% reusable

Hesco Bastion

Bent some panels and coils
Over 95% reusable

Sandbags

Bags began to deteriorate
All sandbags disposed

RDFW

Broke some unit pieces
95% of pieces reusable

Portadam Summary

Strengths

Ease of Construction / Removal
(time, manpower, equipment)

Low seepage rates

No fill required

High degree of reusability

Least ROW required

Weaknesses

Punctured during debris impact test

Can't be raised in typical application

Hesco Bastion Summary

Strengths

Ease of Construction / Removal

(time & manpower)

Low cost

High degree of reusability

Can be raised

Weaknesses

Significant ROW required due to granular fill

Highest seepage rates

Sandbag Summary

Strengths

Low Cost (volunteer / prison labor)

Conforms well to varying terrain

Low seepage rates

Can be raised

Weaknesses

Very labor intensive

Not reusable

RDFW Summary

Strengths

Ease of Construction (time & manpower)

Low seepage rates

High degree of reusability

Can be raised

Most height flexibility (8 inch units)

Weaknesses

Significant ROW required due to granular fill

High cost

Difficult to remove

Remaining Work

1. Place testing data and results on publicly accessible web page.

2. Conduct pilot tests at 3 locations around the country.
   - Philadelphia / Baltimore Districts
   - Omaha District
   - Sacramento District

3. Use purchased products in actual flood events.

Pilot Testing
Omaha District - Missouri River

As Installed

July 2005

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Use During Actual Flood
Iron County, Utah

Installation
May 2005

Removal
July 2005

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Contact Information

Fred Pinkard

(601) 634-3086

U.S. Army Corps of Engineers
Engineering Research and Development Center
Coastal and Hydraulics Lab
Vicksburg, MS

Fred.Pinkard@erdc.usace.army.mil