Flood Fighting Structures Demonstration and Evaluation Program (FFSD)

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Infrastructure Conference

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Flood Fighting Structures Demonstration and Evaluation Program (FFSD)

1. Background
2. Product Selections
3. Laboratory Testing
4. Field Testing
5. Product Summaries
Not a New Problem
Lake Chicot Sand Boil (1973)
Background
Background
“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.”
FFSD Study Team Leaders

Laboratory Testing
Dr. Johannes Wibowoo (GSL)
Perry A. (Pat) Taylor (GSL)
Dr. Donald Ward (CHL)

Field Testing
George Sills (GSL)
Fred Pinkard (CHL)
Product Selections

1. Congressional Directive – Rapid Deployment Flood Wall (RDFW)

2. Standard for Comparison - Sandbags
Product Selections

1. Develop Evaluation/Selection Criteria

2. Issue Solicitation for Technical Proposal
   - 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

Hesco Bastion

US Army Corps of Engineers
ERDC
Coastal and Hydraulics Laboratory
Geotechnical and Structures Laboratory
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
Laboratory Testing

Sandbag Structure

RDFW

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Laboratory Testing
Debris Impact
<table>
<thead>
<tr>
<th>Structure</th>
<th>Construction Effort (man hours)</th>
<th>Removal Effort (man hours)</th>
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</thead>
<tbody>
<tr>
<td>Portadam</td>
<td>24.4</td>
<td>4.4</td>
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<tr>
<td>Hesco</td>
<td>20.8</td>
<td>13.4</td>
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<tr>
<td>Sandbags</td>
<td>205.1</td>
<td>9.0</td>
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<tr>
<td>RDFW</td>
<td>32.8</td>
<td>42.0</td>
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</table>
Laboratory Results

Seepage

![Graph showing seepage rates for Sandbags, Hesco-Bastion, RDFW, and Portadam. The x-axis represents different materials, and the y-axis represents Gpm/ft. The graph includes bars for Static 1 ft, Static 2 ft, and Static 95%.](image-url)
Field Testing
Site Selection

Vicksburg Harbor Study Area
Portadam Structure
Hesco Bastion Structure

Testing

Construction

Removal

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Geotechnical and Structures Laboratory
Hesco Bastion
Installation Modification
Sandbag Structure

Construction

Testing

Removal

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Coastal and Hydraulics Laboratory
Geotechnical and Structures Laboratory
RDFW Structure

Construction

Testing

Removal

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Coastal and Hydraulics Laboratory
Geotechnical and Structures Laboratory
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

<table>
<thead>
<tr>
<th>Structure</th>
<th>Construction Time (hours)</th>
<th>Construction Effort (man hours)</th>
<th>Removal Time (hours)</th>
<th>Removal Effort (man hours)</th>
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<tbody>
<tr>
<td>Portadam</td>
<td>5.1</td>
<td>26.2</td>
<td>2.9</td>
<td>12.6</td>
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<tr>
<td>Hesco Bastion</td>
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<td>57.5</td>
<td>8.7</td>
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<tr>
<td>Sandbags</td>
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<td>2.6</td>
<td>3.5</td>
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<td>RDFW</td>
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<td>48.4</td>
<td>17.3</td>
<td>113.4</td>
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</table>
Field Testing
Seepage

![Graph showing seepage versus wetted surface area for different materials like Sandbags, RDFW, Hesco Bastion, and Portadam.](image)
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

- 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 (8 inch units)

Weaknesses

- Significant ROW required due to granular fill
- High cost
- Most 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.