



ERDC



Engineer Research and Development Center

Force Protection Research

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Topics of Discussion

- **Background**
 - About ERDC
- **Force Protection Research**
 - **Warfighter Protection**
 - **Modular Protection Systems**
 - **Overhead Cover and Compartmentalization**
 - **Joint Forward Operation Base/Joint Contingency Operations Base Handbooks**
 - **Protection of Homeland**
 - **Terrorist Threat Protection**
 - **Critical Infrastructure Blast Protection**
 - **Tunnel Detection**
- **Questions**





Background

About ERDC



Engineer Research and Development Center

www.erdcmil

Engineer Research and Development Center (ERDC)

2500 Employees

Research Laboratories
of the
Corps of Engineers



- ★ Laboratories
- Field Offices

Cold Regions Research
Engineering Laboratory

Construction Engineering
Research Laboratory

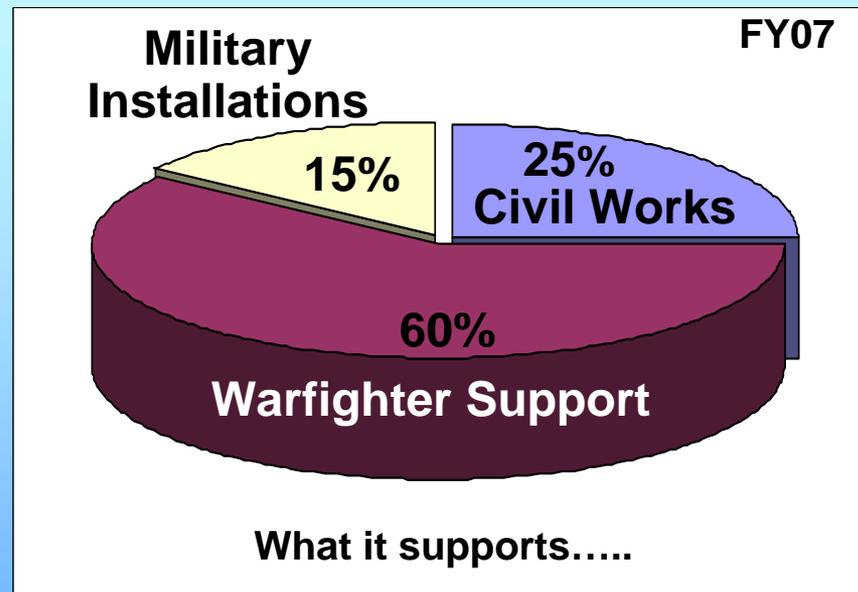
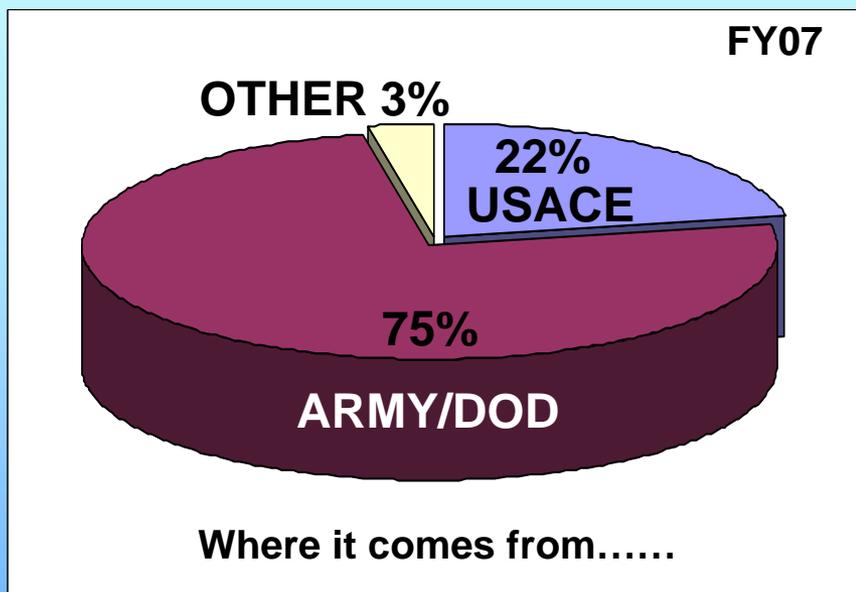
Topographic
Engineering Center

★ Headquarters

Coastal & Hydraulics Laboratory
Environmental Laboratory
Geotechnical & Structures Laboratory
Information Technology Laboratory



ERDC FY07 Funding



Funding Exceeded \$1 Billion for the First Time!



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Unique Facilities



DoD Supercomputer Center
One of Four in DoD



1.5 Acres of Classified Facilities at Level Above Top Secret



Ice Engineering Facilities



Hazardous & Toxic Waste Center



Large-Scale Blast Facilities



Large Hydraulic Model Facilities



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Warfighter Protection

Modular Protection Systems

Overhead Cover and Compartmentalization

**Joint Forward Operation Base / Joint Contingency
Operations Base Handbooks**



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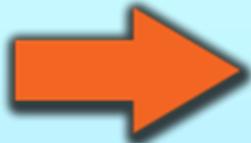
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Modular Protective System



Threats



ERDC developed lightweight, high-strength concrete armor panels with ballistic performance of ceramic armors but at 1/5th cost



Armor-Piercing RPG

Validated by live-fire tests



Setup by troops with no specialized equipment



Modular Protective System

Rapid Equipping Force transitioning to theater



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Modular Protective System MPS

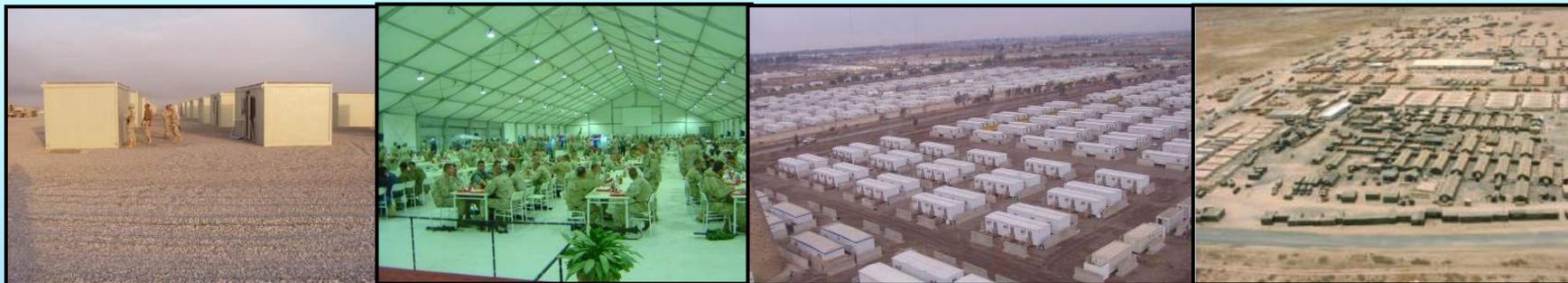


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Soldiers Vulnerable to Rocket/Mortar Attacks



Many Live in Trailer Parks and Tent Cities



ERDC Developed and Validated Protection Technologies

\$700M in Supplemental Implemented Technology since FY05



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Masonry Building Protection



Effect of Vehicle-Borne Explosive Device

ERDC elastomeric retrofit increases masonry building resistance to explosions by a factor of 15



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JFOB and JCOB Handbooks



18,500 Copies Distributed

19,500 Copies Distributed

Joint Forward Operations Base Handbook (JFOB Handbook)

The Joint Forward Operations Base Handbook contributes to implementing tactics, techniques, and procedures and best practices suited to counter the rocket, artillery, mortar, and improvised explosive device threats to JFOB in Iraq.

The objective is to reduce the casualty rate during combat operations...

FOR OFFICIAL USE ONLY

FORWARD OPERATIONS BASE (JFOB) FORCE PROTECTION HANDBOOK

SECOND PRINTING
DECEMBER 2006

FOR OFFICIAL USE ONLY

Providing a quick-reference guide for a systematic approach to planning, developing, and improving JFOB defensive capabilities...

J3, DDA/T HD

Joint Contingency Operations Base Handbook (JCOB)

The JCOB Handbook provides force protection equipment and material solutions for contingency operations bases.

It is intended to complement the JFOB Handbook of tactics, techniques and procedures (TTPs), providing planners with baseline equipment and material.

The JCOB Handbook is a resource document that provides expeditionary force planners with information for more efficient use of materiel and better protective measures.

The JCOB Handbook adds force protection equipment, materiel solutions, and TTPs to existing bare base designs that often assumed little or no opposition.

Forward operating bases are often tent cities that do not include force protection equipment and materiel in the initial establishment leaving them vulnerable to unconventional attacks.

Rapidly responding to contingency operations in any part of the world

J3, DDA/T HD



Protection of Homeland

Terrorist Threat Protection

Critical Infrastructure Blast Protection

Tunnel Detection



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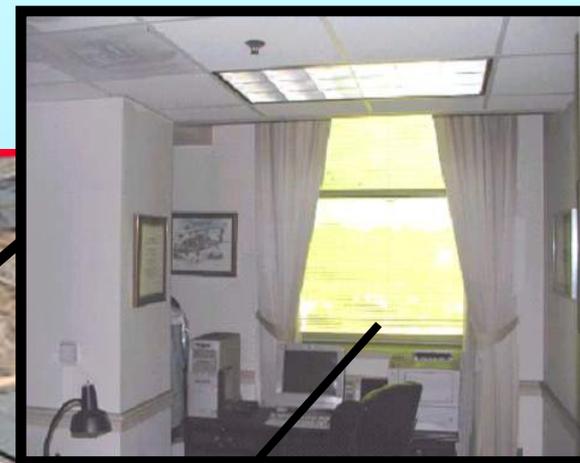
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Terrorist Threat Protection Pentagon Interior Damage



**Without ERDC
Technology
300 Feet North
of Impact**



**With ERDC
Technology
50 Feet North
of Impact**



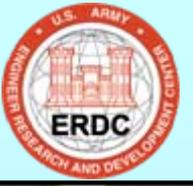
Typical Third Floor Views



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Terrorist Threat Protection - Blasts

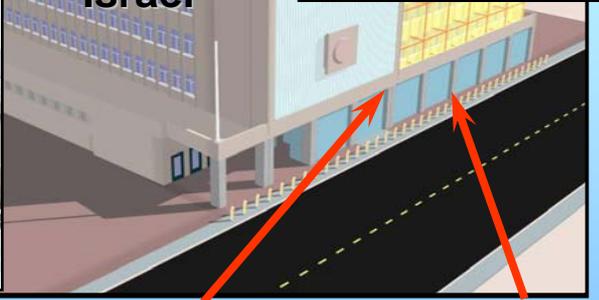


Government Building Retrofits



U.S. Embassies

U.S. Embassy Tel Aviv, Israel



RETROFITS:

Blast Resistant
Wall

Column
Wrap



Tunnels, Subway & Train Stations

Homeland Security Subway Bombings London, Madrid & Mumbai



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Terrorist Threat Protection – Embankment Dams

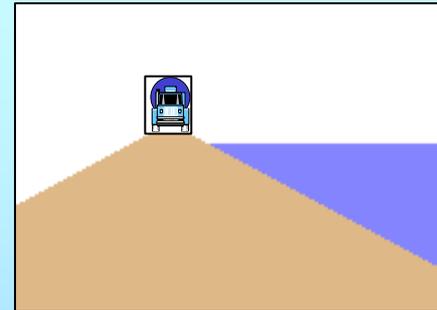


Research Approach

- Explosive testing and numerical simulations to determine vulnerability of embankment dams
- Scaled-model centrifuge experiments
- Develop design/construction mitigation systems

Products/Benefits

- Vulnerability of embankment dams quantified
- Mitigation measures
- Reduced risks to catastrophic failure

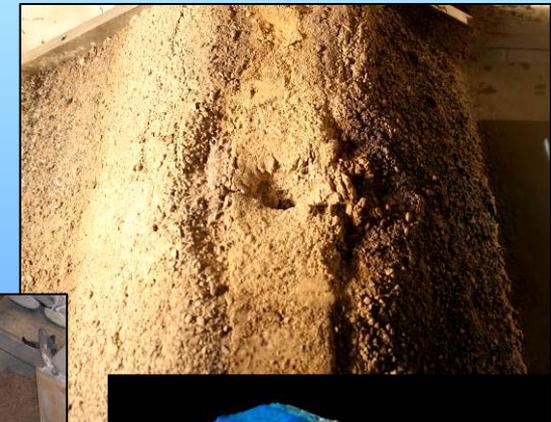


Truck Bomb Threat

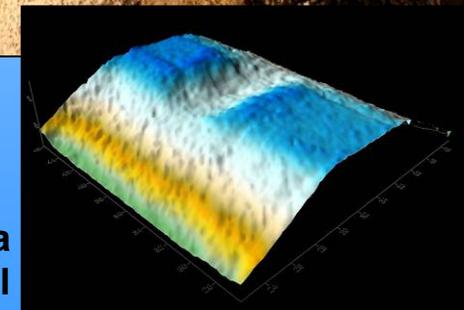


US Army Centrifuge

Earthen Embankment Model and Result of Simulation of 20-ton Truck Bomb Blast



Laser Image of Crater in a Rockfill Dam Model





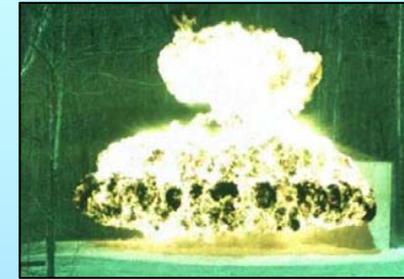
Terrorist Threat Protection - Bridges



Retrofits



Golden Gate Bridge



Threats

Brooklyn Bridge

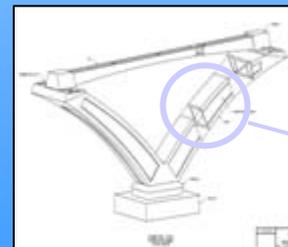
Cable Stayed Bridges



New



Cooper River Bridge, Charleston, SC



Woodrow Wilson Bridge



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Global Tunnel Detection Efforts



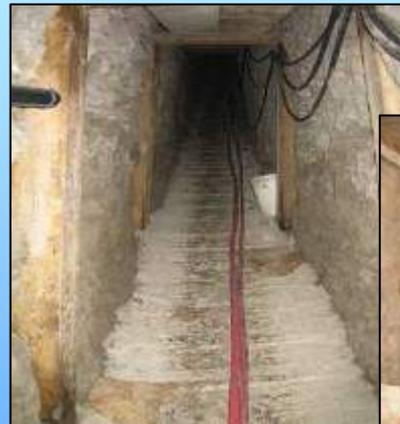
- Provide validated tunnel detection capability for USG assets globally
 - Indicators and warning capabilities
 - Confirmation/denial & localization capabilities
- Identify and perform R&D for leap-ahead capabilities for Future Force



Iraq



Israel/Egypt



Mexican & Canadian Borders
35 (1995 – 2005)
>40 (2006 to date)



Israel/Egypt

CENTCOM/EUCOM/PACOM:

- Small cross sections
- Shallow depth
- Hand-dug with small metallic items
- Unimproved (no wiring, water pumps, or HVAC)

NORTHCOM/EUCOM/CENTCOM/PACOM

- Intermediate cross sections
- Shallow to deep depths
- Dug with mechanized drills (pneumatic jackhammers)
- Improved (power conduits, water pumps, forced-air systems)



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2007

**ARMY RESEARCH
LABORATORY OF THE YEAR**



91,92,96,97,98,99,02,05,07