

Joint Rapid Airfield Construction (JRAC)



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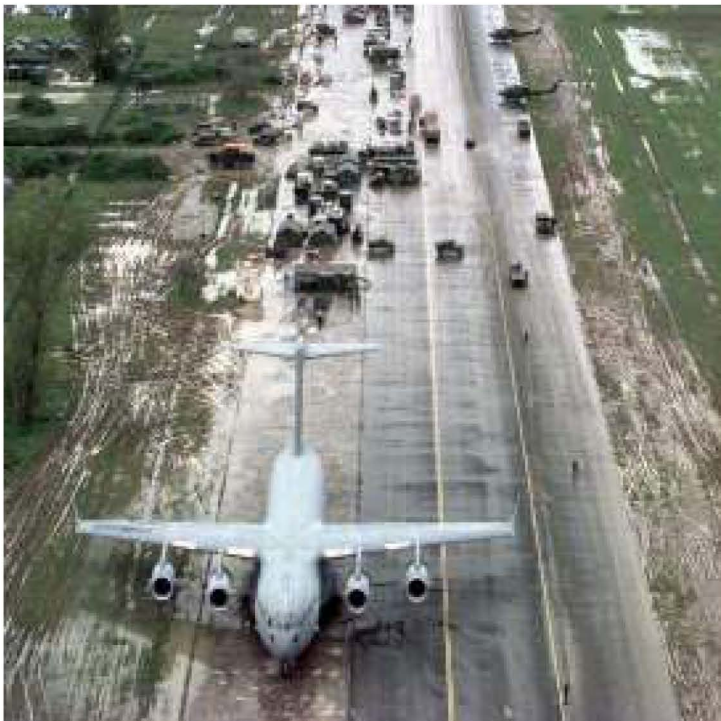


Program Objective

The Joint Rapid Airfield Construction program will develop materials and techniques for rapidly upgrading existing or constructing new contingency airfields in-theater with a low logistical footprint. From the airfield site assessment, site selection, construction, soil stabilization, and even through the repair and maintenance stages, ...

JRAC will transform the U.S. military's approach to rapid contingency airfield engineering.

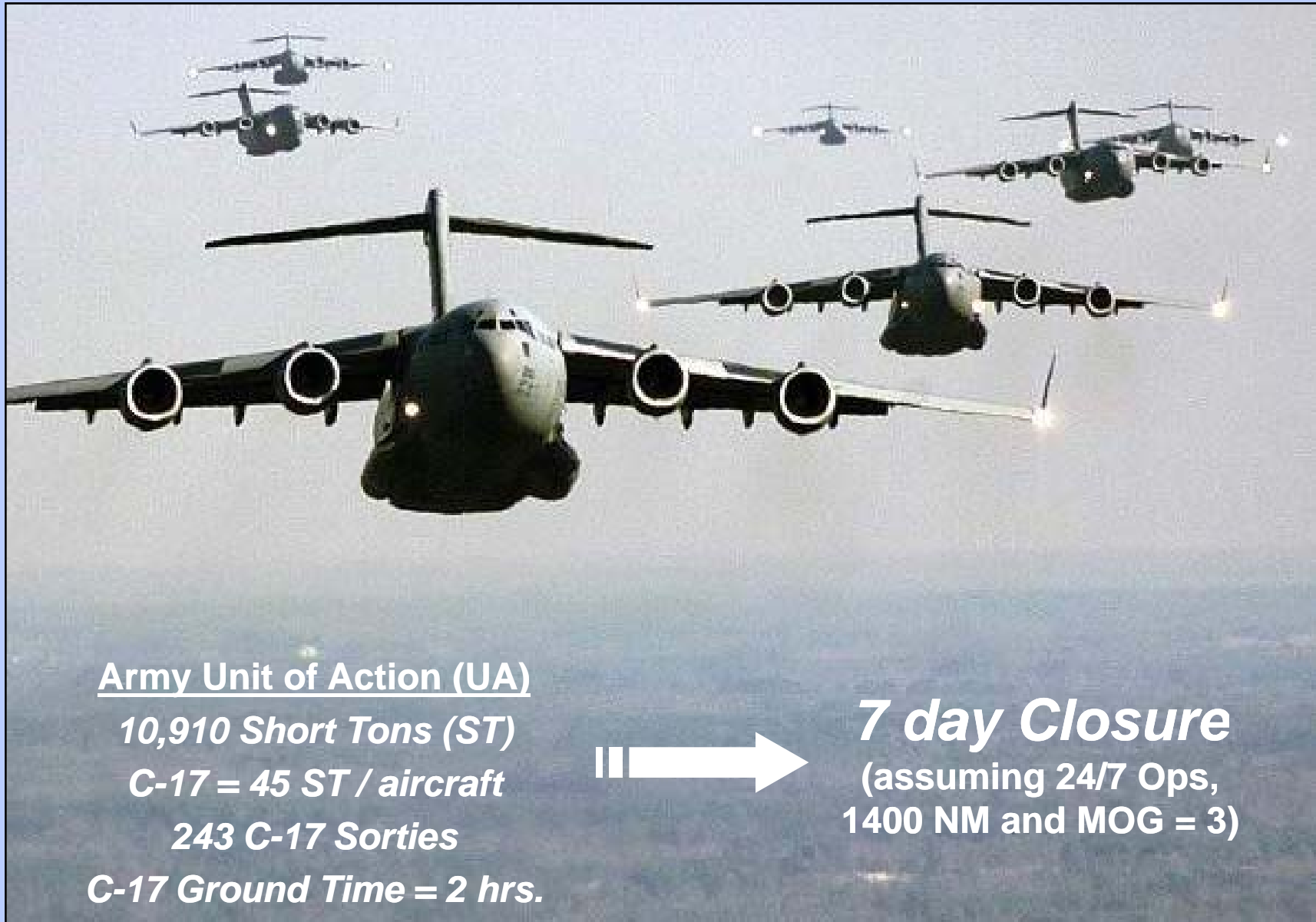
Go Anywhere!



Really Quickly!



The Pattern is Full!



Army Unit of Action (UA)

10,910 Short Tons (ST)

C-17 = 45 ST / aircraft

243 C-17 Sorties

C-17 Ground Time = 2 hrs.



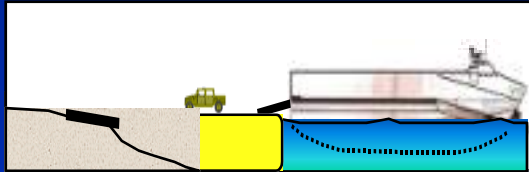
7 day Closure

***(assuming 24/7 Ops,
1400 NM and MOG = 3)***

Enable Theater Access

PROBLEM:
* Lack of Infrastructure
* Anti-access

RPE Rapid Port Enhancement



6.2 STO

RPE Objectives -

- Maximize TSV Utility
- Increase number of Potential Port Sites
- Increase number of Lanes Per Site
- Decrease Cube/Weight and Times Per Deployment of Systems

JRAC Joint Rapid Airfield Construction



JRAC Objectives -

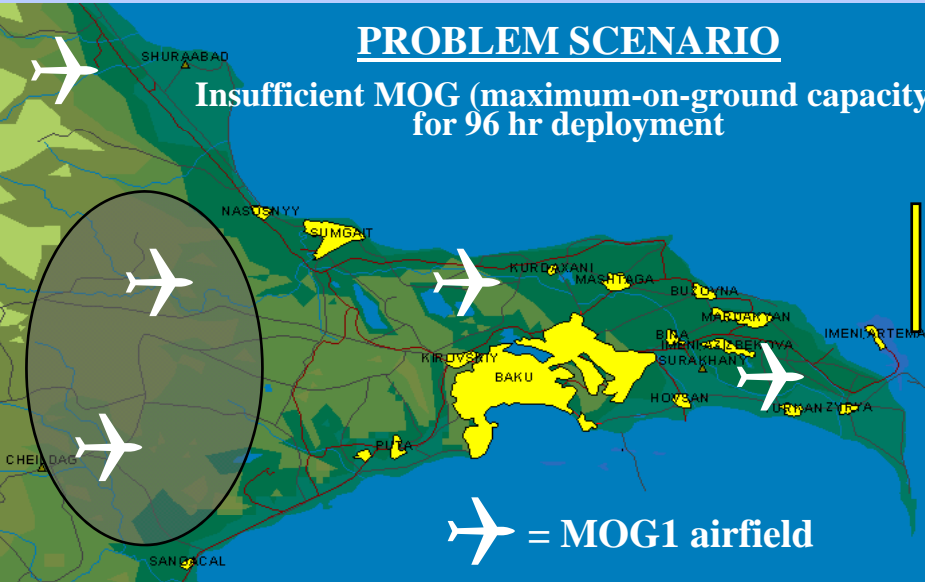
- Increase airfield MOG capacity
- Increase airfield location options
- Decrease engineering timelines and logistical requirements

6.3 STO

A JRAC Scenario

PROBLEM SCENARIO

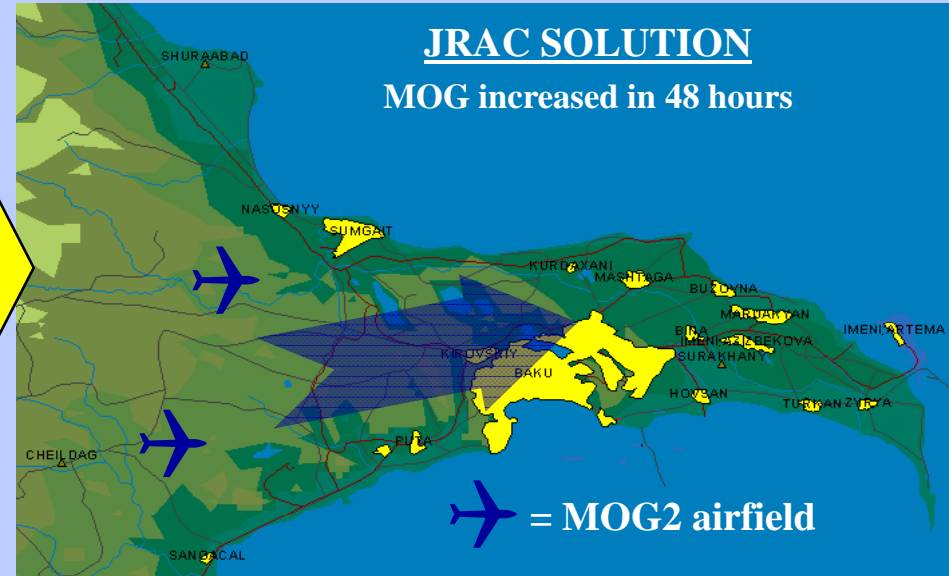
Insufficient MOG (maximum-on-ground capacity) for 96 hr deployment



✈ = MOG1 airfield

JRAC SOLUTION

MOG increased in 48 hours



✈ = MOG2 airfield



Remote / Expedient Site Assessment



Enhanced Construction Technologies



Rapid Stabilization & Lightweight Mats

How does JRAC allow for such a paradigm shift?

JRAC Research Pillars

SITE SELECTION



ENHANCED CONSTRUCTION



**Joint Rapid
Airfield
Construction**

JRAC Statistics

- 28 work units
- Over 30 researchers
- \$23.2M in Army funds
- 6 years in 6.2/6.3 phase



RAPID STABILIZATION

JRAC
increases airfield options,
reduces logistical
requirements, and projects
the force...*Anytime and
Anywhere!*

Site Selection

OBJECTIVE

Provide decision aids to rank and select sites for contingency airfields based on engineering effort, mission suitability, pavement design and construction requirements, and airfield performance under traffic.

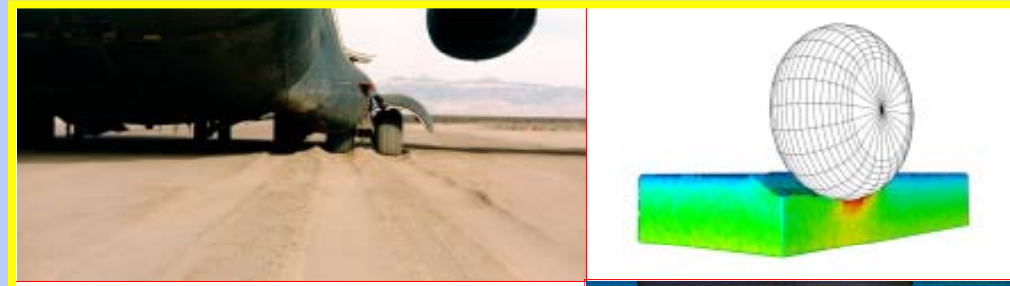
Terrain/Site Data



Material Data

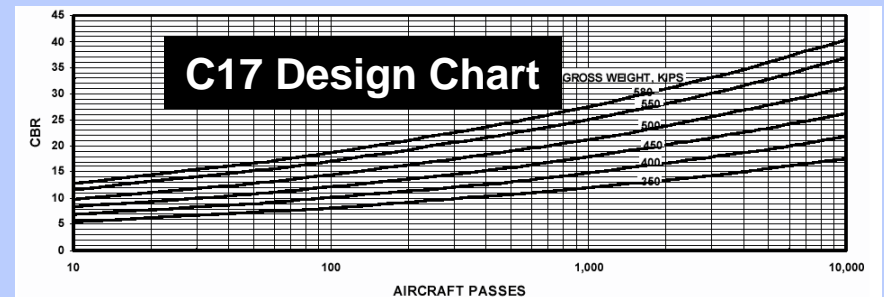


Performance Simulation



Rapid Soil Descriptor Database

USCS Classification		Atterbergs		GSD	Field Properties		
Name	Description	LL (%)	PI (%)	D10 (mm)	w (%)	CBR	γ_d (pcf)
GW	well-graded gravel	8	5	0.4	4	>100	135
SP	poorly-graded sand	8	6	0.25	4	95	105
SM	silty-sand with clay	15	8	0.05	12	85	99
CL	low plasticity grey clay	25	15	0.002	22	89	102
CH	fat black clay	67	42	<0.001	31	78	92



Enhanced Construction Technology

OBJECTIVE

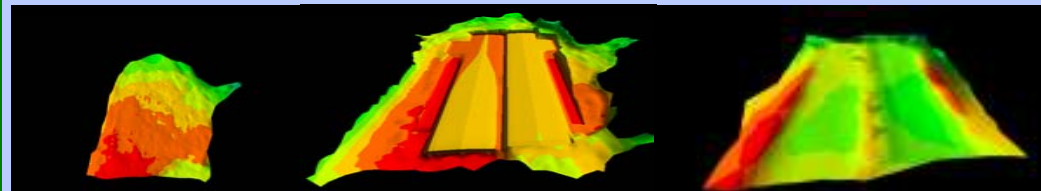
Increase overall design and construction productivity with reduced logistical footprint.

Integrated Design and Construction Planning

Given Terrain

Design Overlay

Construction Monitoring



Expedient Construction



Rapid Repairs



GPS Instrumentation

Rapid Quality Control



Soil Strength



Soil Stiffness



Soil Density

Rapid Stabilization

OBJECTIVE

Reduce time and increase strength/durability for airfield stabilization.

Chemical Additives

Acids

Enzymes

Polymers

Tree Resins

Petroleum Emulsions

Lignosulfonates



Mechanical Stabilization

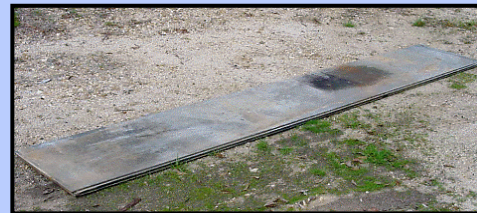
Mat Systems



Geofibers



Geocells



AM-2 Aluminum Mat



DURABASE (Heavy)



Fiberglass (Light)

**Next-Generation
Composite Mats**

FY03 Major Activities

- ☑ Stabilized Soil Test Section
- ☑ Rapid MOG Enhancement Test Sections
- ☑ CRREL Stabilization Test Section
- ☑ Enhanced Equipment Evaluations
- ☑ Evaluation and Development of QC Tools
- ☑ Evaluation of Rapid Assessment Tools

Select FY04 Demo Site



Test Facility at ERDC Vicksburg



**HVS Mark IV in
CRREL Frost Effects Research
Facility**

FY04 Demo

Objective – Construct C-130 “contingency” airfield using realistic scenarios and resources with JRAC technologies. The intent is to partnership with a scheduled exercise. Demo will include:

- Site Selection and Assessment Demo
- C-130 Airfield Construction Demo
- Traffic and Performance Evaluation



- **Technical Issues – Gary Anderton (ERDC)**
- **Operational Issues – Travis Mann (ERDC)**
- Jeff Edmonds (MANSCEN)



Selection of JRAC Demo Site

Selection Criteria

- ***Pre-existing semi-prepared airfield***
- ***Active airfield operations***
- ***Capacity for limited upgrade***
- ***Location with options – multiple airfields***
- ***Active engineering and construction components***
- ***Post-demonstration traffic***

Ft. Bragg, NC
Sicily ALZ
20th Engineer Brigade



Ft. Bragg – Sicily ALZ

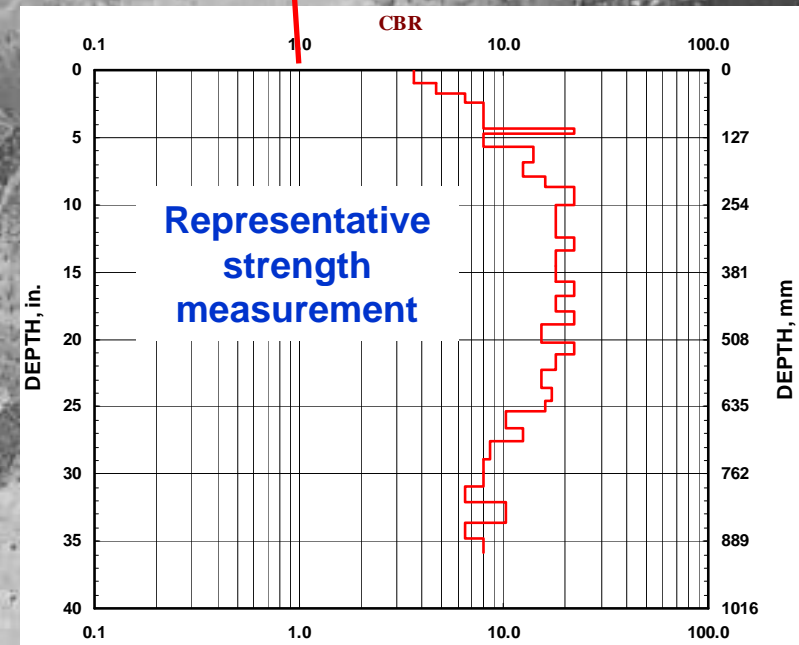
- C130 Capable
- Approximately 3500 feet with parallel taxiway
- Very susceptible to seasonal moisture
- Surface moisture content currently 13-14%
- Structurally adequate
- Maintenance requirements include allowing the surface to dry and then conducting minor grading



Typical example of drainage problems



Rutting caused by ground vehicles





JRAC 04 Demo

“A Joint Exercise”

- *MOG Expansion of Sicily ALZ*
- *Probable additional airfield reconstruction efforts*
- *Possible surfaced airfield repairs at McCall LZ*
- *Host - 20th Engineer Brigade*
- *ERDC coordinates joint force participation*
- *2-4 weeks on site*
- *Each participating agency brings own people, equipment and funding*
- *JRAC Researchers – What are you bringing?*



Way Ahead:

- ✓ Verbal commitment by 25 Aug 03
- Memorandum of Agreement by 30 Sept 03
- ERDC provides site assessment by 31 Dec 03
- ERDC provides demo design by 31 Jan 04
- ERDC provides JRAC training at Ft. Bragg (Demo – 30 days)
- JRAC Demonstration (July – August 04)