Joint Rapid Airfield Construction (JRAC)

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TEC CERL CHL CRREL ITL GSL

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!

JRAC Research Pillars

SITE SELECTION

ENHANCED CONSTRUCTION

Joint Rapid Airfield Construction

JRAC Statistics

- *28 work units*
- *Over 30 researchers*
- *$22.5M in Army funds*
- *6 years in 6.2/6.3 phase*

RAPID STABILIZATION

JRAC technologies will dramatically increase contingency airfield upgrade and construction capabilities!

FY04 Major Activities

- ☑ Rapid Repair Material Evaluations
- ☑ Rapid Assessment Vehicle – Engineer (RAVEN)
- ☑ Selection of Soil Stabilizer/Reclaimer Machine
- ☑ Laboratory Evaluations of Dust Control Technologies
- ☑ Polymer and Fiber Stabilized Soil Test Sections
- ☑ Stabilization of Thawing Soils Test Section
- ☑ **Ft. Bragg – Sicily ALZ Demonstration**

The RAVEN

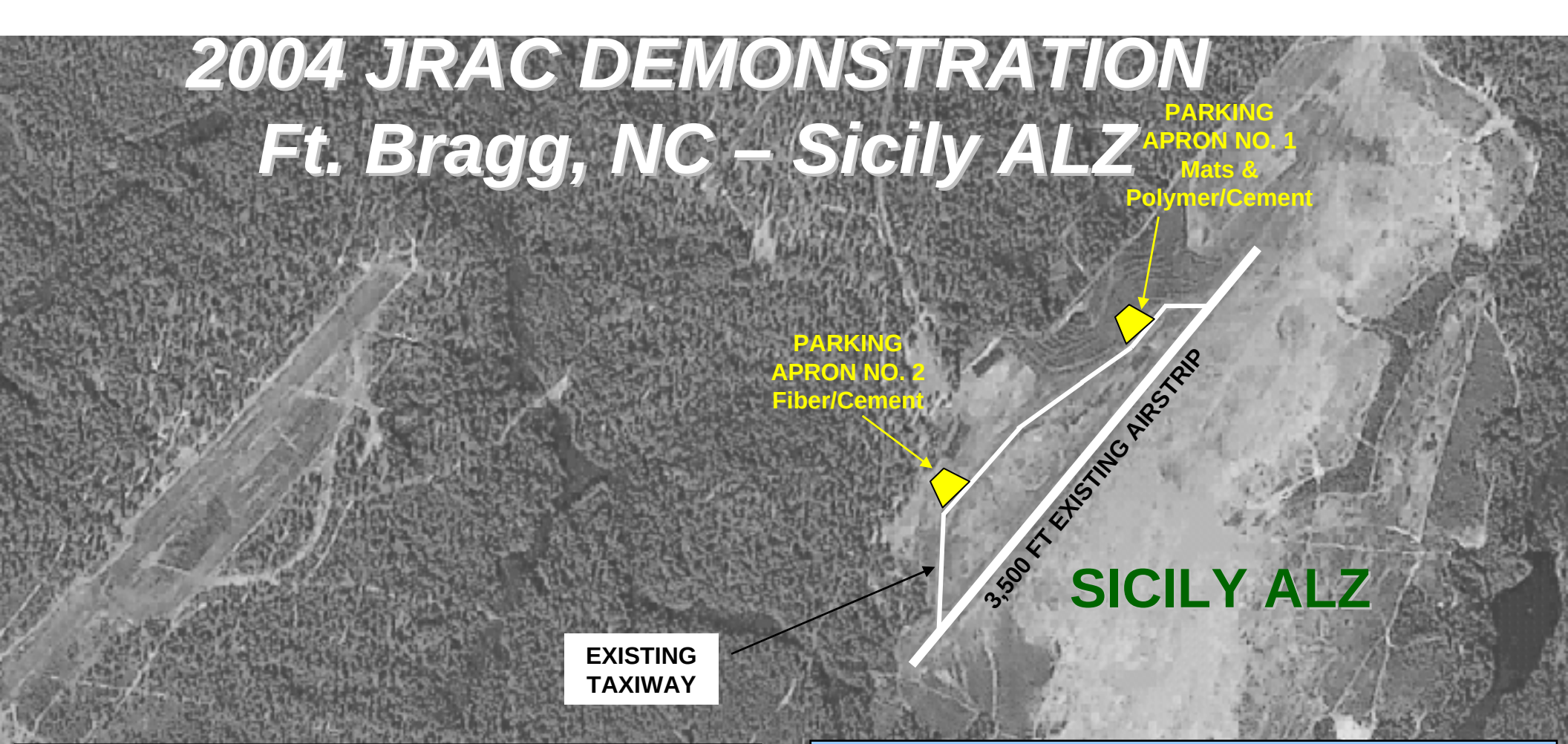
CMI RS-325 Soil Stabilizer

FY04 Demo

Objective – Construct C-130 "contingency" parking aprons using realistic scenarios and resources with JRAC technologies. Demo included:

- **Construction of two Aprons**
- **Both Active and Reserve Component Soldiers**
- **Traffic and Performance Evaluation**

2004 JRAC DEMONSTRATION
Ft. Bragg, NC – Sicily ALZ



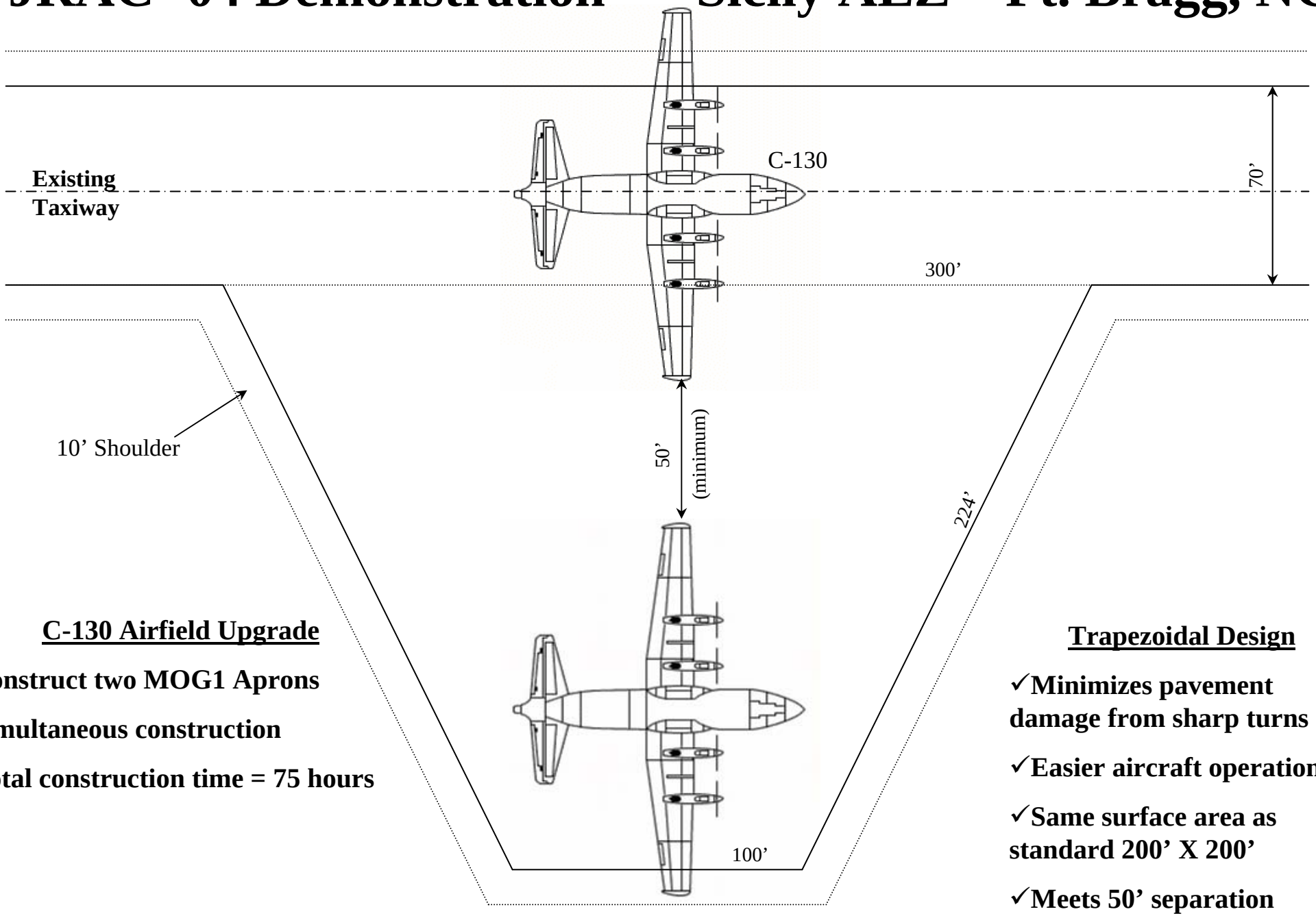
JRAC Demonstration Components

- Site Assessment and Design (Mon.. early AM)
- Clear and Grub (Mon. AM)
- Earthmoving/Cut & Fill (Mon. PM - Tues. AM)
- Mat installation Apron 1 (Tues. early AM)
- Polymer/Cement stabilization Apron 1 (Tues. PM)
- Fiber/Cement Stabilization Apron 2 (Wed. AM)
- Polymer surface cap Aprons 1 & 2 (Wed. AM & PM)
- Visitors Day site visit (Wed. PM)
- C-130 aircraft operations (Thur. AM)

JRAC Value Added

- **Provide additional MOG2 to Sicily ALZ**
- **Provide valuable training to Ft. Bragg & 412 ENCOM**
- **Validate JRAC technologies under military scenario**
- **Positions JRAC 2007 Demo and final products for success**

JRAC ’04 Demonstration Sicily ALZ – Ft. Bragg, NC



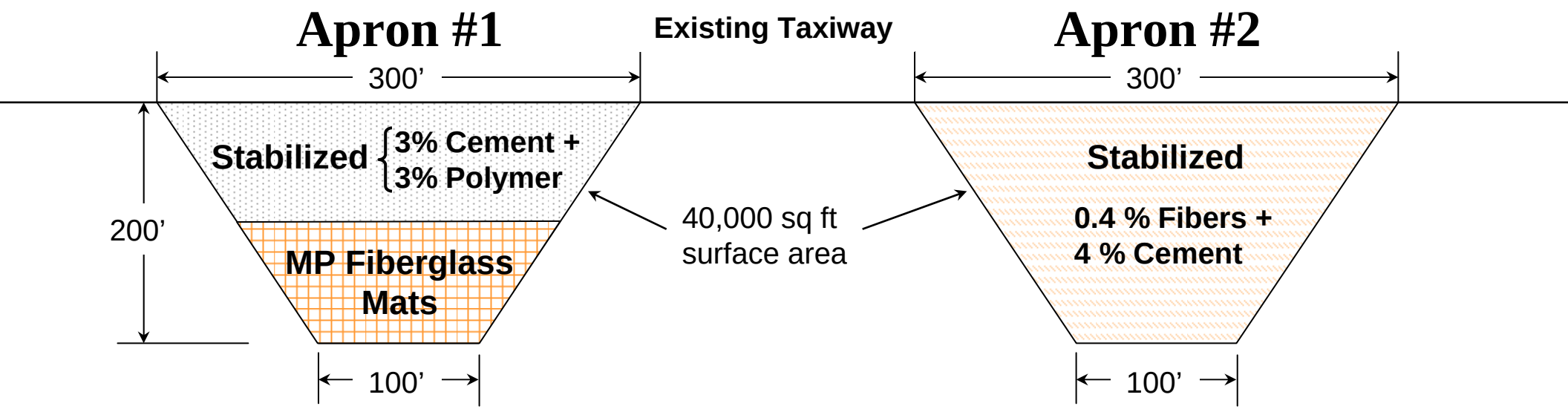
C-130 Airfield Upgrade

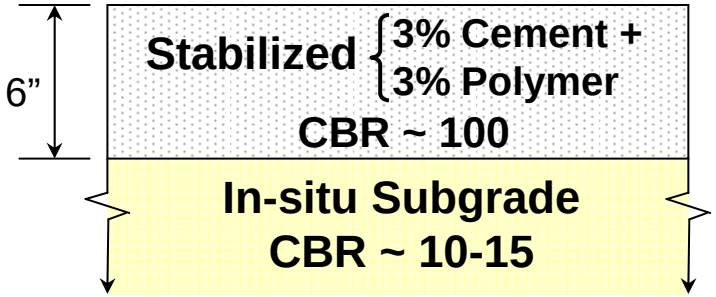
- **Construct two MOG1 Aprons**
- **Simultaneous construction**
- **Total construction time = 75 hours**

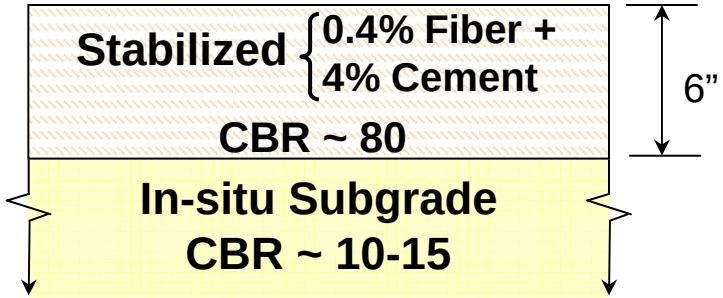
Trapezoidal Design

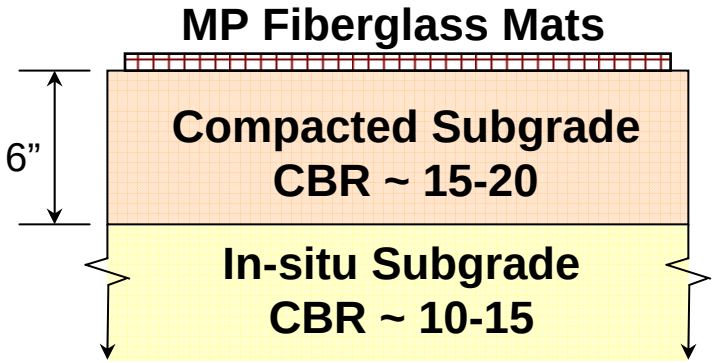
- ✓**Minimizes pavement damage from sharp turns**
- ✓**Easier aircraft operations**
- ✓**Same surface area as standard 200’ X 200’**
- ✓**Meets 50’ separation requirement**

JRAC Demo Apron Geometries and Cross-Sections









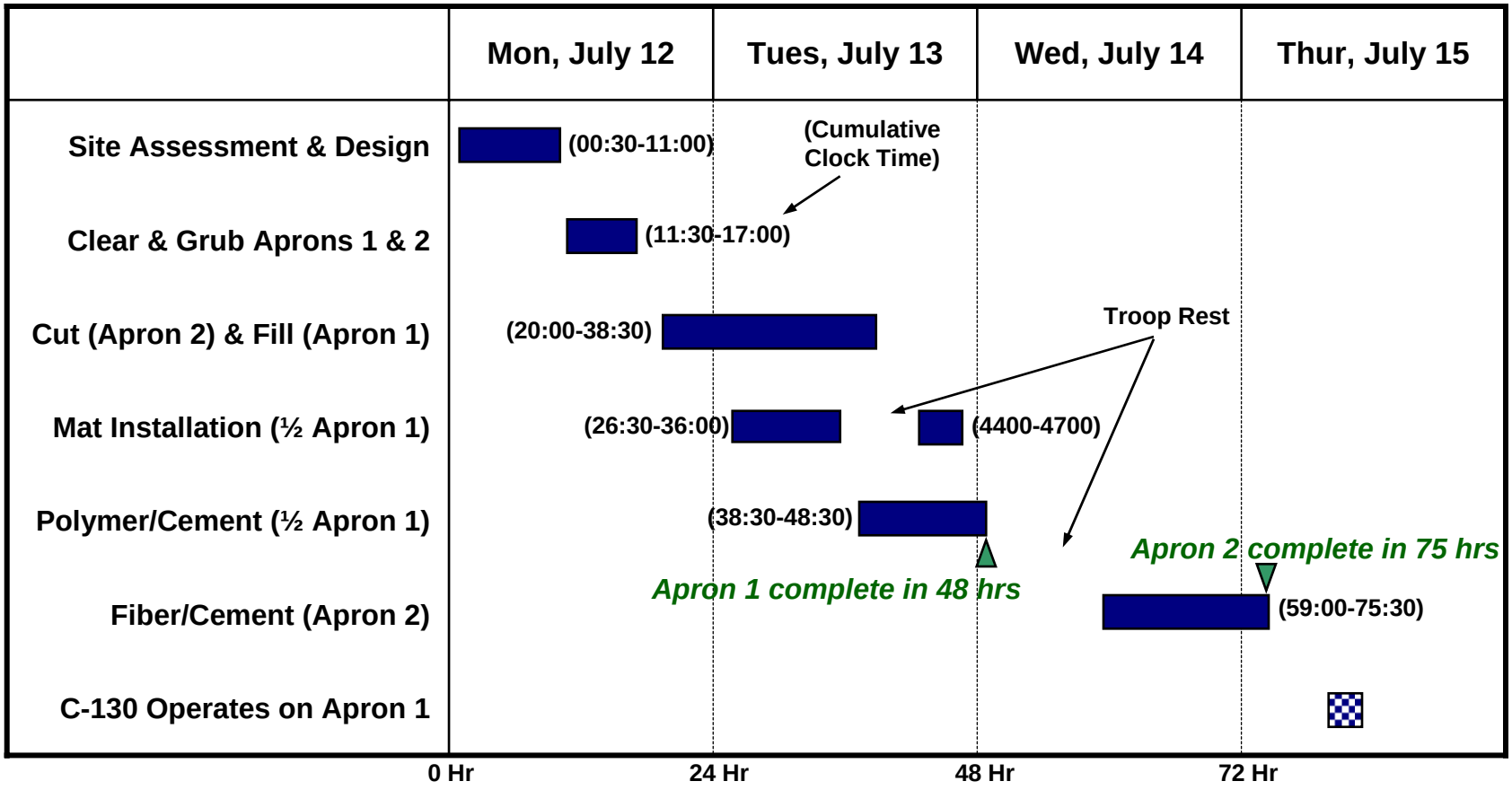
APRON #1

400 sacks Cement
3900 gal. Polymer
580 MP Mats

APRON #2

9700 lbs. Fibers
1000 sacks Cement

JRAC Demo Timeline



Monday, July 12 – Site Assessment, Design, Begin Earthmoving

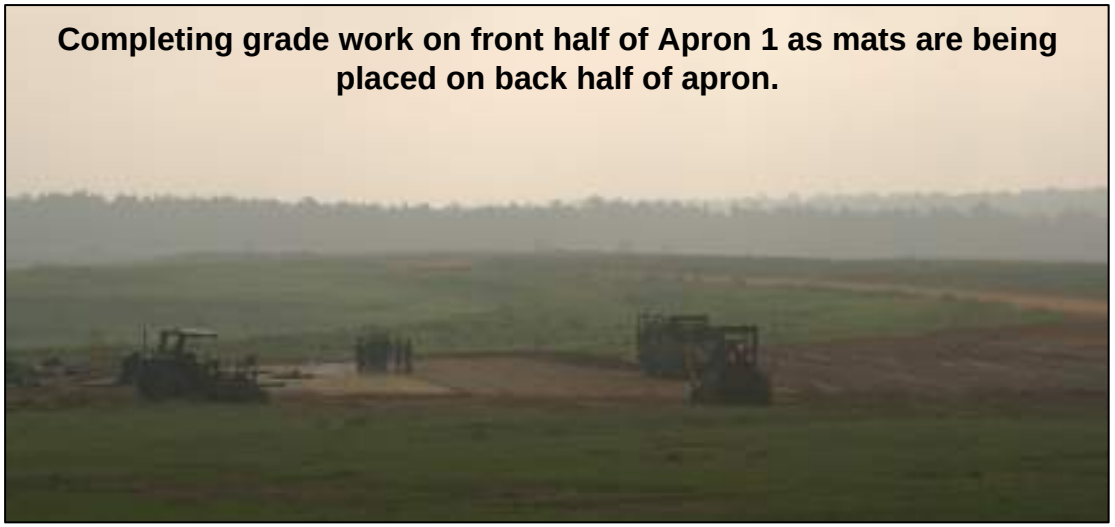
The RAVEN (Rapid Assessment Vehicle – Engineer) began the project just after midnight, in the dark and in the rain.

After collecting survey data through the night, soldiers gather around the RAVEN to conduct soil tests (left) and produce the digital designs (right).

Digital topography and design files are loaded into GPS-instrumented machines to begin earthmoving.

Soldiers quickly check grades during earthmoving with GPS Rover.

Tuesday, July 13 – Complete Earthmoving, Stabilization of Apron 1



Completing grade work on front half of Apron 1 as mats are being placed on back half of apron.

Soldiers assembling 20,000 sq ft of fiberglass-reinforced matting to cover half of Apron 1.

Spotting bags of cement on Apron 1 surface, just before quick spreading with garden rakes and shovels.

Soil stabilizer mixes cement and liquid polymer from connected supply tank into Apron 1 soil at 6-in. depth.

Wednesday, July 14 – Visitors Day
Stabilization of Apron 2

Visitors are given a brief overview of JRAC demonstration project just before touring construction site.

Visitors observe final mat assembly on Apron 1. Completed polymer/cement section seen on left.

Visitors observe RAVEN performing automated DCP (soil strength) test in autonomous mode (operated remotely through laptop elsewhere on site).

Fibers and cement placed on ground are mixed with water into Apron 2 surfacing at 6-in. depth.

Simultaneous placement of fibers and cement with compaction on Apron 2.

Thursday, July 15 – Visitors Day
C-130 on New JRAC Apron

C-130 lands at Sicily ALZ with new Apron 1 in foreground.

C-130 taxis onto Apron 1 before parking.

JRAC researchers ask Air Force pilots their opinion of the new apron – “A big thumbs up!”

The ERDC team with Ft.Bragg and 412 ENCOM Officers.

Sicily ALZ Before and After JRAC

Apron 1

Half Matting and Half Polymer/Cement Stabilized
Completed in 48 hours

Apron 2

Fiber/Cement Stabilized
Completed in 75 hours

What's Next?

Research and Development continues through FY07

* Development of JRAC Design and Evaluation System for Contingency Airfields
* Rapid stabilization for C-17
* Rapid evaluation / repair of existing paved surfaces
* Design JRAC kits (GPS survey, field soils tests, QC/QA equipment, etc.)
* Plan for JRAC '07 Demonstration at C-17 airfield

C-130 Aircraft

175,000-lb

Contingency Tire Pressure = 100 psi

C-17 Aircraft

447,000-lb

Contingency Tire Pressure = 120 psi

Transition Plans

- JRAC is now part of Enable Theater Access (ETA) initiative with Rapid Port Enhancement and other future RDT&E programs
- ETA Integrated Concept Team formed to monitor and facilitate transition plans
- MANSCEN staffing Air and Ground LOC documents (ICD, CDD, CPD)(COL McDaniel, Vern Lowery)
- 6.4 / 6.5 proposal for FY08/09 POM funding wedge ($5.3M / FY) being worked by HQDA G-3 and G-4 (COL Todd Semonite, OCE-P)
- Complete JRAC system should be fielded by FY10; Many JRAC technologies ready for use today!

JRAC Website

https://jrac.erdc.usace.army.mil/

JRAC News

Success! JRAC Demo Project at Ft. Bragg's Sicily ALZ – July 12-15, 2004 JRAC researchers held their first major demonstration exercise at Ft. Bragg, North Carolina's Sicily Assault Landing Zone (ALZ). *Briefings, Videos, and pictures can be seen by clicking here...*

JRAC Researchers Help Reconstruct Airfield in Oman - A number of JRAC researchers were involved in a major airfield reconstruction project at Masirah Island, Oman. *Click here for presentation ...*

Project Spotlight

Operation Brownout, a helipad demonstration and testing of various matting materials, was *held at Fort Campbell, KY. ...*

In FY01 JRAC PI's Jeb Tingle and Travis Mann wrote a report to provide an assessment of Caterpillar®, Inc.'s Computer-Aided Earthmoving System (CAES) for use by the military in expedient airfield construction. To See that report click here *ERDC/GSL TR-01-20*

Demonstration project test section with MP Mat, Hex Mat and Sand Fiber. *Click here to see video ...*

Links & Downloads

Demonstration Presentations

- *Download the JRAC Marketing Video*
- *View the demonstration overview slideshow*

The new JRAC work unit plan has been posted. *click here ...*

The JRAC Overview presentation for 2003 has been posted. *Click here to view the PowerPoint file* **or the presentation can be downloaded as a zip file.** *Click here for a zip file.*

The 2003 JRAC Researchers Meeting was held at the ERDC-Vicksburg site on August 26-27, 2003. Over sixty researchers, industry partners, and representatives from various military user agencies participated in discussions covering research results, user perspectives, and plans for the 2004 JRAC demonstration. *Click here for more information and downloads or presentations ...*

Joint Rapid Airfield Construction

Supports Contingency Airfield Needs. . .

. ..Today

. . . Tomorrow

… and Beyond