

**US Army Captains Career Course  
General Engineering Module  
Introduction to General Engineering**

Date prepared: 26 October 2010

**1. Scope**

This one hour block of instruction provides an introduction to the general engineering (GE) role and skill set for Engineer Captains. Students will gain a basic knowledge of the various tasks and expectations of general engineering projects. The instructor will discuss the format for the general engineering module and involve students in discussion on GE and Full Spectrum Operations (FSO) along with fitting GE into Army operations and finally GE and counterinsurgency.

The learning objective of the Identify the General Engineering skill set will lay the foundation for the remaining module lessons. The learning objectives foster the achievement of the remaining follow on lessons in the General Engineering Module.

**2. Terminal Learning Objective 1**

Identify elements of the General Engineering (GE) Module

**Action: Identify the Elements of the General Engineering Module**

**Conditions:** Acting as a future company grade leader at the organizational level and using references, articles, and class discussions based on the contemporary operational environment.

**Standard:** Identification will include:

1. Understanding the GE Module to include purpose, assessment methodology, schedule/calendar, and site visits.
2. Understanding student responsibilities with regard to attendance, homework/quizzes, practical exercises, the Capstone exercise, site visits, and daily class requirements.
3. Identifying the elements of General Engineering, how GE fits into the bigger Army picture, and its relevance to the overarching Army structure.

**Learning Domain:** Cognitive

**Learning Level:** Knowledge

**3. HOMEWORK ASSIGNMENT:**

**4. INSTRUCTOR ADDITIONAL READING(S)/MATERIAL:**

Instructors should be familiar with FM 3-34, Engineer Operations, January 2004, FM 3-0, Operations, February 2008, and FM 3-24, Counterinsurgency, December 2006

*Instructor Note:* Instructors should also feel free to utilize the Center for Army Lessons Learned (CALL) especially if they feel their experience level is thin as CALL contains a wealth of information to share with students. However, if instructors utilize information from CALL they should be aware of any foreign disclosure rating issues before sharing sensitive information Center for Army Lessons Learned web site available at: <http://CALL.ARMY.MIL>

## 5. TRAINING AIDS, REFERENCES AND RESOURCES

- a. Advance Sheet
- b. Appendix B, Assessment
- c. Doctrinal references:
  1. FM 3-34 Engineer Operations
  2. FM 3-0 Operations
  3. FM 3-24 Counterinsurgency

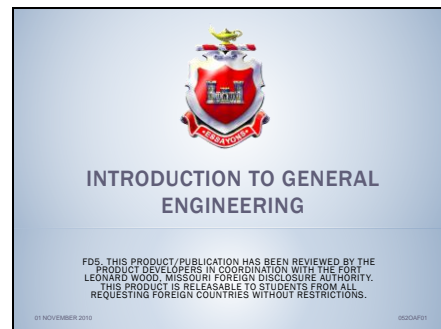
## 6. CONDUCT OF LESSON

### a. Lesson Timeline

05 minutes	Introduction
10 minutes	Concrete Experience
05 minutes	Publish/Process
20 minutes	Generalize New Information
10 minutes	Develop/Apply

### Slide 1, Introduction Slide

Quick intro of instructor(s) and welcome to the GE module.



## Slide 2, Ground Rules

Ground rules for the beginning of the GE module. These need to be only shown/discussed once. Students may need a reminder throughout the module but the full explanation can occur at this point.

### GROUND RULES

- Be respectful to other students and to instructors.
- Ask questions and share relevant personal experiences that assist other students' learning. Understand instructor may choose to answer questions later or move sharing time to break in order to cover the material.
- One conversation or speaker at a time. Instructor facilitates.
- Sit by Small Group; SG turns daily attendance in to Class Rep; Class Rep reports to Instructor in writing. Missing class requires approval of CPT(P) Wittmeier.
- Follow the instructor's timeline; generally, class periods will be 50 minutes with 10 minute breaks. However, instructor will set specifics for each block.
- Bring the appropriate references and materials needed for each class.
- Feel free to eat and drink in the classroom in a way that is respectful of others and does not interrupt or interfere with learning experience. Clean up after yourself.
- Put cell phones in vibrate mode.
- Do not use tobacco products in class.

## Slide 3, Concrete Experience

### WHAT IF?



### b. Concrete Experience: (10 minutes) Use the following scenario.

*You are a new company commander or staff Engineer who has been sent to work for a non-Engineer Commander. You must sell yourself and what you can do for him in a short conversation. What do you say to him?*

**Instructor note:** *Generally the instructor/facilitator is minimally involved during the CE; however, in this case more involvement may be necessary to maintain a realistic scenario. If the class needs further information then set the location and circumstances. The point here is to take them out of their comfort zone and push them into thinking about a scenario they have probably never dealt with to this point in their career.*

**c. Publish and Process:** (05 minutes) This step involves finding out what happened within individuals, at both cognitive (knowledge and perception) and affective (emotional and feeling) levels, while the activity was progressing. Each student needs to review the role he or she took in the process and assess the success of the group.

*Questions to ask students:*

What would you say if you had 2 minutes to tell him what you can do for him/her? What can the Engineer reach in assets to assist a Battalion Commander? What missions can they perform? Why are Engineers broken out into so many different skill sets?

**Instructor Note:** Instructor summarizes group processes and uses either a personal experience or that of a student to transition to the lesson material (GNI). Instructor introduces the learning objective and explains that students will learn more about the many facets of General Engineering. Instructor ensures relevancy of material to students by utilizing descriptions of actual Engineering operations.

**Slide 4, Terminal Learning Objective**

The purpose of this block of instruction is to give students an overview of the General Engineering Module, what is required to successfully complete this portion of the course and how the application of these skills will matter in the future.

**TERMINAL LEARNING OBJECTIVE**

- Action:
  - Identify elements of the General Engineering (GE) Module
- Conditions:
  - In a classroom environment, given instruction.
- Standard: Identification of the GE Module elements include:
  - Understanding the GE Module to include purpose, assessment methodology, schedule/calendar, and site visits.
  - Understanding student responsibilities with regard to attendance, homework/quizzes, practical exercises, the Capstone exercise, site visits, and daily class requirements.
  - Identifying the elements of General Engineering, how GE fits into the bigger Army picture, and its relevance to the overarching Army structure.

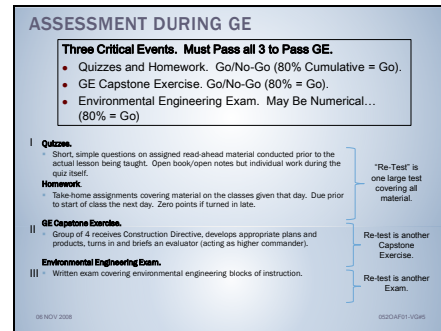
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**d. Generalize New Information**

This section begins the new information given to students regarding the GE module as well as the elements of General Engineering roles for military missions. Multimedia presentation and doctrinal references will be utilized to introduce new lesson material.

## Slide 5, Assessment during GE

Explanation of critical events and how students will be assessed throughout the module. Instructors need to be very clear on expectations and in the event of failures. Students need to understand right up front the ground rules for grading and retesting to prevent misunderstandings later in the module in the event of a critical event failure which leads to a recycled student.



**ASSESSMENT DURING GE**

**Three Critical Events. Must Pass all 3 to Pass GE.**

- Quizzes and Homework. Go/No-Go (80% Cumulative = Go).
- GE Capstone Exercise. Go/No-Go (80% = Go).
- Environmental Engineering Exam. May Be Numerical... (80% = Go)

**I Quizzes.**  
Short, simple questions on assigned read-ahead material conducted prior to the actual lesson being taught. Open book/open notes but individual work during the quiz itself.

**Homework.**  
Take-home assignments covering material on the classes given that day. Due prior to start of class the next day. Zero points if turned in late.

**II GE Capstone Exercise.**  
Group of 4 receives Construction Directive, develops appropriate plans and products, turns in and briefs an evaluator (acting as higher commander).

**Environmental Engineering Exam.**  
Written exam covering environmental engineering blocks of instruction.

**III**

Re-Test is one large test covering all material.

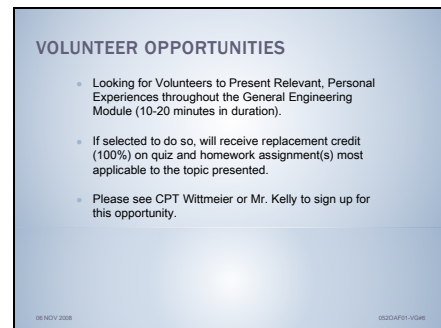
Re-test is another Capstone Exercise.

Re-test is another Exam.

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## Slide 6, Volunteer Opportunities

Self-explanatory.



**VOLUNTEER OPPORTUNITIES**

- Looking for Volunteers to Present Relevant, Personal Experiences throughout the General Engineering Module (10-20 minutes in duration).
- If selected to do so, will receive replacement credit (100%) on quiz and homework assignment(s) most applicable to the topic presented.
- Please see CPT Wittmeier or Mr. Kelly to sign up for this opportunity.

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## Slide 7, Training Schedule

Stress this is the basic schedule but is always subject to change. Events occur out of our control such as guest speaker cancellations or site visit constraints.

### TRAINING SCHEDULE - GENERAL

- Revised Week 12 distributed this morning.  
- Review & Answer any questions.
- Revised Week 13-16 to be distributed Thursday morning. What you have is pretty close for general planning purposes...
- Practical Exercises. Build up to Capstone Exercise. If do these along the way, should have no problem with Capstone. Sometimes individual work; sometimes group.
- Site Visits. We will try to make as interesting and relevant as possible and look forward to your feedback. Be prepared for inclement weather, bring water, etc. Follow ECCC/School uniform policy with regard to headgear, etc. Some sites will require hard hats...

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## Slides 8 & 9, Summary of weekly schedule

### WEEK 1 (12) – HORIZONTAL ENGINEERING

- Overview to GE and Horizontal Engineering
- Foundations
  - Soils
  - Geology
  - Asphalt
  - Concrete
- Theater of Operation Roads
- Project Management Topics
- TA 244 Site Visit
- Practical Exercises:
  - Drainage, Road Design, Project Scheduling



Photo courtesy ODD (public domain)

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### Summary: Weeks 2-5

WEEK 2 (13) – FINISH HORIZONTAL ENGINEERING;  
BEGIN VERTICAL ENGINEERING

Week 3 (14) – Vertical Engineering Focused on T/O  
Construction and Infrastructure Improvement

Week 4 (15) – Complete Vertical Engineering; Conduct GE  
Capstone Exercise

Week 5 (16) – Environmental Engineering and Exam

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## Slide 10, Transition to GE and FSO

Transitional slide to GE and role in FSO

### GE AND FULL SPECTRUM OPERATIONS

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## Slide 11,

**DEFINITION:** Those engineering capabilities and activities, other than combat engineering, that modify, maintain, or protect the physical environment.

### General Engineering

**DEFINITION:** Those engineering capabilities and activities, other than combat engineering, that modify, maintain, or protect the physical environment.

Examples include: the construction, repair, maintenance, and operation of infrastructure, facilities, lines of communication and bases; terrain modification and repair; and selected explosive hazards activities. (FM 3-34)

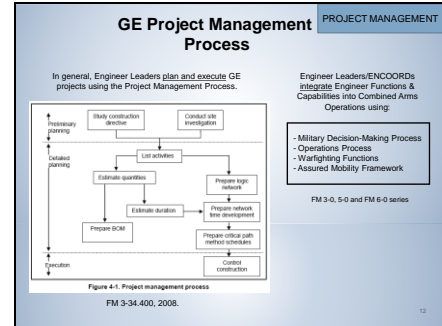
#### PROJECT MANAGEMENT



11

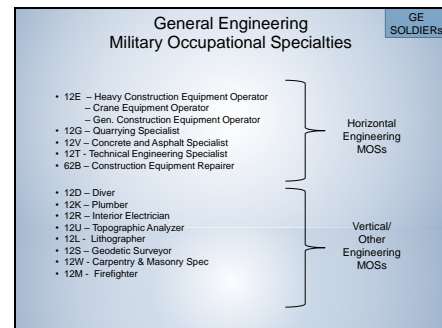


## Slide 12, GE Project Management Process



## Slide 13, General Engineering and the Engineer MOS

Engineers possess a wide variety of skills sets.



## Slide 14, Modular Engineer Force Units

**GE UNITS**

**Modular Engineer Force Units:  
General Engineering**

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Modular Force Handbook, 2008. 11

## Slide 15, Horizontal Company

**GE UNITS**

Modular Force Handbook, 2008.

**Horizontal Company  
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**MISSION**

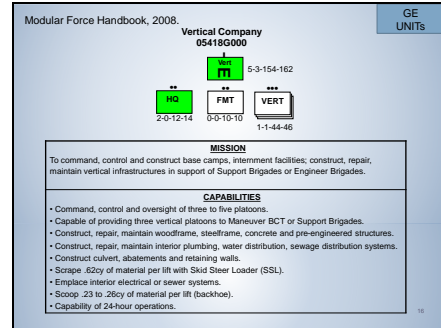
To provide command and control of Engineer Effects platoons that are necessary to conduct missions such as repair, maintain, construct airground lines of communication (LOC), emplace culverts, hauling, force protection, and limited clearing operations.

**CAPABILITIES**

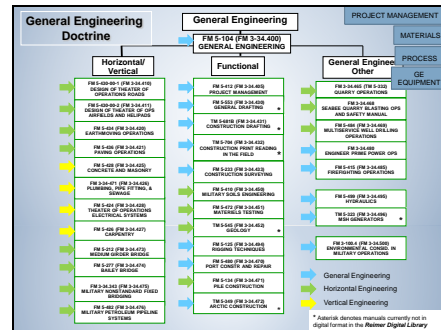
- Provides command and control for three to five platoons as an Engineer Team.
- Provides personnel and equipment to perform Engineering tasks such as clearing and grubbing operations; haul, grade, shape, compact, cut and fill material; emplace culverts; remove snow/ice; construct drainage structures; conduct burrow pit operations; provide dust control operations; construct base camps, airlanding platforms, FARPS, supply routes, roads, control points, fire bases, tank ditches, ASPs, and field hospital platforms; prepare river crossing sites; and support port repair due to HYEX.
- Provides personnel and equipment for lift and load support in order to remove stockpiles; haul material; remove rubble; or raze and remove structures. Conducts convoy operations and burrow pit operations (light).
- Provides force protection.

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## Slide 16, Vertical Company



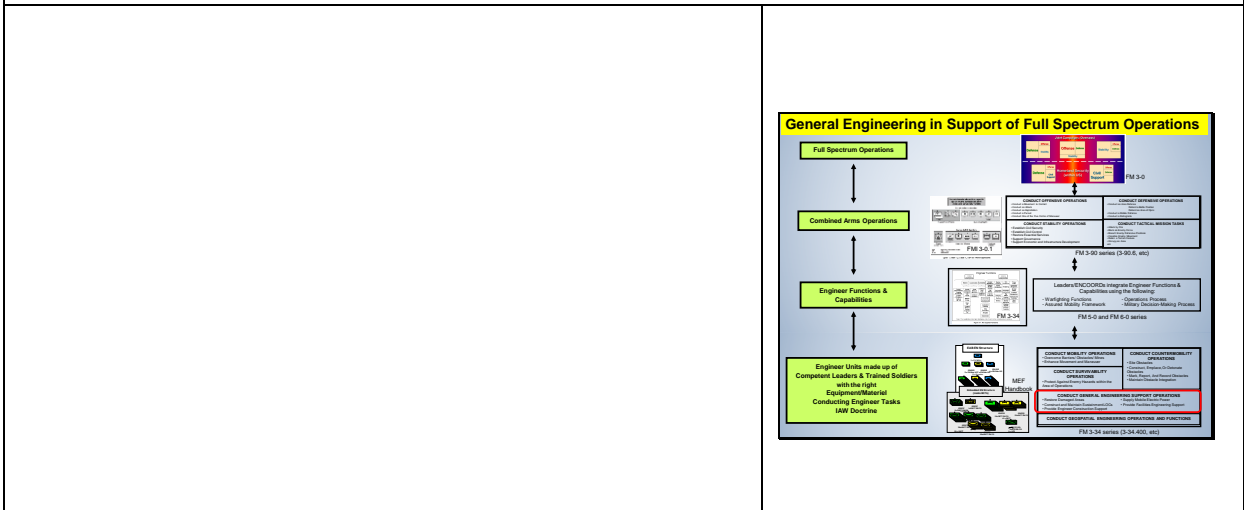
## Slide 17, General Engineering Doctrine



## Slide 18, Expanded role of GE in FSO/GE performed by GE units

	<p><b>General Engineering</b></p> <p><b>DEFINITION:</b> Those engineering capabilities and activities, other than combat engineering, that modify, maintain, or protect the physical environment.</p> <table border="1" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><b>Expanded Role of GE in FSO</b></p> <p>In the past, GE functions have been described almost exclusively as stability operations in a sustainment area.</p> <p>In today's complex OE, it is imperative that GE tasks occur throughout the theater of operations.</p> <p>Engineers must be prepared to perform a full array of GE missions while dealing with a wide range of threats and influences.</p> <p>(FM 3-34.400 General Engineering)</p> </td> <td style="width: 50%; vertical-align: top;"> <p><b>GE Performed By GE Units</b></p> <p>While selected GE tasks may be performed by combat engineer units, they are typically performed by GE units (to include the United States Army Corps of Engineers [USACE], other Services, HN, and civilian contractors).</p> <p>Combat engineers are limited from performing GE tasks by their need to focus on combat engineering tasks, lack of organic equipment, and specific training limitations for certain GE tasks.</p> <p>(FM 3-34.400 General Engineering)</p> </td> </tr> </table>	<p><b>Expanded Role of GE in FSO</b></p> <p>In the past, GE functions have been described almost exclusively as stability operations in a sustainment area.</p> <p>In today's complex OE, it is imperative that GE tasks occur throughout the theater of operations.</p> <p>Engineers must be prepared to perform a full array of GE missions while dealing with a wide range of threats and influences.</p> <p>(FM 3-34.400 General Engineering)</p>	<p><b>GE Performed By GE Units</b></p> <p>While selected GE tasks may be performed by combat engineer units, they are typically performed by GE units (to include the United States Army Corps of Engineers [USACE], other Services, HN, and civilian contractors).</p> <p>Combat engineers are limited from performing GE tasks by their need to focus on combat engineering tasks, lack of organic equipment, and specific training limitations for certain GE tasks.</p> <p>(FM 3-34.400 General Engineering)</p>
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## Slide 19, General Engineering in Support of FSO

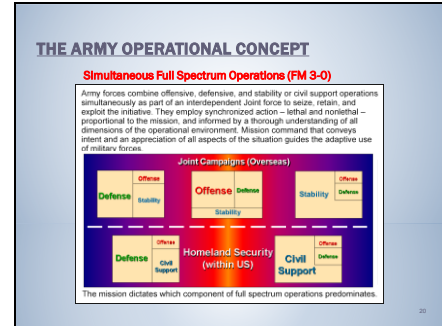


## Slide 20, The Army Operational Concept

Army forces combine offensive, defensive, and stability or civil support operations simultaneously as part of an interdependent Joint force.

They employ synchronized action – lethal and non-lethal, proportional to the mission, and informed by a thorough understanding of the operational environment.

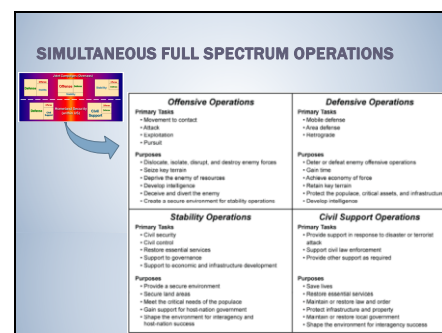
Mission command that conveys intent and appreciation of the unique aspects of the situation guides the adaptive use of military forces.



## Slide 21, Simultaneous FSO

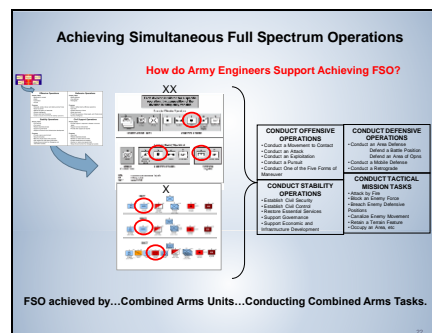
**Discussion:** The third and final component of the **Continuum of Operations** is **Full Spectrum Operations**. Full spectrum operations are simultaneous combinations of offensive, defensive, and stability tasks (civil support replaces stability in operations conducted within the US) to address any form of violence across the spectrum of conflict.

Full Spectrum Operations support the type of operation by balancing the proper combination of offense, defense, and stability tasks to accomplish the mission for the unique situation, objectives or conditions to be achieved, desired end state, and level of violence. At brigade level and above, units will simultaneously conduct unique combinations of offense, defense, and stability tasks to accomplish their assigned mission. At battalion level and below, units will typically focus on a single component of full spectrum operations because they lack the resources to conduct simultaneous operations.

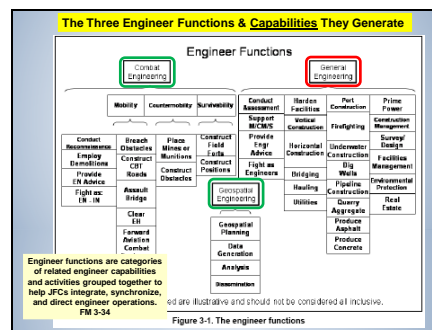


## Slide 22, Achieving Simultaneous Full Spectrum Operations

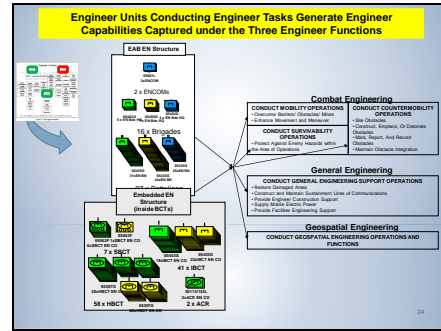
### How do Army Engineers Support Achieving FSO?



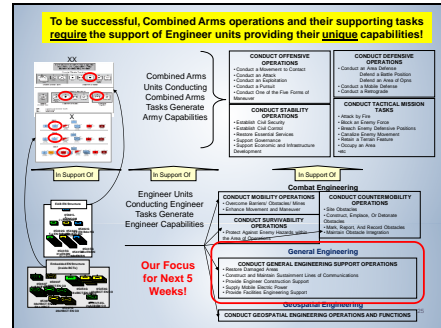
## Slide 23, The Three Engineer Functions & Capabilities They Generate



## Slide 24, Engineer Units Conducting Engineer Tasks Generate Engineer Capabilities Captured under the Three Engineer Functions



## Slide 25, Combined Arms Operations and Their Supporting Tasks



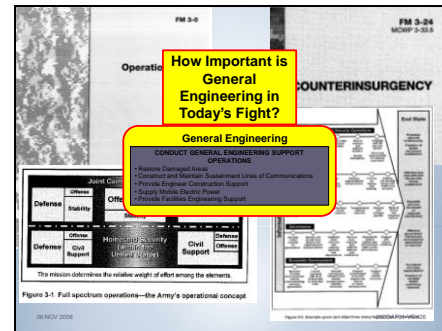
## Slide 26, Stability Operations and Civil Support

Stability Operations and Civil Support is where GE is most important.

Taken from FM 3-0 (page 3-1):

“Army forces combine offensive, defensive, and stability or civil support operations simultaneous as part of an independent joint force to seize, retain, and exploit the initiative, accepting prudent risk to create opportunities to achieve decisive results. They employ synchronized action – lethal and nonlethal – proportional to the mission and informed by a thorough understanding of all variables of the operational environment.”

How do construction projects affect your unit’s area of operations?



## Slide 27, GE's Contribution to Stability Operations

FM 3-34 Engineer Operations describes the role of Engineers in post conflict operations.

“Engineers conducting missions promote stability by returning a sense of normalcy. Often these projects have an economic effect as well. Engineers are focused on assisting in stabilizing a region by improving the infrastructure (FM 3-34 page 9-8).”





## Slide 28, GE's Contribution to Stability Operations

We see general engineering contributing specifically to stability operations.

FM 3-0 Operations discusses the importance of stability operations in detail.

“Stability operations encompass various military missions, tasks, and activities conducted outside the United States in coordination with other instruments of national power to maintain or reestablish a safe and secure environment, provide essential governmental services, emergency infrastructure reconstruction, and humanitarian relief (JP 3-0). Stability operations can be conducted in support of host-nation or interim government or as part of an occupation when no government exists. Stability operations involve both coercive and constructive military actions. They help to establish a safe and secure environment and facilitate reconciliation among local or regional adversaries. Stability operations also help establish political, legal, social, and economic institutions and support the transition to legitimate local governance. Stability operations must maintain the initiative by pursuing objectives that resolve the causes of instability.”

***Play the video titled “Courthouses-Baghdad.”***

How does this project promote stability?

**GE'S CONTRIBUTION TO STABILITY OPERATIONS**

**U.S. Army Engineers:**

- provide general engineering effects (horizontal and vertical)
- under the most challenging conditions in terms of terrain, weather, and enemy situations
- to positively influence friendly force operations and the host nation itself.

- During Operation Enduring Freedom V and VI, the rugged, mountainous terrain of Afghanistan's Hindu Kush range became home to Army engineers.
- The mission was to construct a new, two-lane, 123-kilometer road—a highway from Kandahar City (roughly 25 kilometers northwest of Kandahar Airfield) to Tarin Kowt. Working seven days a week for months in the extreme climate and terrain of Afghanistan, the engineers completed the project ahead of schedule.
- The completion of the road marked the end of geographical isolation for hundreds of thousands of Afghan people and assisted the country in its transition toward democracy. This action was more than just the building of a road. (FM 3-34.400)

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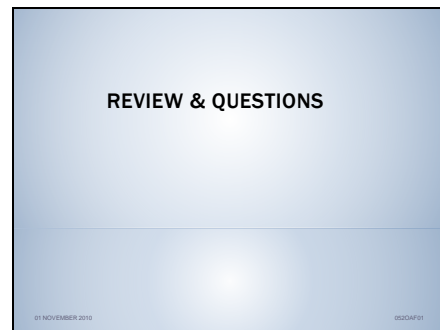
### Slide 29, GE Support to Civil Support Operations

To understand how GE contributes to Support Operations we need to look at chapter 3 of FM 3-0.



### Slide 30, Apply/Develop

(this is the check on learning section) No new information is discussed at this point in the lesson.



**e. Develop:** (10 minutes). Future use could take two paths in this section: Students should discuss not just future use of lesson material/tasks such as potential deployments but also the integration into Branch Specific tasks] and in their future duty positions.

**f. Apply:** Instructor should summarize and integrate both lesson material and student discussion by giving analysis and feedback to the group. Instructor will conduct a brief summary AAR for the CE discussing positives and challenges that arose during the group work and integrates with the lesson material that followed the CE as a recap and transition out of the Intro to GE lesson. (check on learning)  
Have the Students answer the following questions:

1. Why .....

2. How .....

3.

## **ECCC General Engineering Module**

### **052OAF01 Introduction to General Engineering**

#### **Appendix B Assessment Plan**

**Class Participation (Individual) 100%** Instructors assess each student's demonstrated understanding of the course material and his or her ability to develop and deliver cogent arguments or relevant insights from course material in a clear and concise fashion. Students demonstrate their knowledge, skill, and ability through the quality and focus of their discussion comments and questions, their preparation for class, their ability to reason critically and to think creatively, their performance during practical exercises and case studies, and contributions to group work. Student participation is evaluated and graded as pass/fail in gradebook.