Lesson 3.7
Mines, Explosive Remnants of War (ERW), Improvised Explosive Devices (IED) and Crater Analysis

Lesson 3.7 Content

- Mines, Explosive Remnants of War (ERW)
- Improvised Explosive Devices (IED)
- Safety and best practice
- Crater analysis

Learning Outcomes Lesson 3.7

- Explain how to operate in a mined mission area in a United Nations peace operation environment
- Identify indicators of IEDs, components and mitigation measures
- Explain the basic procedures for crater analysis

Safety Warning

DO NOT:

Move

Touch

Any ordnance explosive

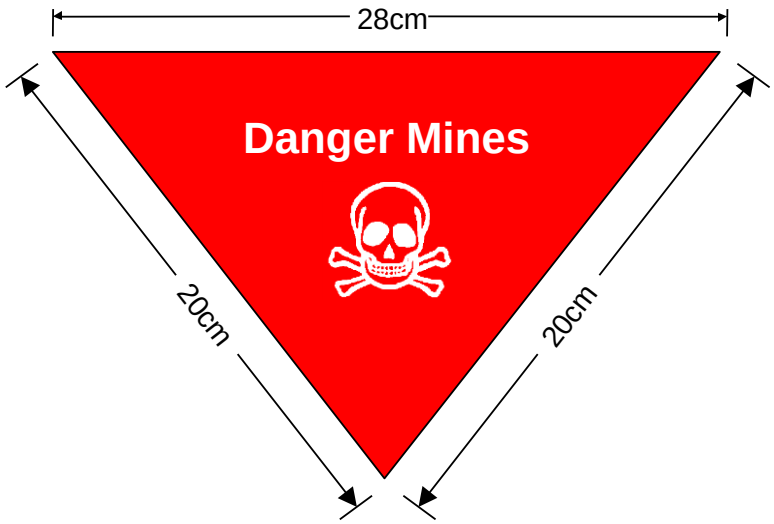
Safely mark and report

UNMO Roles / Responsibilities

- Observe
- Monitor
- Assess
- Verify
- Report

Mine, ERW and IED Awareness

- Landmines
- ERW
- IED



Landmines

Anti-personnel mines (AP)

Anti-vehicle mines (AV)

- Wound / kill
- Destroy / damage vehicles
- Buried, surface
- Camouflaged
- Locations shift in time
- Consult experts
- Do not touch or move

ERW

Unexploded Ordnance (UXO)

Abandoned Explosive Ordnance (AXO)

ERW

Small Arms and Light Weapons Ammunition

Grenades

ERW

Projectile

Bombs

Rockets

Missiles

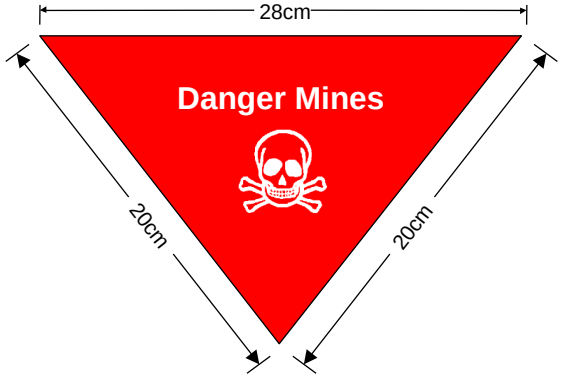
Where are Mines and ERW

Indicators to identify Danger Area:

- Armed clash took place
- Areas of military activities
- Damaged buildings / vehicles
- Bridges, culverts, water points
- Restricted / marked areas,
- Barriers, road closures
- Abandoned weapons
- Ammunition storage
- Injured / dead animals
- Over grown , not used areas or paths

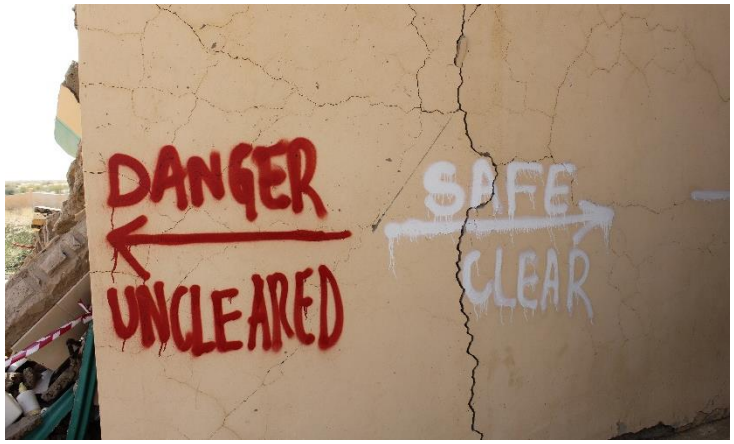
Mines and ERW Markings

Official markings

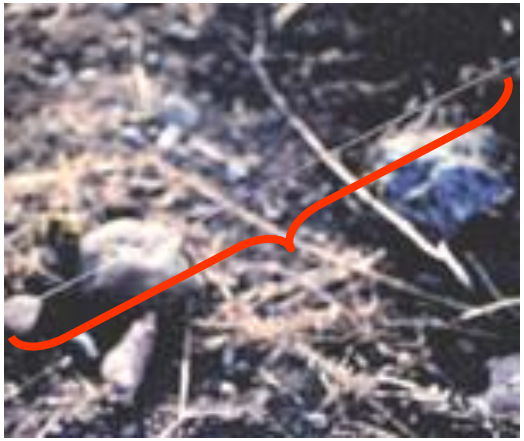


Local markings

Humanitarian actors markings



Other Indicators of Mines / ERW



Tripwires, low to ground

Ammunition cans

Dead or blast injured animals

Damaged, cleared vegetation

Regularly spaced potholes / craters

By passes, tracks around good areas of road

Mines and ERW Difficult to Spot

- Hard to spot
- Partially covered
- Hidden amongst the rubble

Emergency Procedures in Minefields

M **Movement STOPS**

I **INFORM HQ**

N **NOTE the area**

E **EVALUATE your course of action**

D **DO NOT MOVE**

Improvised Explosive Devices

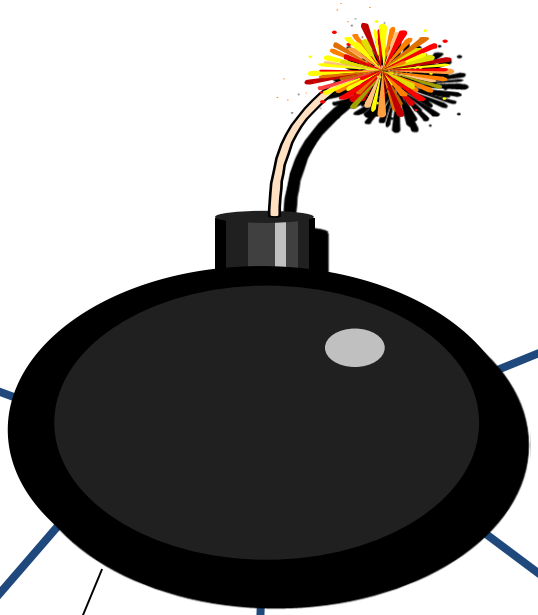
Improvised Explosive Devices (IED)

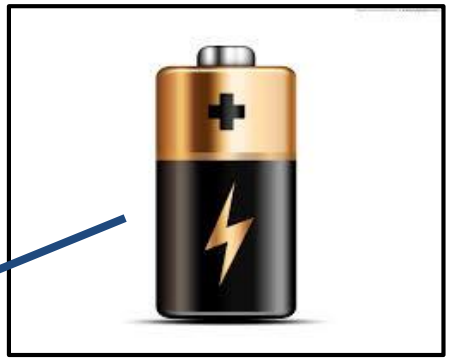
- Placed or fabricated
- Improvised manner
- Destructive, lethal, noxious, pyrotechnic or incendiary chemicals
- To destroy, incapacitate, harass or distract
- May incorporate military stores
- normally devised from non-military components

Constraints facing manufactures of IEDs are components imagination to set up the devices

Improvised Explosive Devices

Container





Power Source

Explosives

Switch

Initiator

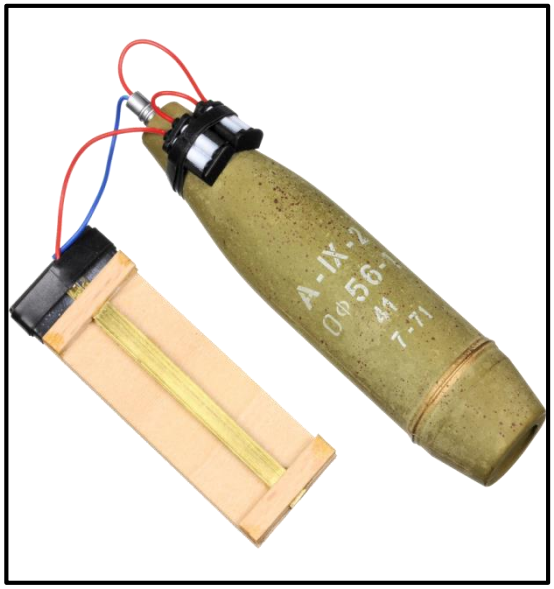
Enhancements

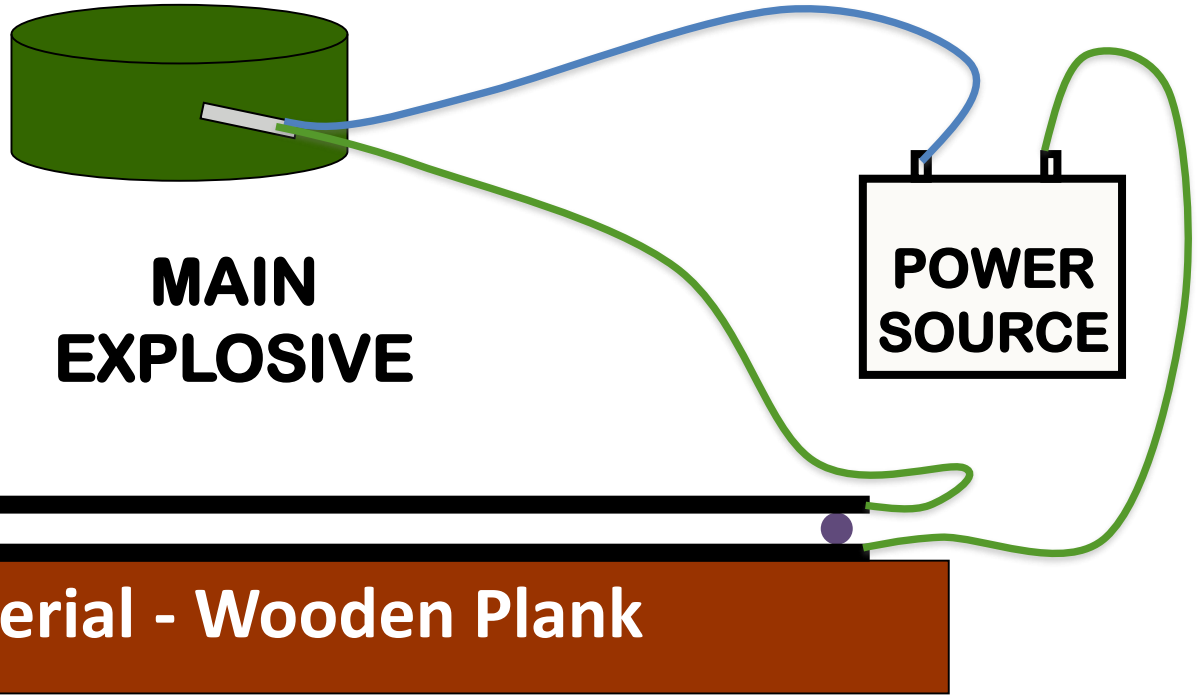
Improvised Explosive Devices

IEDs are categorized by the type of switch used to initiate the device:

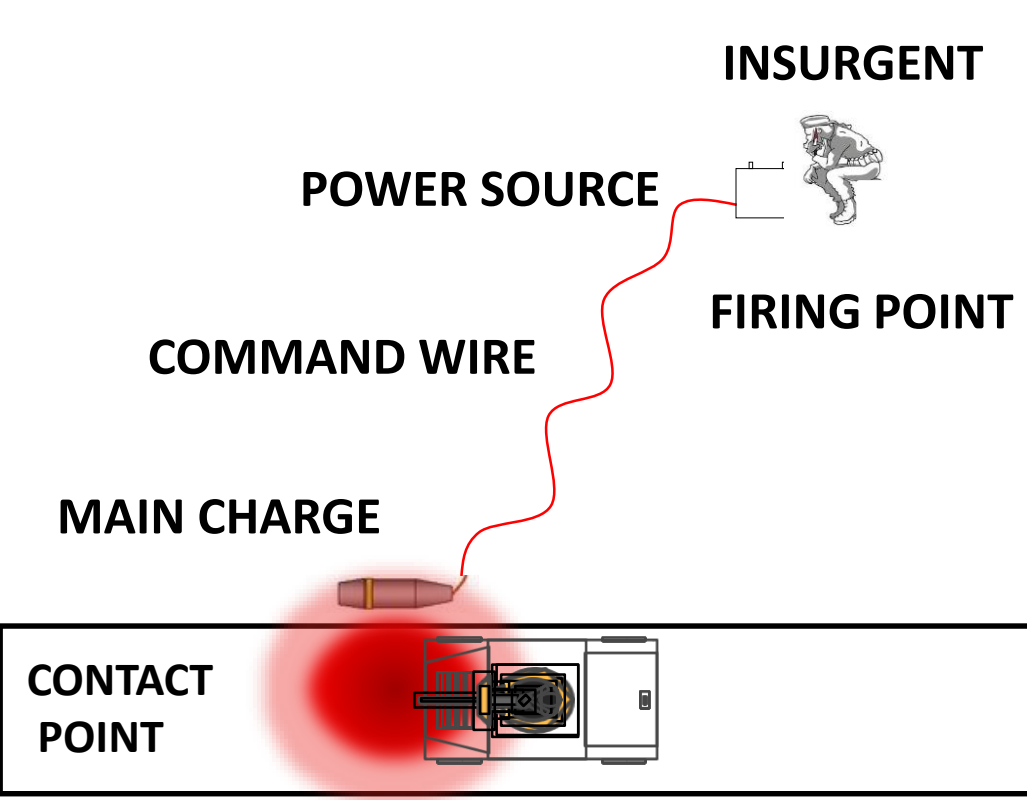
- Victim Operated
- Command Initiated
- Time Initiated

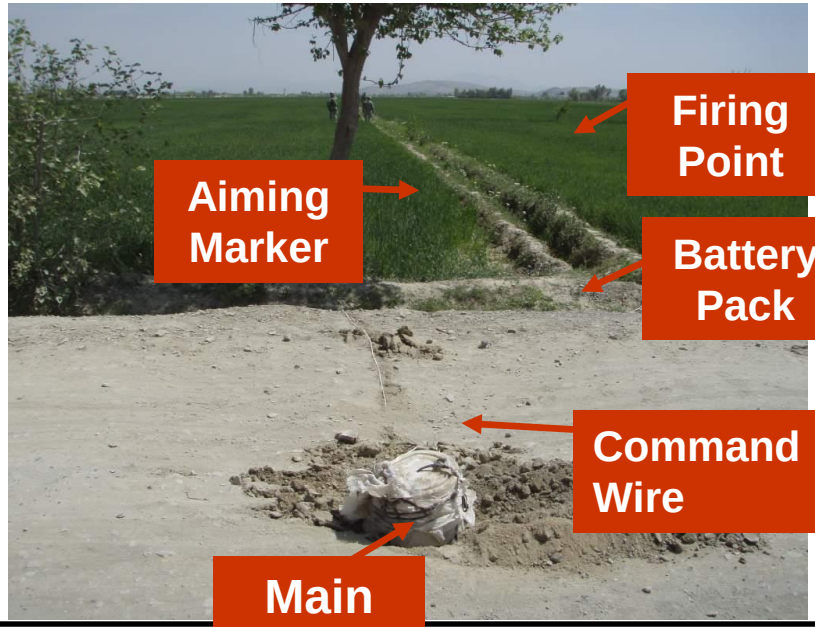
Victim Operated IEDs





Command Wire IED



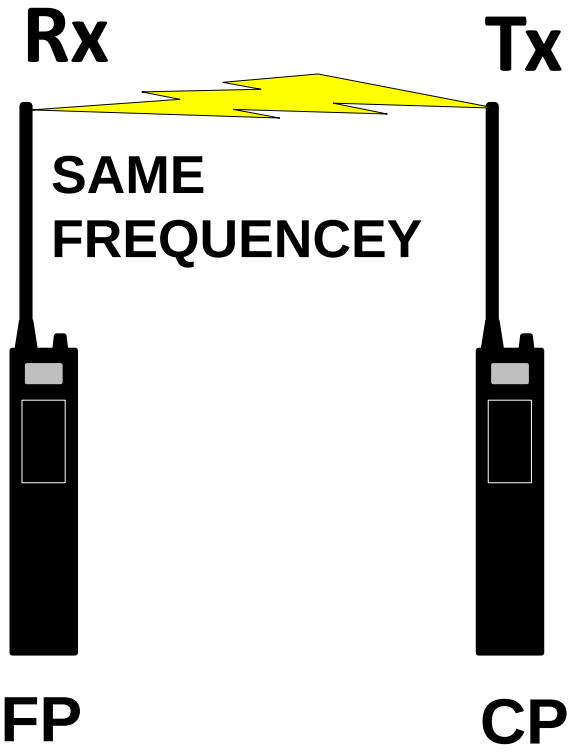


- Aggressor retains control
- Optimum effect on intended target
- Most common are Command Wire and Radio Controlled

Radio Controlled IED

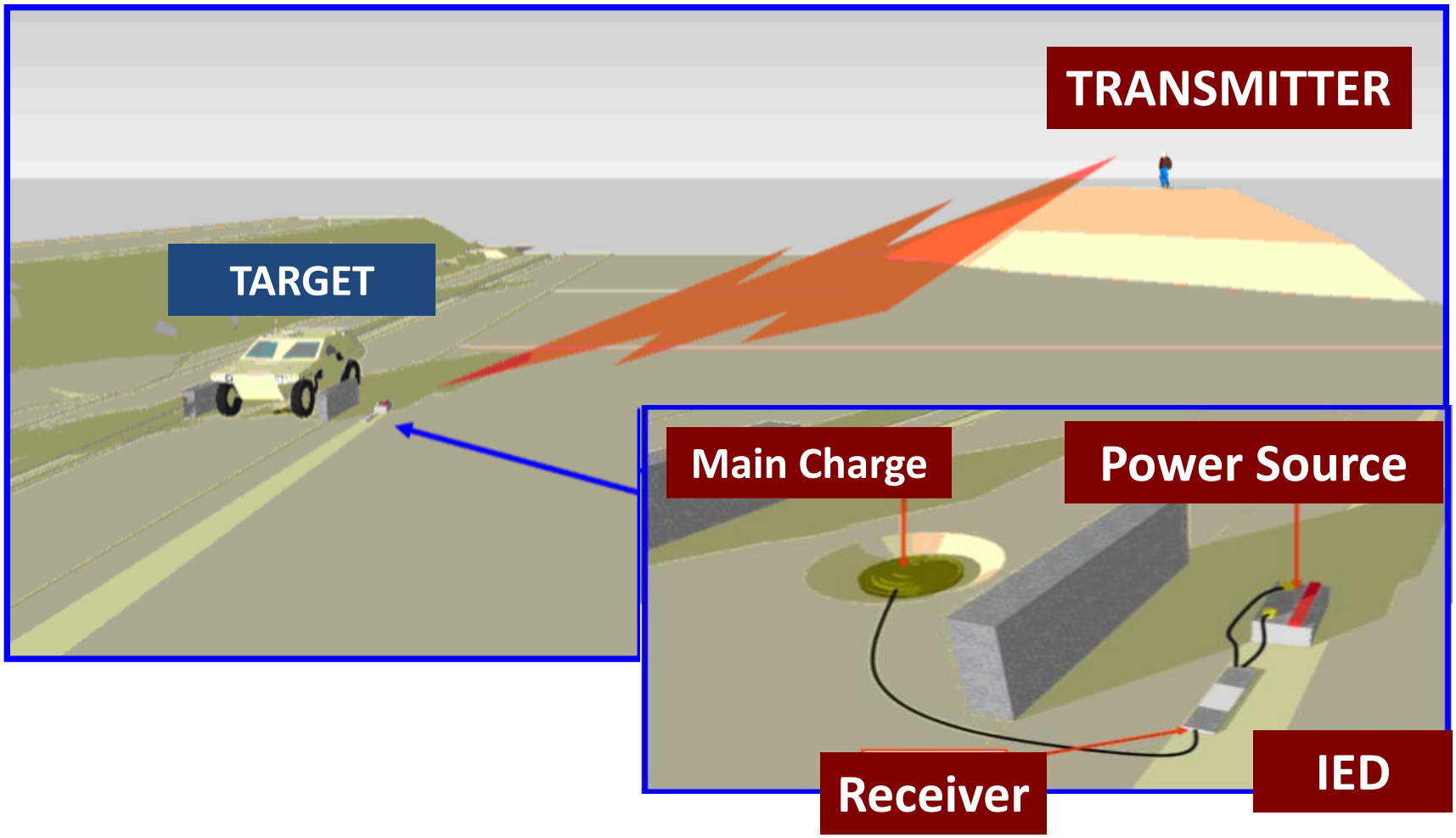
Keyless Entry Systems

Cell Phones



- Insurgent retains control
- Greater stand off between Contact Point and Firing Point
- Quick to emplace
- Receiver (Rx) and Transmitter (Tx) operating on same frequency

Radio Controlled Wire IED



Explosives / Main Charges

Military | **Commercial** | **Home-made**

IED Safety and Best Practice

IED indicators use - AWARE

Atmospherics

Warning Signs

Aiming Markers

Recognize Ground Signs

Examine surrounding for items out of place

IED Indicators / Ground Signs

- **Ground Sign, most essential indicators**
- **Evidence of change from natural state**
- **Emplacement & concealment leaves signs**

IED Warning and Aiming Markers

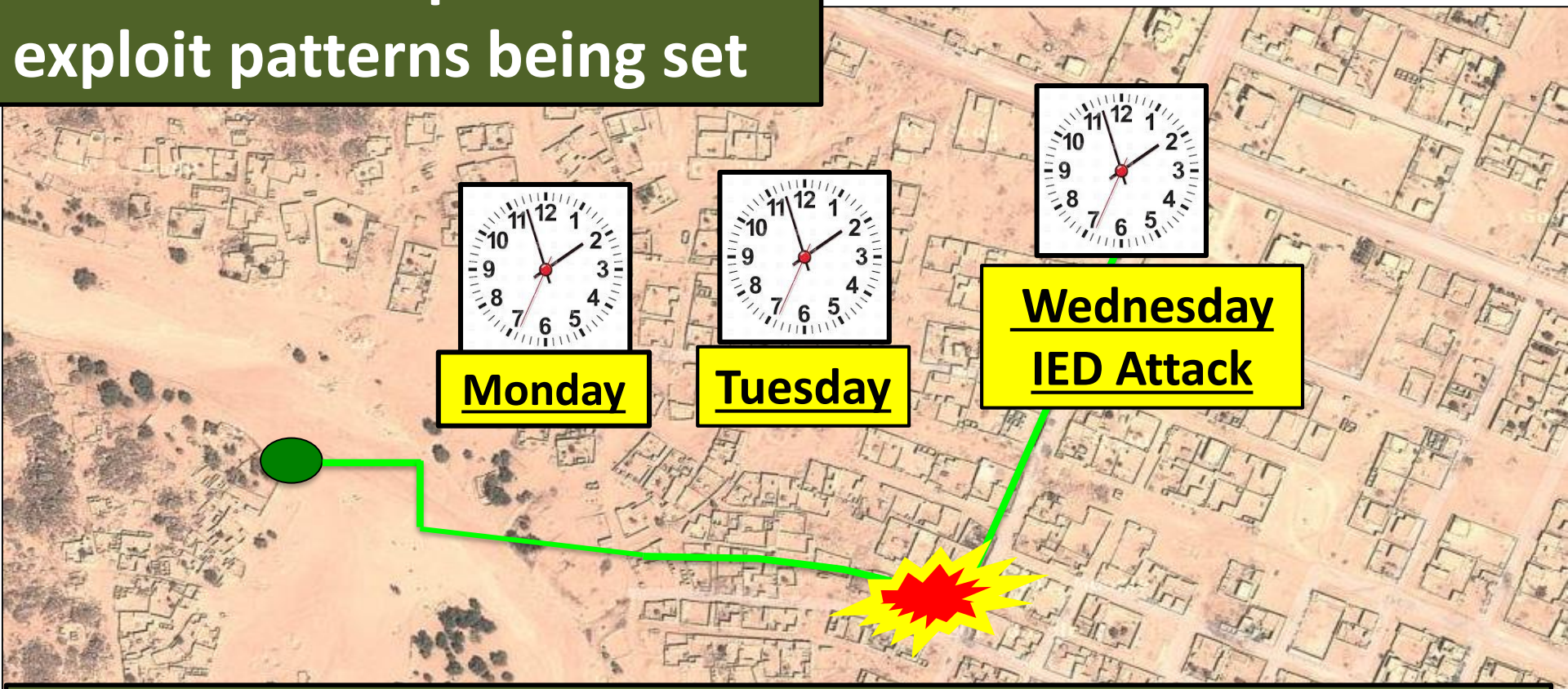
Warning Marker

Aiming Marker

- Different warning markers
- Used by locals / terrorists to warn population
- Aiming markers- to initiate IED accurately at intended target

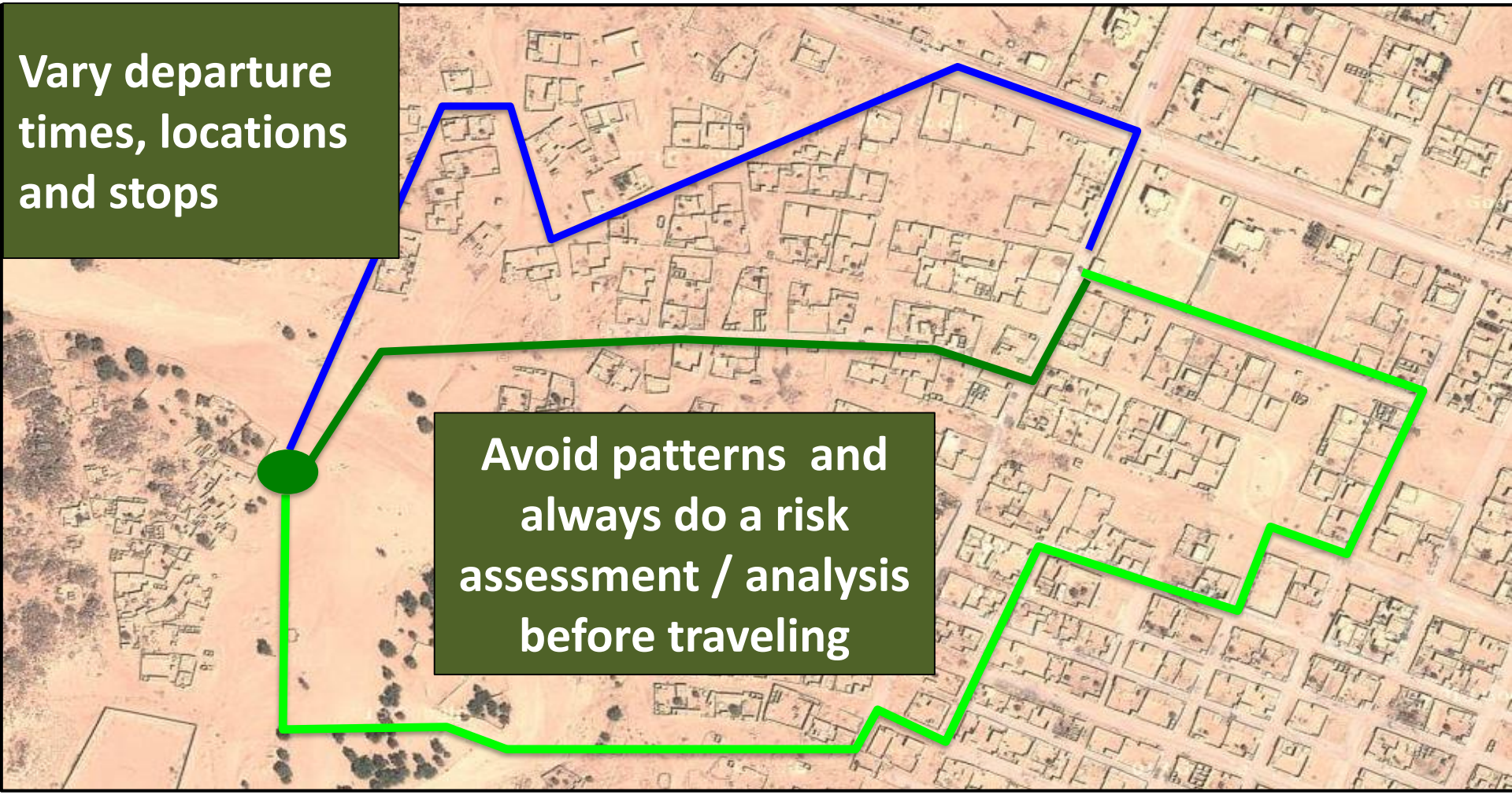
Avoid Setting Patterns

Attackers are quick to exploit patterns being set

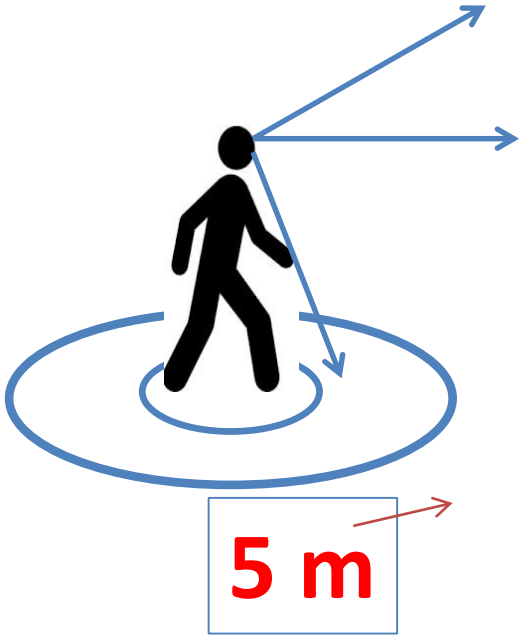


In today's asymmetric environment the UN is specifically targeted by armed groups

Avoid Setting Patterns



0/5/25 Meter Checks



- Look before you exit vehicle
- Search 5m around vehicle
- Expand search to 25m.

Actions on Finding an IED

STOP DO NOT APPROACH

DO NOT TOUCH

Actions- 5Cs

Confirm

Clear

Cordon

Control

Call

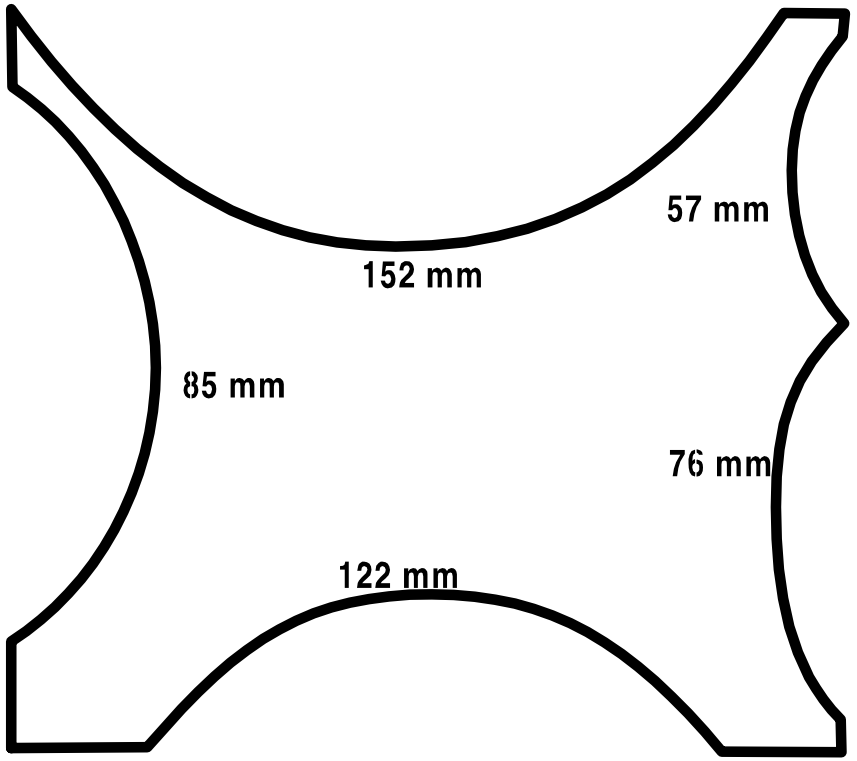
Crater Analysis

- Value of analysis
- Confirm presence of belligerent artillery
- Determine direction to source
- Verify or determine firing positions
- Detect presence of new weapons and caliber

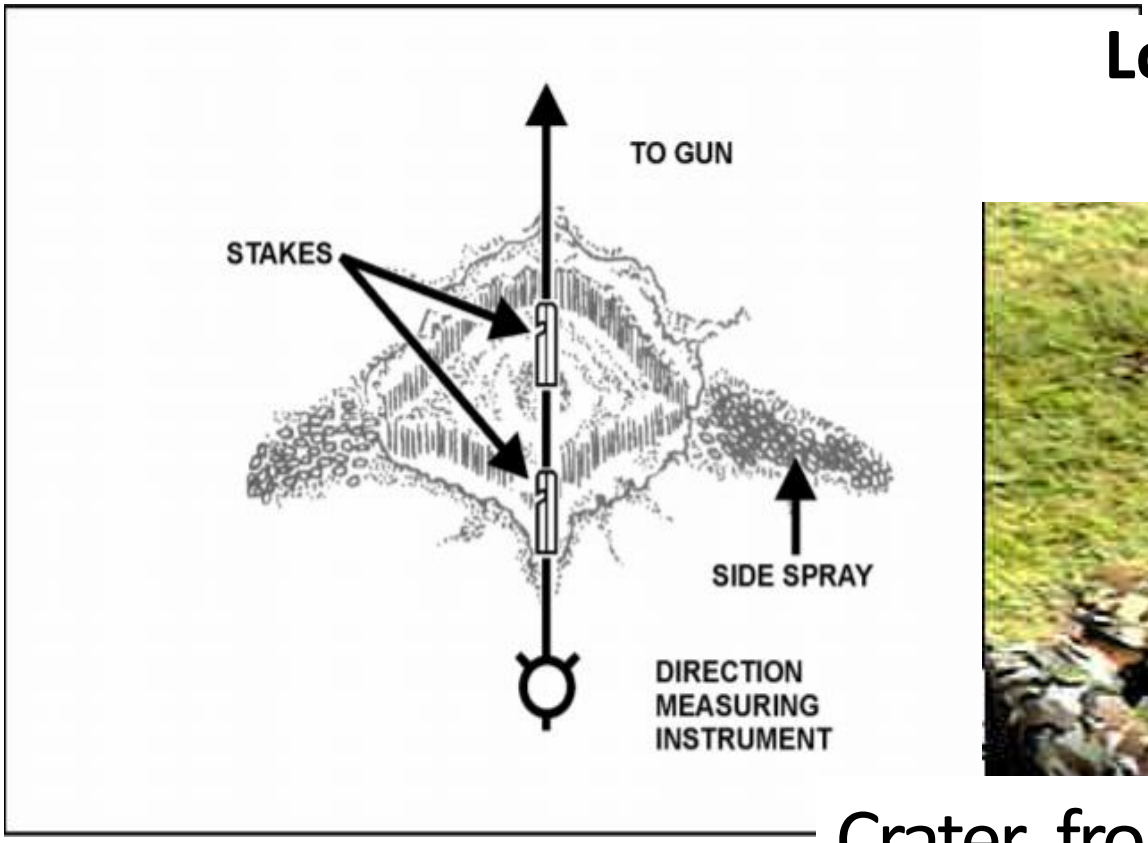
Crater Analysis

EQUIPMENT

- Compass, stakes, wire
- Still or video camera
- Curvature template



Artillery Crater Analysis

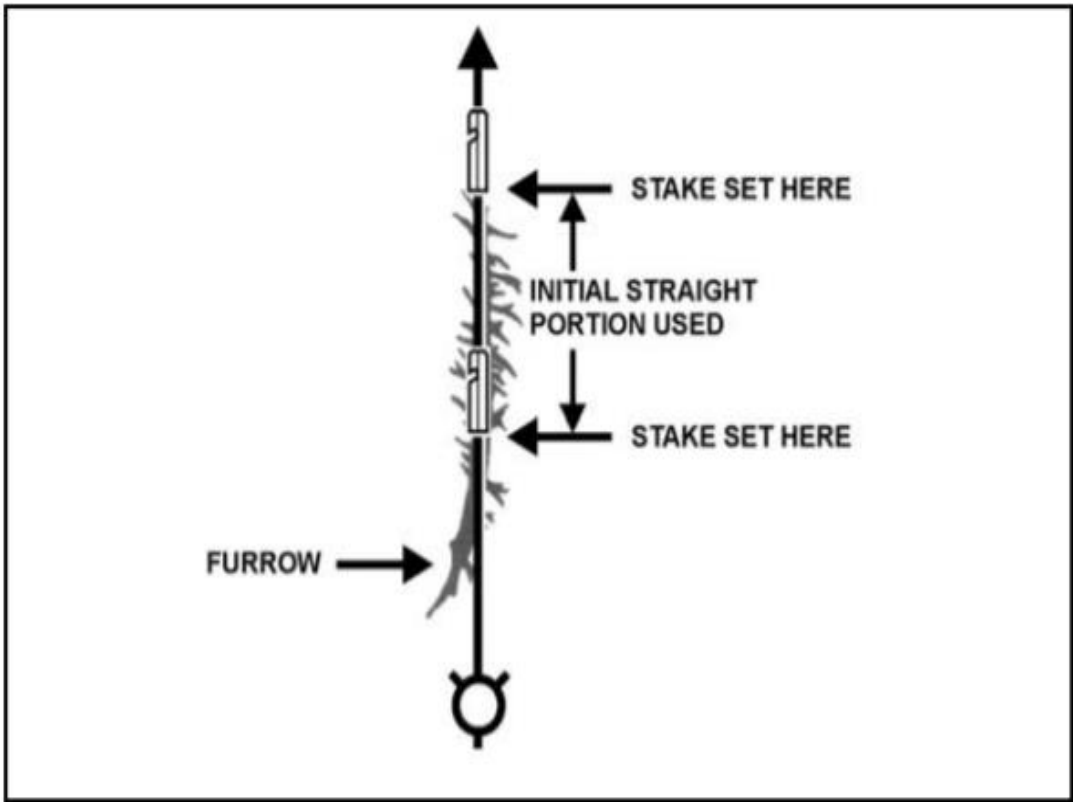


Artillery Round Quick Fuze (Center Stake Method)

Low-Angle Fuze Quick Craters (Artillery)

Crater from a rocket impacting, low or medium angle fall; analyzed as an artillery craters

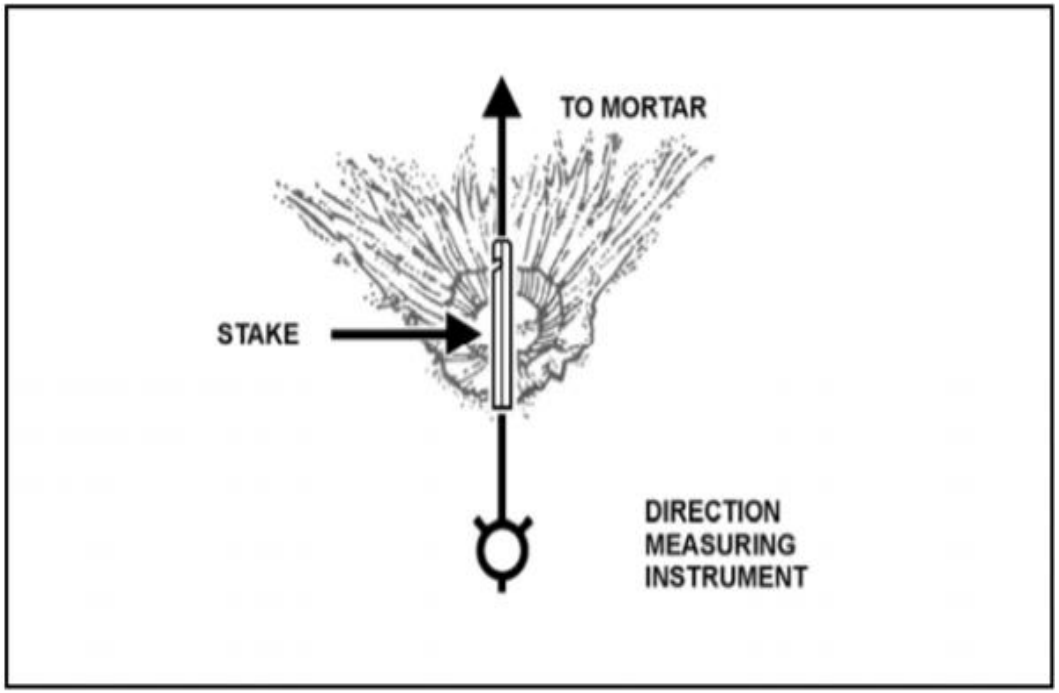
Artillery Crater Analysis



Low-Angle Fuze Delay Craters

- **Artillery Round (Fuze Delay)**
- **Ricochet Furrow Method**

Mortar Crater Analysis

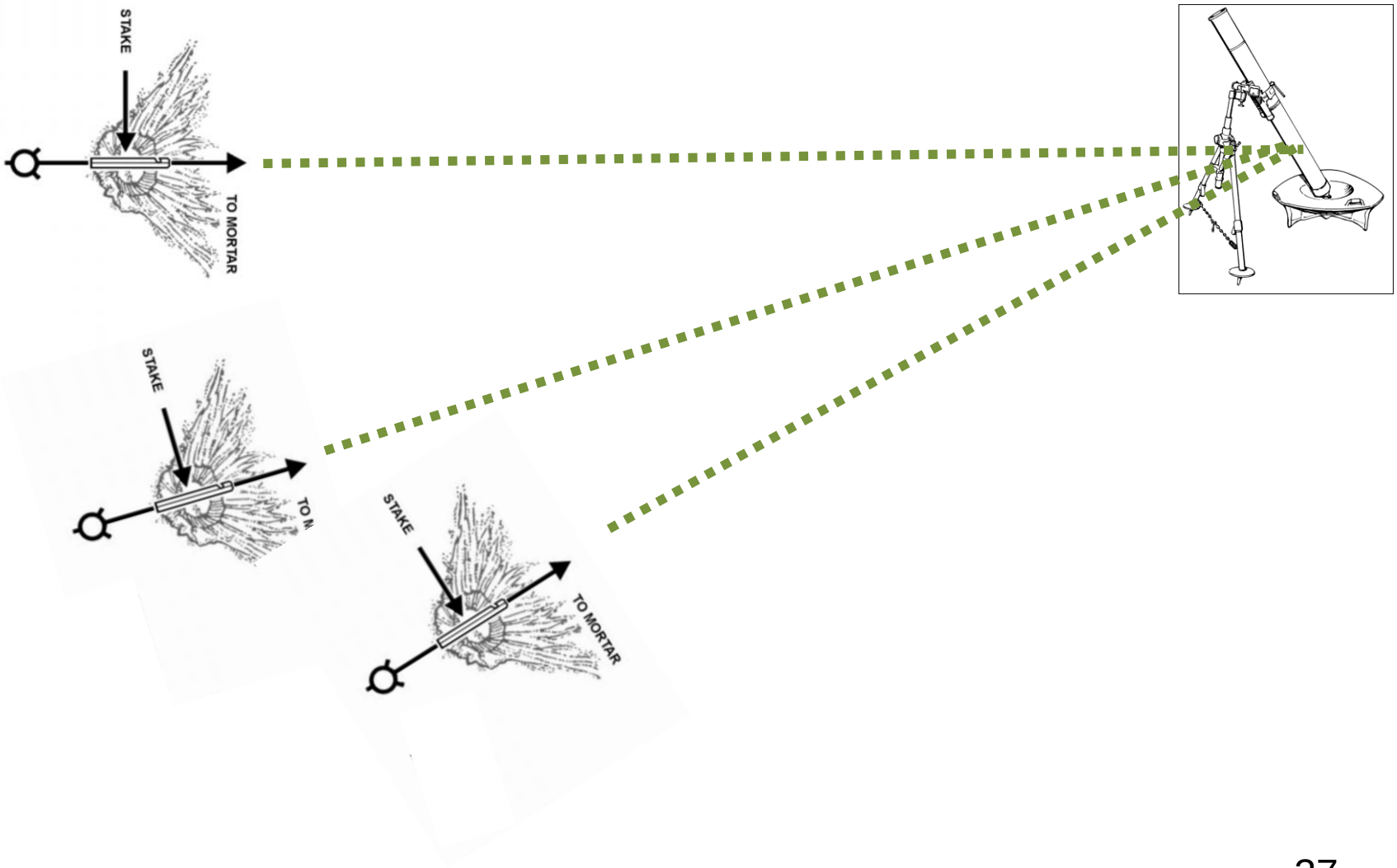


High-Angle Shell Craters (Mortars)

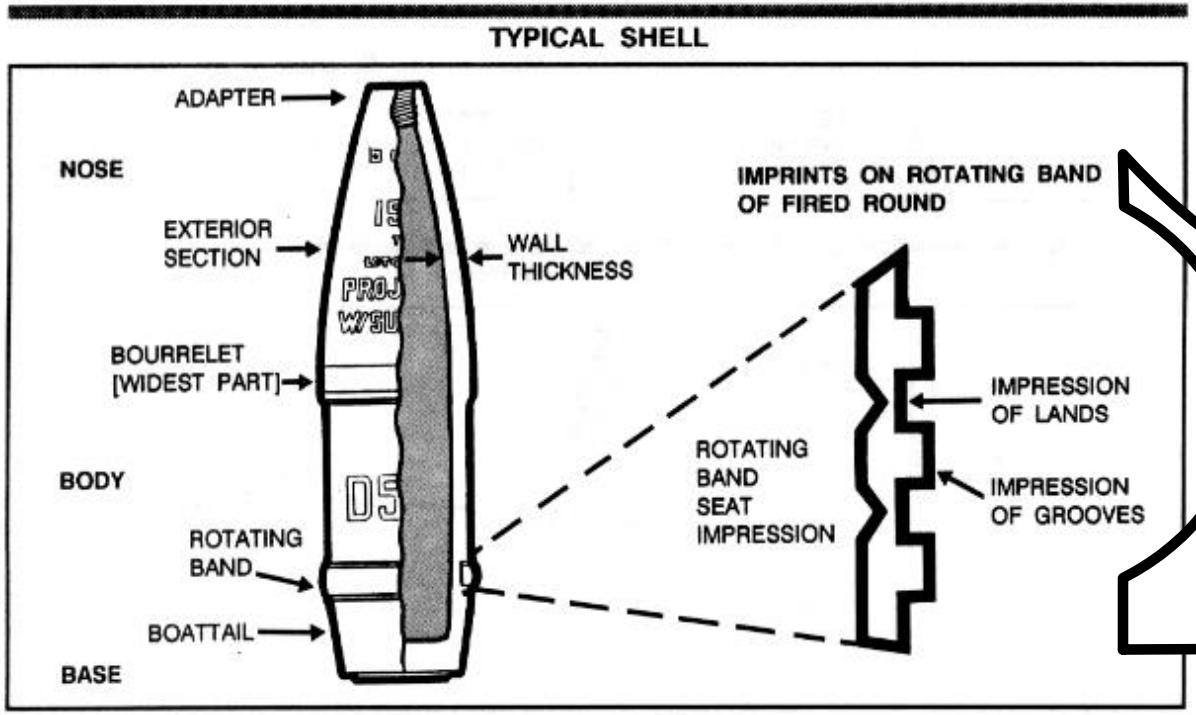
Rocket impacting high angle of fall analyzed same as a crater resulting from mortar round

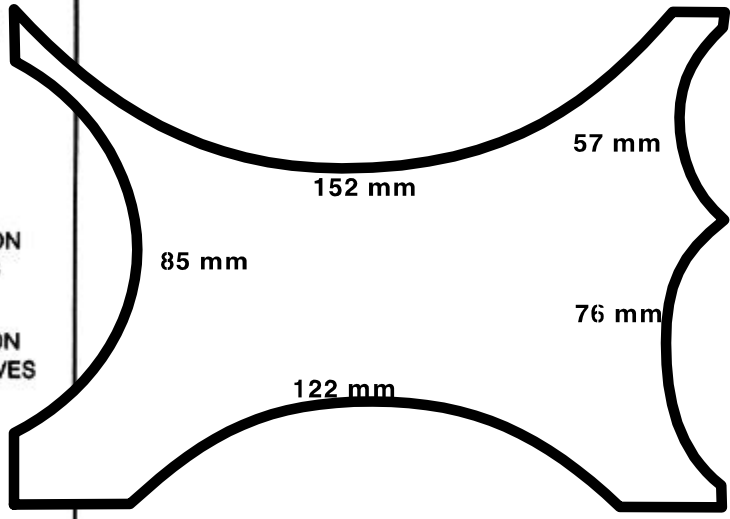
Mortar Round

Direction and Point of Origin



Fragment Analysis





- Duds and Low-Order Bursts
- High-Order Bursts
- Rotating Bands and Band Seats
- Tail Fins
- Fuzes

Lesson Take Away

- Do not touch, move explosive hazards
- Seek qualified help from UN experts
- IEDs are significant threats ; components-SPICE
- Know IED signs; use AWARE
- Crater Analysis determine direction and location of weapon systems

Questions