DARACK RESEARCH

SUMIDS: Small Unmanned Multi-Domain Systems

Next-Generation Systems and System Constellations for the Optimization and Projection of Warfighter Capability

Ed Darack

*This is an updated version of an article originally published on 7 FEBRUARY 2022 on the SUMIDS concept.

Darack Research DSA-2 during military testing and evaluation in California's eastern Sierra Nevada mountains. The DSA-2 is a pioneering SUMIDS capable of a wide spectrum of high-endurance, multi-domain operations. CREDIT: Ed Darack

INTRODUCTION:

SUMIDS, Small Unmanned Multi-Domain Systems, are next-generation military platforms that optimize warfighter situational awareness and signature at the tactical and operational levels. These single-person portable / single-person operable unmanned systems function in two or more domains, notably air and land, and comprise both active and passive mechanisms to dramatically extend warfighter capability. In addition to individual systems, the SUMIDS concept comprises constellations of specialized platforms that a warfighter / small unit can deploy and utilize in concert with one another, including marker beacons and pods carried by SUMIDS vehicles. Ed Darack developed the SUMIDS concept based on years of direct observation of warfighters in training and while deployed to combat in Afghanistan and Iraq, as well as historical research, notably detailed studies of missions like Operation Eagle Claw. Darack created the SUMIDS concept and evolved individual SUMIDS platforms for small units, including fire teams, squads, and platoons, as well as specialized teams including Scout Sniper teams and special operations teams, notably those tasked with special reconnaissance. SUMIDS were developed to be fluidly

integrated into in-place and evolving warfighting systems and constructs, synergizing a full spectrum of capabilities at tactical and operational levels—these are not meant to be ad hoc or standalone systems, but fully integrated to engender next-generation warfighter capability. The versatile nature of SUMIDS and SUMIDS constellations allows warfighters to perform a tremendous range of applications, including active and passive building of situational awareness, kinetic applications, cyber applications, MULTI-INT applications, meteorological monitoring applications, electronic warfare applications, communications applications, information operations, search and rescue applications, and others.

DEVELOPMENT:

The SUMIDS concept emerged to extend warfighter capability at the tactical and operational levels using high-persistence, multi-domain remote passive and active systems. Current generation small unmanned military systems provide low-persistence (less than one hour, typically) passive ISR or loitering munition capability, and function in only one domain (typically either air or land). They typically offer limited versatility and frequently require operators to create workarounds to adapt to their limitations, requiring deconfliction which interferes with primary warfighting responsibilities. Ed Darack developed these systems as extensions (as opposed to replacements) of warfighter capabilities—a suite of specialized tools to integrate tightly and intuitively into kill chain / kill web frameworks to optimize warfighter efficacy. SUMIDS extend warfighter situational awareness building ability through high persistence and use of active mechanisms; these systems naturally integrate into in-place constructs without impeding decision-making, notably weaponeering, and require minimal deconfliction. The concept was inspired, in part, by a warfighter's use of an integrated pointing and illumination module (like a PEQ-16B, which

A United States Marine rifleman aims an M4 carbine fitted with an ACOG (Advanced Combat Optical Gunsight) and an AN/PEQ-16B Mini Integrated Pointing Illumination Module (MIPIM) during a combat operation outside the city of Marjah, Afghanistan. The Marine is building situational awareness passively, by scanning the distance, and can build it actively for other mission components using a laser pointer, an illuminator, chemlights, or other active mechanisms. Observation of warfighters building situational awareness through both active and passive mechanisms served as a primary inspiration for the development of Darack Research SUMIDS. CREDIT: Ed Darack

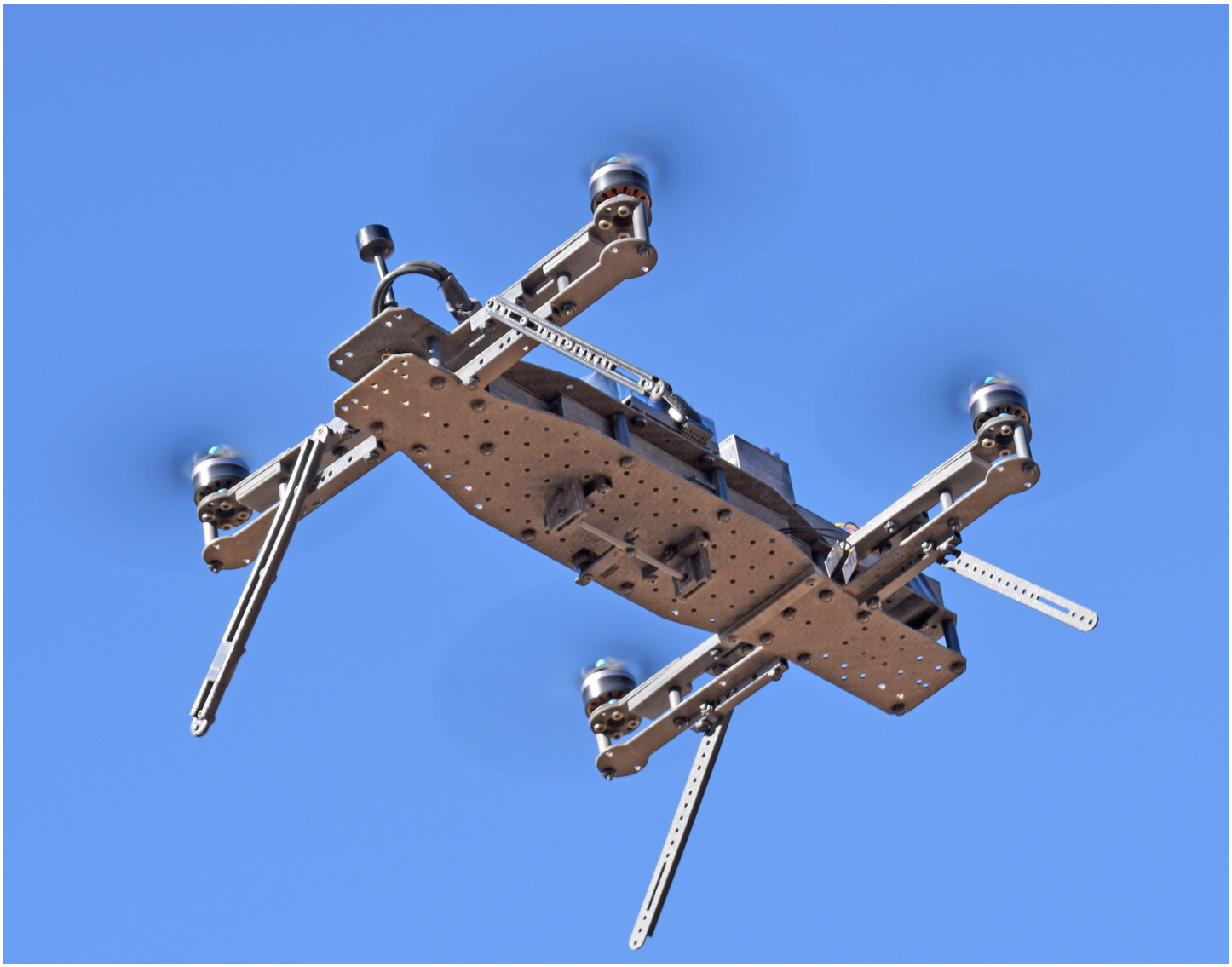
A United States Marine SAW gunner builds situational awareness by peering around a corner during a combat operation outside the city of Marjah, Afghanistan. SUMIDS can build situational awareness remotely, optimizing warfighter signature. CREDIT: Ed Darack

comprises a visible and an infrared laser pointer and a visible and an infrared illuminator) as well as the use of chemlights for marking tactical points. During a combat patrol, a user will build situational awareness by scanning an area and possibly illuminating a location of interest with the PEQ-16B's illuminator and / or using the laser pointer. Chemlights may be used to mark potential targets or landing zones. By paralleling these functions with a small unmanned system or constellation of small unmanned systems, small units can optimize situational awareness at the tactical and operational levels while maintaining optimized signature at a remote, covered location, "painting the battlespace" remotely.

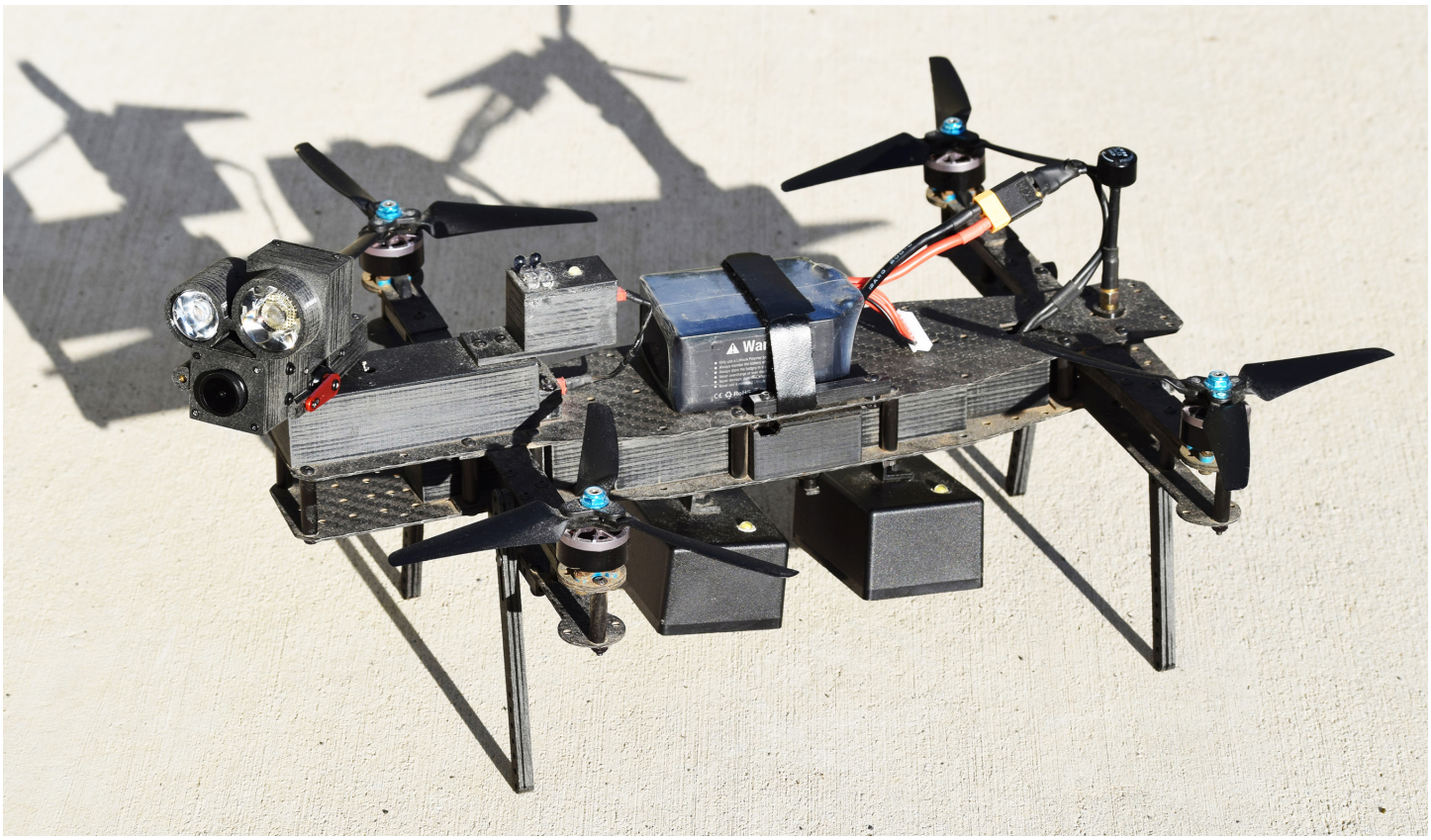
Ed Darack developed the SUMIDS concept and individual vehicles to meet several criteria: to be able to parallel the passive and active situational awareness building capabilities of an on-site warfighter, to optimize mission time, and to be highly versatile. The SUMIDS concept is best exemplified by the DSA-2 (Darack Research SUMIDS (Aerial)-2). The DSA-2 is a quadrotor (also called quadcopter) that weighs less than 12 pounds total, including controller, spare batteries, and spare componentry (vehicle weight being less than four pounds). The DSA-2, which measures 19 inches in length by 17 inches in width, features a fully articulating situational awareness module mounted atop the craft's forward extremity, an easily configurable landing gear system, a 2-point cargo system, and an open architecture form that is easily adaptable to specialized applications (including multiple tie-down points).

A Darack Research DSA-2 SUMIDS during military flight testing and operational evaluation. The DSA-2, a pioneering SUMIDS, has multiple tie-down points, has a quickly modifiable landing gear system, has a 2-hardpoint cargo system, and has its situational awareness module mounted on the upper forward aspect of the craft's body. It can be flown to a key terrain feature, powered down, and then it can conduct high-endurance ISR using its fully articulating situational awareness module, which comprises a day / night imagery sensor, a bore sight mounted laser pointer, a visible wavelength illuminator, and an 850-nanometer infrared illuminator. It can sparkle targets, illuminate targets, self-mark with an onboard high-intensity light emitting diode array, and deploy remotely activated marker beacons to mark targets, create landing zones, or mark other tactical points like target reference points (TRPs). CREDIT: Ed Darack

An operator can fly the DSA-2 over an area of interest (AOI) and perform aerial ISR (intelligence, surveillance, and reconnaissance) and then land it atop a key terrain feature and either power down or conduct low-power-consumption static ISR from the ground with the fully articulating situational awareness module. The situational awareness module comprises a day / night imager, a laser pointer bore sight mounted to the imager, a high-output visible wavelength illuminator, and a high-output 850-nanometer infrared illuminator. The DSA-2 can also be fitted with self-marking systems, including high-intensity infrared or visible wavelength marker lights. Furthermore, the DSA-2 can deploy up to two individual, remotely activated marker beacons or pods to mark targets or to create landing zones or other designated tactical points. The ability to power the system remotely allows for mission times not in minutes or hours, but in days, where a remote operator can conduct ISR at intervals, and then remotely reposition the DSA-2 as a mission requires, saving energy. The combination of passive ISR systems and active marking and illumination systems allows an individual warfighter to remotely build a tremendous level of situational awareness for all components of an operation at the tactical level and the operational level. This parallels the capabilities of an on-site warfighter using an integrated pointing and illumination module. Furthermore, SUMIDS enable this next generation of situational awareness to be built while maintaining optimized signature, engendering a massive evolutionary leap of multi-domain capability for the individual warfighter and small unit.



DSA-2 during military flight testing, underside view. View shows easily configurable, open architecture design, easily configurable landing gear system, multiple tie-down points, and 2-hardpoint cargo system. CREDIT: Ed Darack



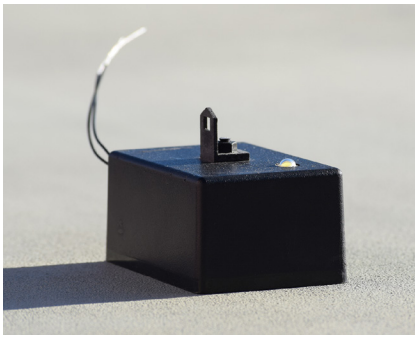
DSA-2, with remotely activated marker beacons mounted on vehicle's 2-hardpoint cargo system (each marker beacon can be individually deployed). This image shows the fully articulating situational awareness module (comprising a day / night imager, a bore sight mounted laser pointer, a visible wavelength illuminator, and an 850-nanometer infrared illuminator), a modular light pod (for self marking) behind the situational awareness module, the quickly adjustable landing gear system, and the open architecture design that is quickly and easily adaptable to a broad spectrum of applications due to the craft's form and multiple tie-down points. CREDIT: Ed Darack

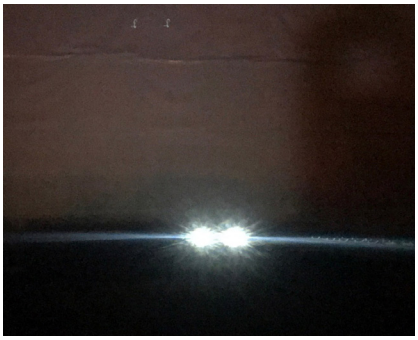
This series of images illustrates the highly versatile landing gear system of the DSA-2. Central to the SUMIDS concept, the landing gear of the DSA-2 can be quickly adapted to a wide variety of surfaces for operation on land. Each landing gear leg is mounted individually with a single bolt and can be adjusted to a wide variety of angles. This allows the DSA-2 to be landed on a variety of terrain for high-endurance ISR and situational awareness building. Shorter landing gear legs may be used for situations requiring the lowest profile for the DSA-2 while operating on land; longer landing gear legs can be used for situations requiring clearance of visual obstacles for the situational awareness module, and landing gear legs of varying length, each leg mounted at an appropriate angle, can be used for sloped surfaces like roofs. CREDIT: Ed Darack

Detailed view of the DSA-2's landing gear system, shown with easily mountable snowshoes attached for snow or mud operations. CREDIT: Ed Darack

Detailed view of the DSA-2's fully articulating situational awareness module, which comprises a day / night imager, a bore sight mounted laser pointer, a visible wavelength illuminator, and an 850-nanometer infrared illuminator. By mounting the situational awareness module on the upper side of the forward extremity of the DSA-2 ("up and out front"), the system can perform high-endurance ISR and situational awareness building while operating on land due to the configuration's intrinsic high field of view. A user can select an appropriate landing gear configuration, fly the DSA-2 to a predetermined key terrain feature, then pan and tilt the situational awareness module to gather imagery. Operator can then use active systems (laser pointer and illuminators) when needed to build situational awareness for other mission participants. Due to its ability to be powered down remotely, the DSA-2 can have on-station times stretching to days. CREDIT: Ed Darack

SUMIDS control unit with integrated screen for imagery downlink, showing image of an MV-22B Osprey during exercise at the Marine Corps Mountain Warfare Training Center in which SUMIDS were incorporated to build situational awareness. The operator controlled the situational awareness module from 2.6 miles distant in mountains overlooking the expeditionary airfield, illuminated areas of interest, sparkled notional targets, and marked notional targets with remotely activated marker beacons. CREDIT: Ed Darack





Remotely activated marker beacons that can be carried by the DSA-2 and other Darack Research SUMIDS. Left: detailed view of marker beacon. Middle: Deployed marker beacon. Right: Two side-by-side marker beacons activated at night. Marker beacons may be configured with high-intensity visible wavelength light emidding diodes (LEDs) (of a variety of colors), high-intensity infrared LEDs, or radio frequency emitters. CREDIT: Ed Darack

Demonstration of a helicopter landing zone created using the DSA-2 to remotely position marker beacons and using an onboard light pod. A user may remotely surveil a location for a landing zone, then position the two marker beacons and the vehicle in an appropriate geometry, then activate the marker beacons and onboard light pod. NOTE: reduced helicopter landing zone size for demonstration purposes. CREDIT: Ed Darack

SYSTEMS AND CONSTELLATIONS:

Darack Research has developed several SUMIDS vehicle systems, including the DSA-1, which is larger counterpart to the DSA-2; the Ground Surveillance and Targeting Vehicle (GSTV), a ground robot which can be deployed by hand or by the DSA-1; the Static Surveillance and Targeting Pod (SSTP), a stationary pod that can be deployed by hand, by the DSA-1, or the DSA-2; and several marker beacons and pods.

The full constellation of SUMIDS have been extensively tested and evaluated, notably by U.S. Marines, special operations forces, and by members of foreign ally forces during training exercises at the Marine Corps Mountain Warfare Training Center.

Basic functions of SUMIDS and scenarios in which they may be utilized (and have been tested during military training) are best illustrated through imagery from testing and evaluating and through simplified diagrams and maps.

Static demonstration of a remote meteorological monitoring station using a SUMIDS. Show is the DSA-1, a SUMIDS larger than the DSA-2. The versatile nature of SUMIDS and SUMIDS constellations allows warfighters to perform a tremendous range of applications, including active and passive building of situational awareness, kinetic applications, cyber applications, MULTI-INT collections applications, meteorological monitoring applications, electronic warfare applications, communications applications, search and rescue applications, and others. CREDIT: Ed Darack

Darack Research Ground Surveillance and Targeting Vehicle (GSTV). The GSTV can be carried by the DSA-1 through the air, deployed on the ground, and then perform ISR and situational awareness building from the ground. It comprises a situational awareness module (day / night imager, bore sight mounted laser pointer, visible wavelength illuminator, and an 850-nanometer infrared illuminator), a 2-point cargo system (to carry marker beacons, as shown in image), and has a form, like the DSA-1 and DSA-2, allowing use for a wide array of applications. CREDIT: Ed Darack

GSTV, antenna deployed, using visible wavelength illuminator during cold weather operations. CREDIT: Ed Darack

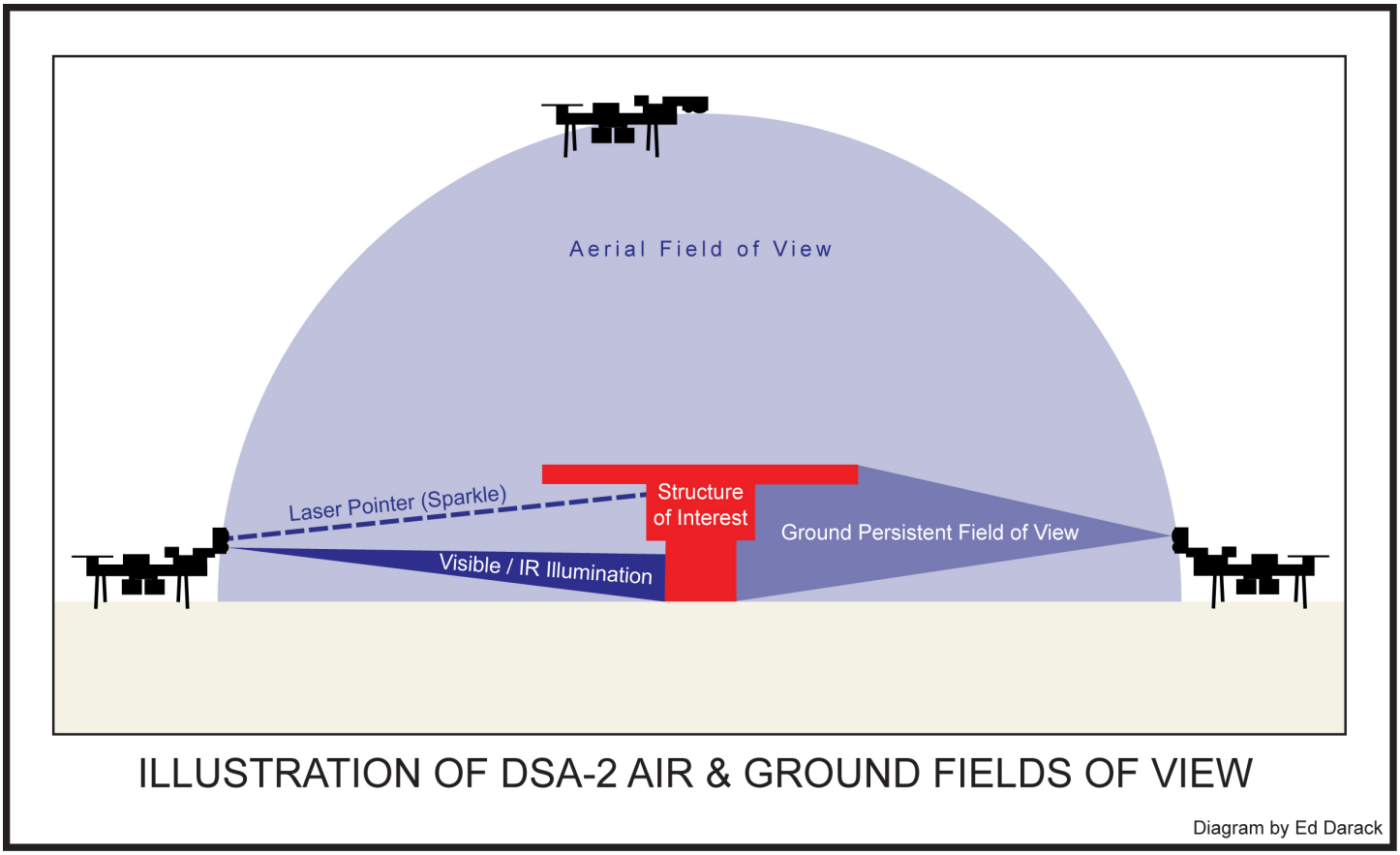
GSTV performing high-endurance ISR during mountain warfare training. CREDIT: Ed Darack

Darack Research Static Surveillance and Targeting Pod (SSTP). The SSTP, which can be carried and deployed by the DSA-1 or DSA-2, is a small pod that comprises a fully articulating day / night imager with a bore sight mounted laser pointer and a self marker. Shown in this image: cold weather testing of the SSTP; self marker activated. CREDIT: Ed Darack

Royal Marine testing the SSTP during mountain warfare training. CREDIT: Ed Darack

ILLUSTRATIONS OF SUMIDS FUNCTIONS AND HYPOTHETICAL SCENARIOS

The following illustrations graphically demonstrate SUMIDS functions and hypothetical scenarios using SUMIDS and SUMIDS constellations. Notably, these illustrate the fluid integration of SUMIDS into in-place and evolving warfighting constructs and show their next-generation utility and engendered synergy through this integration.



Page 12: Illustration of DSA-2 Air & Ground fields of view. This graphic illustrates the full spectrum fields of view attainable by SUMIDS like the DSA-2, from overhead (nadir) imagery to high oblique imagery, to low oblique imagery, to imagery sourced from the ground (including upward looking). Many of the most important views of a target are unattainable by aerial and space-based platforms; SUMIDS like the DSA-2 provide a full-spectrum view. CREDIT: Ed Darack

Page 13: This graphic illustrates that intelligence from space-based and aerial platforms may be fused with intelligence sourced by SUMIDS, before, during, and after an operation, and how this fusion approach yields the most comprehensive overview of a target. As with other forms of intelligence collections platforms, each may play a role in an evolving operation throughout all phases. In many situations where SUMIDS may be employed, initial site surveys that determine how SUMIDS may be employed begin with analysis of intelligence data sourced from NRO and aerial platforms (manned and unmanned). SUMIDS like the DSA-2, due to its full-spectrum intelligence collections capabilities as illustrated above, provide invaluable detail unattainable by other means, notably during the most critical phases of an operation. SUMIDS optimizes efficacy at the tactical an operational levels through synergy with other platforms engendered through full-spectrum intelligence collections capabilities, including modularized MULTI-INT, and active systems. CREDIT: Ed Darack

NRO MULTI-INTELLIGENCE

UNMANNED AERIAL DEDICATED MULTI-INTELLIGENCE

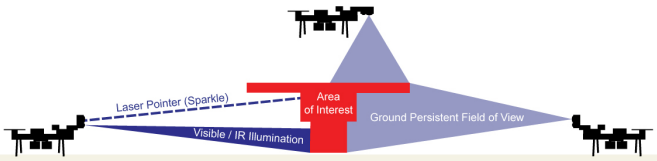
UNMANNED AERIAL MULTI-ROLE / MULTI-INTELLIGENCE

MANNED AERIAL MULTI-ROLE / MULTI-INTELLIGENCE

MANNED AERIAL DEDICATED MULTI-INTELLIGENCE

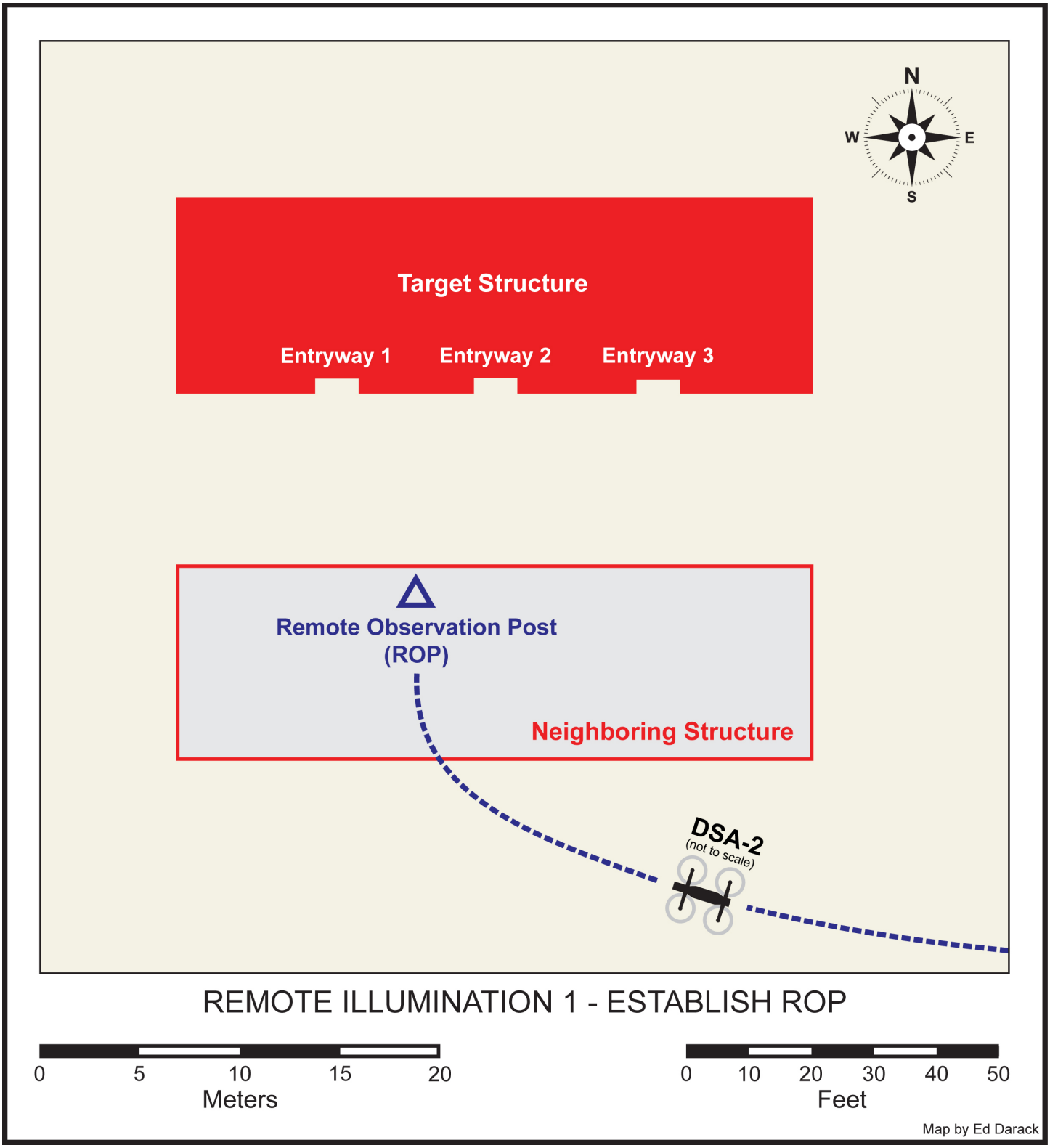
UNMANNED AERIAL LOW-ALTITUDE DEDICATED MULTI-INTELLIGENCE (PRIMARILY IMINT)

SUMIDS PASSIVE IMINT / MODULARIZED MULTI-INT / ACTIVE SYSTEMS



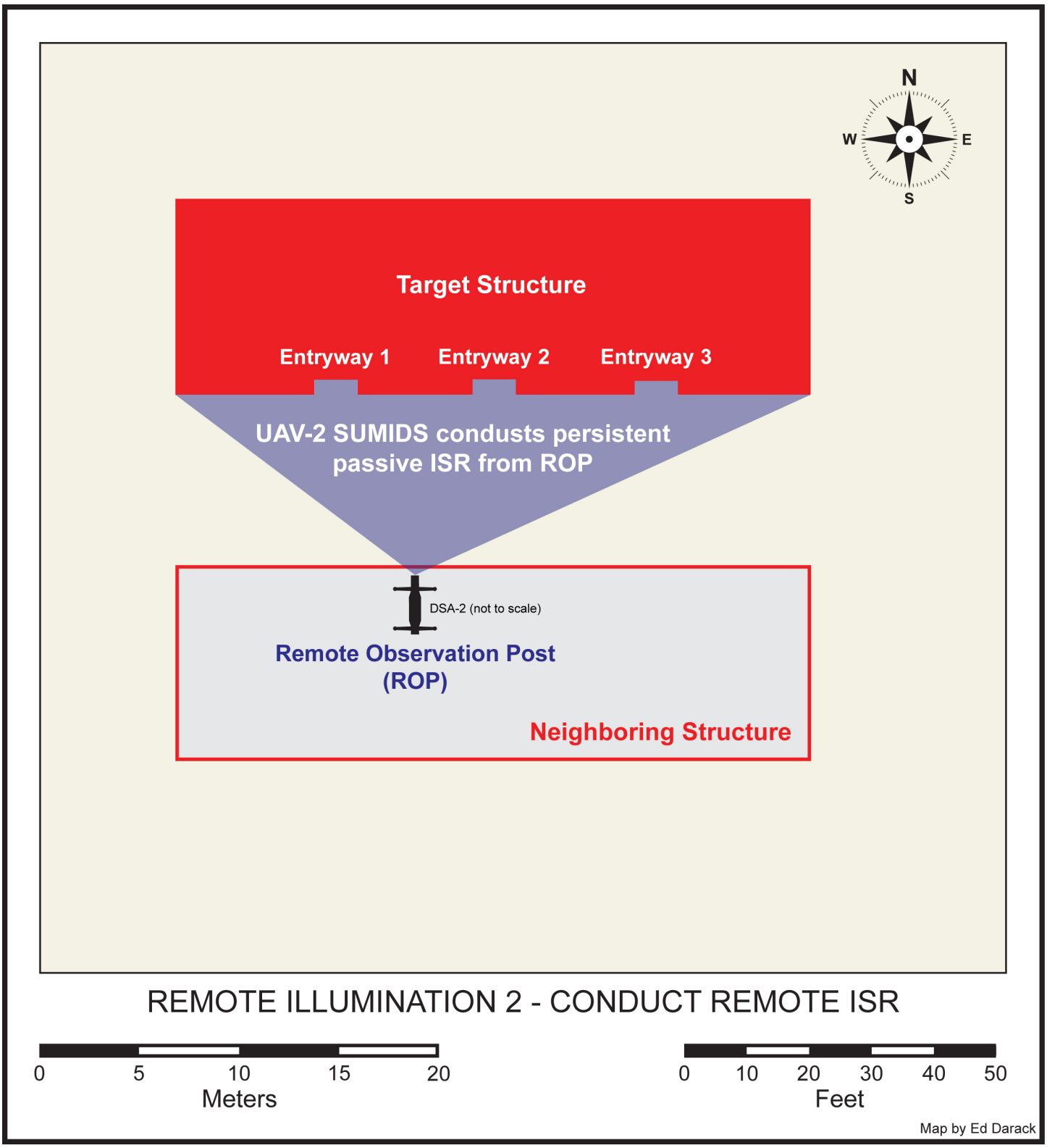
SUMIDS FUSION / INTEGRATION - FULL-SPECTRUM SYNERGIZED SA

Diagram by Ed Darack

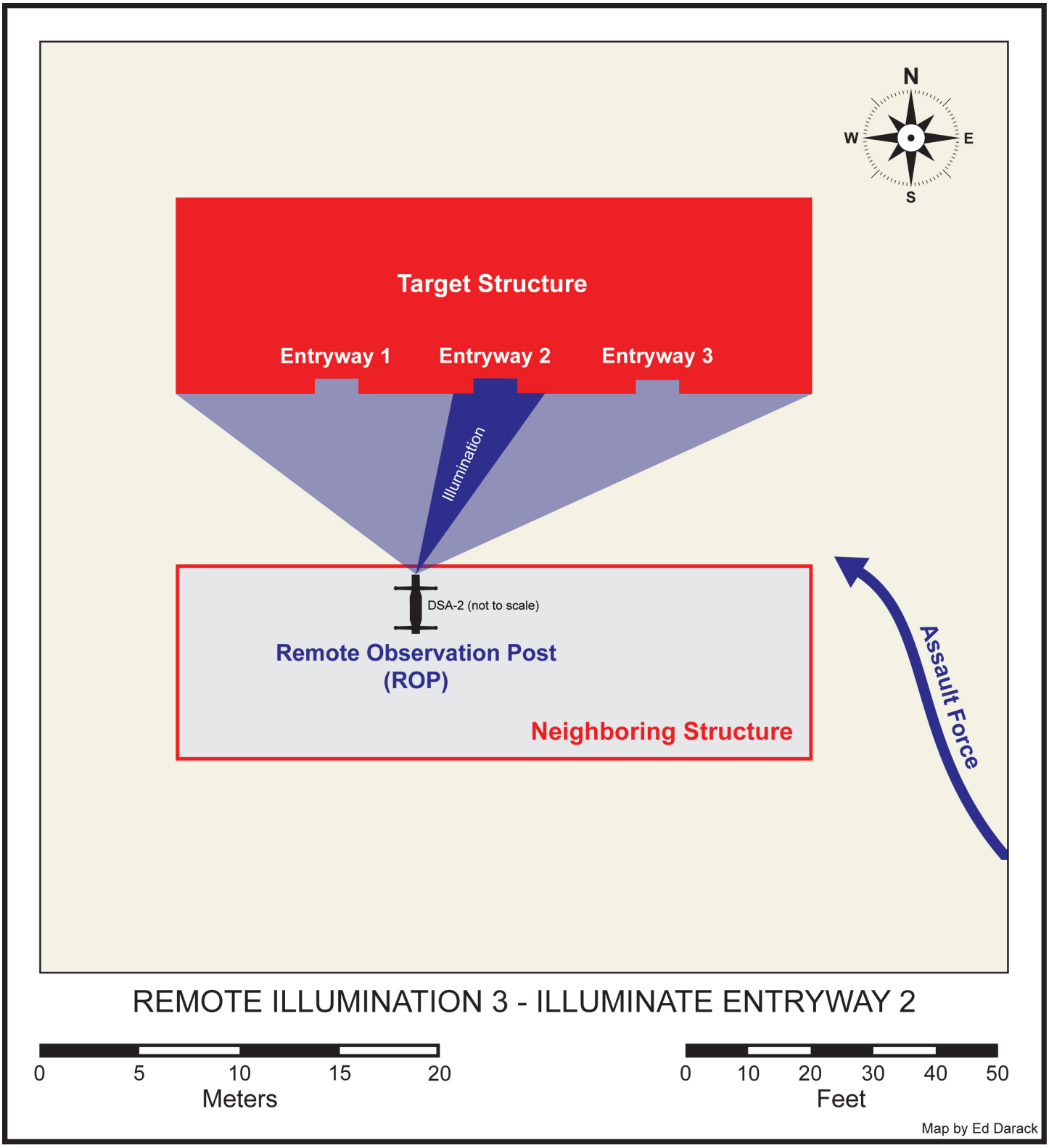


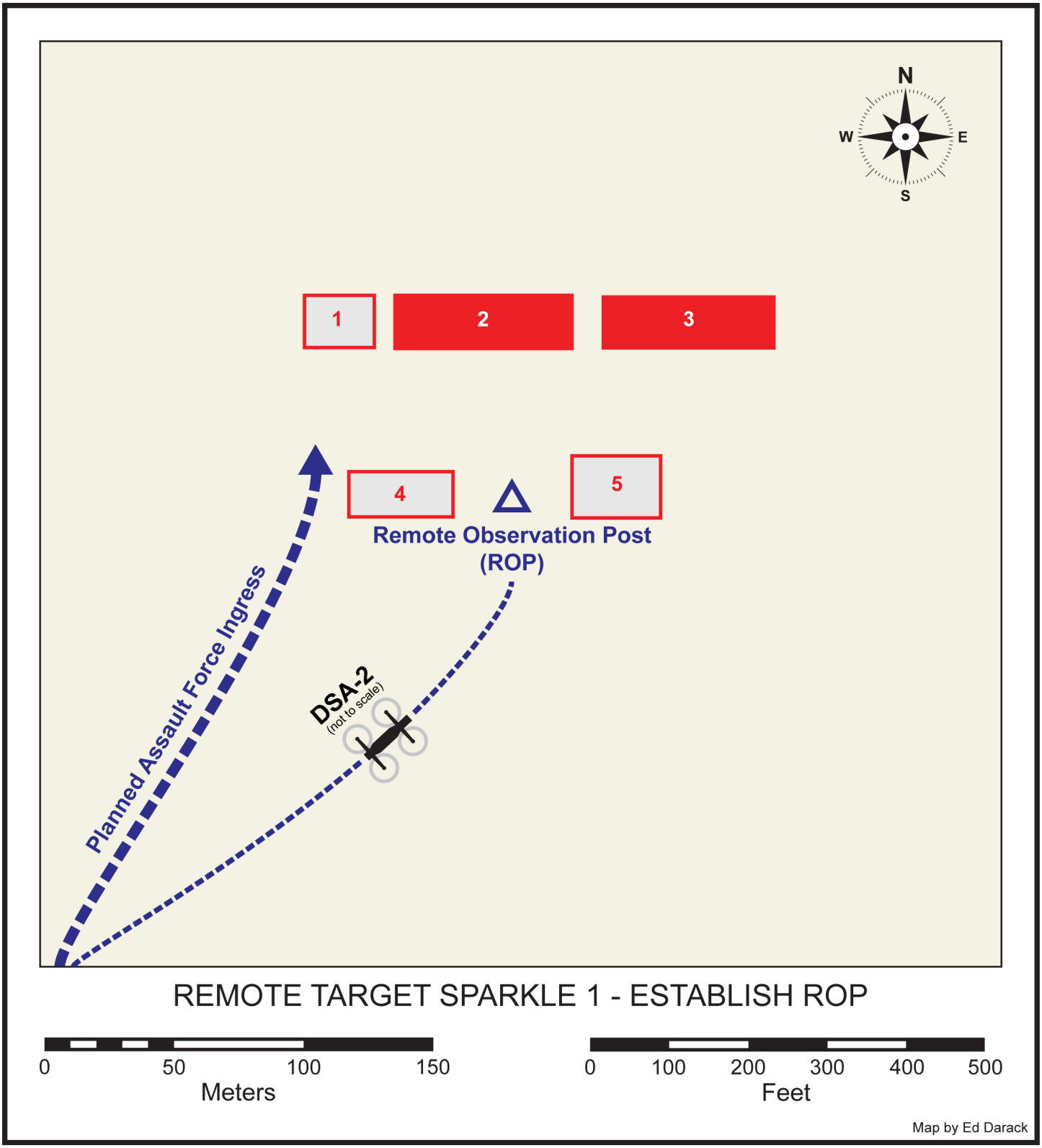
Page 14, 15, 16: Establishment of a remote observation post (ROP), ISR, and then remote illumination using a Darack Research DSA-2. Through ISR, an operator identifies the most appropriate entryway to be used by an assault force and then illuminates it using the remote infrared illuminator. The remote illumination provides optimized situational awareness for an ingressing assault force; the assault force operates with optimized signature as the illumination source is the DSA-2, not members of the assault force. CREDIT: Ed Darack

REMOTE ILLUMINATION



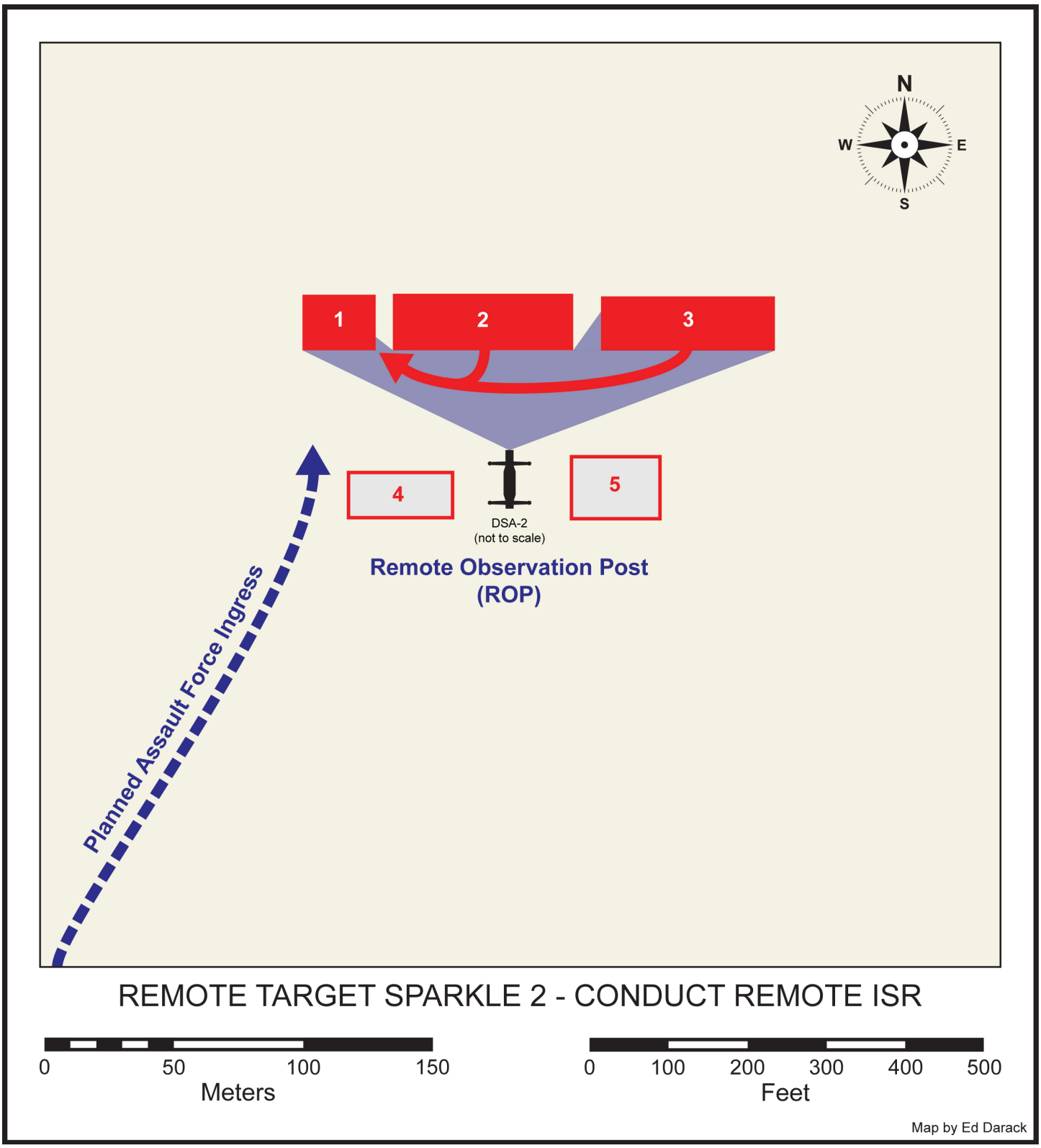
REMOTE ILLUMINATION



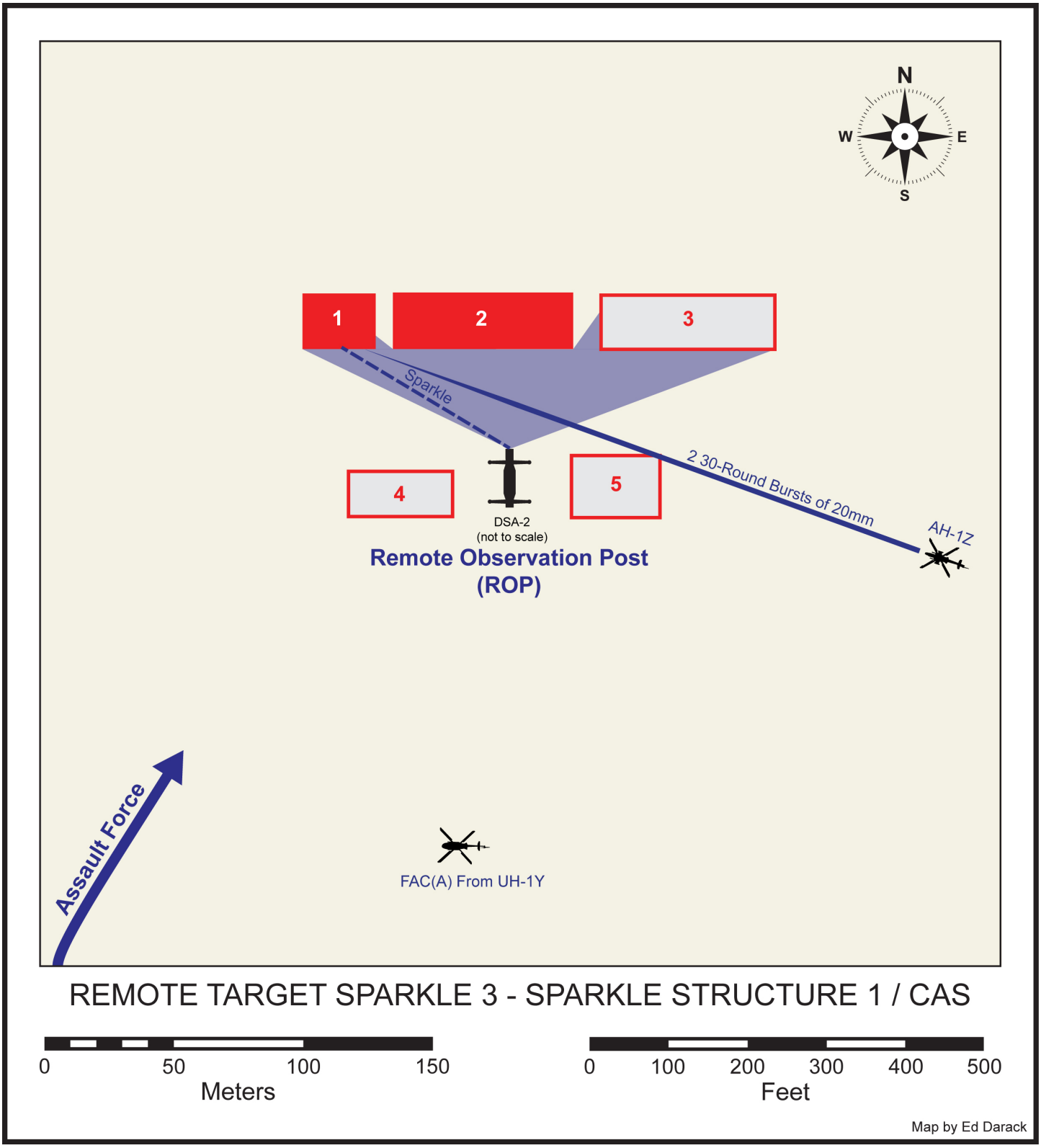


Pages 17-20: Establishment of a remote observation post (ROP), ISR, and then remote sparkle using a Darack Research DSA-2. Operator remotely identifies movement of enemy personnel and is able to remotely positively identify (PID) and sparkle target structure for AH-1Z and UH-1Y strikes, where the UH-1Y conducts forward air control (airborne) (FAC(A)). This scenario demonstrates the next-generation, fully integrated capability of SUMIDS for in-place and evolving warfighting constructs. CREDIT: Ed Darack

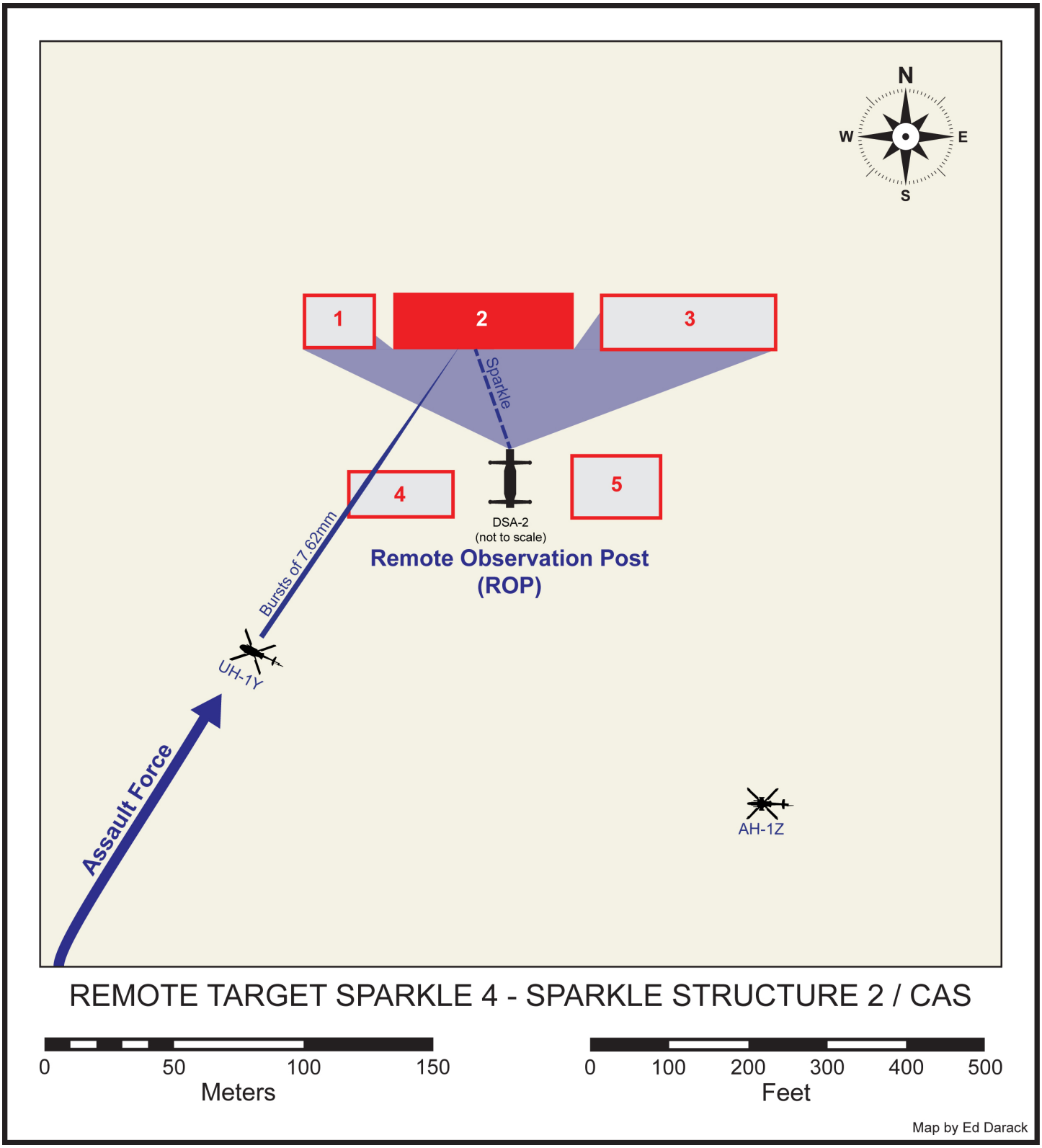
REMOTE TARGET SPARKLE



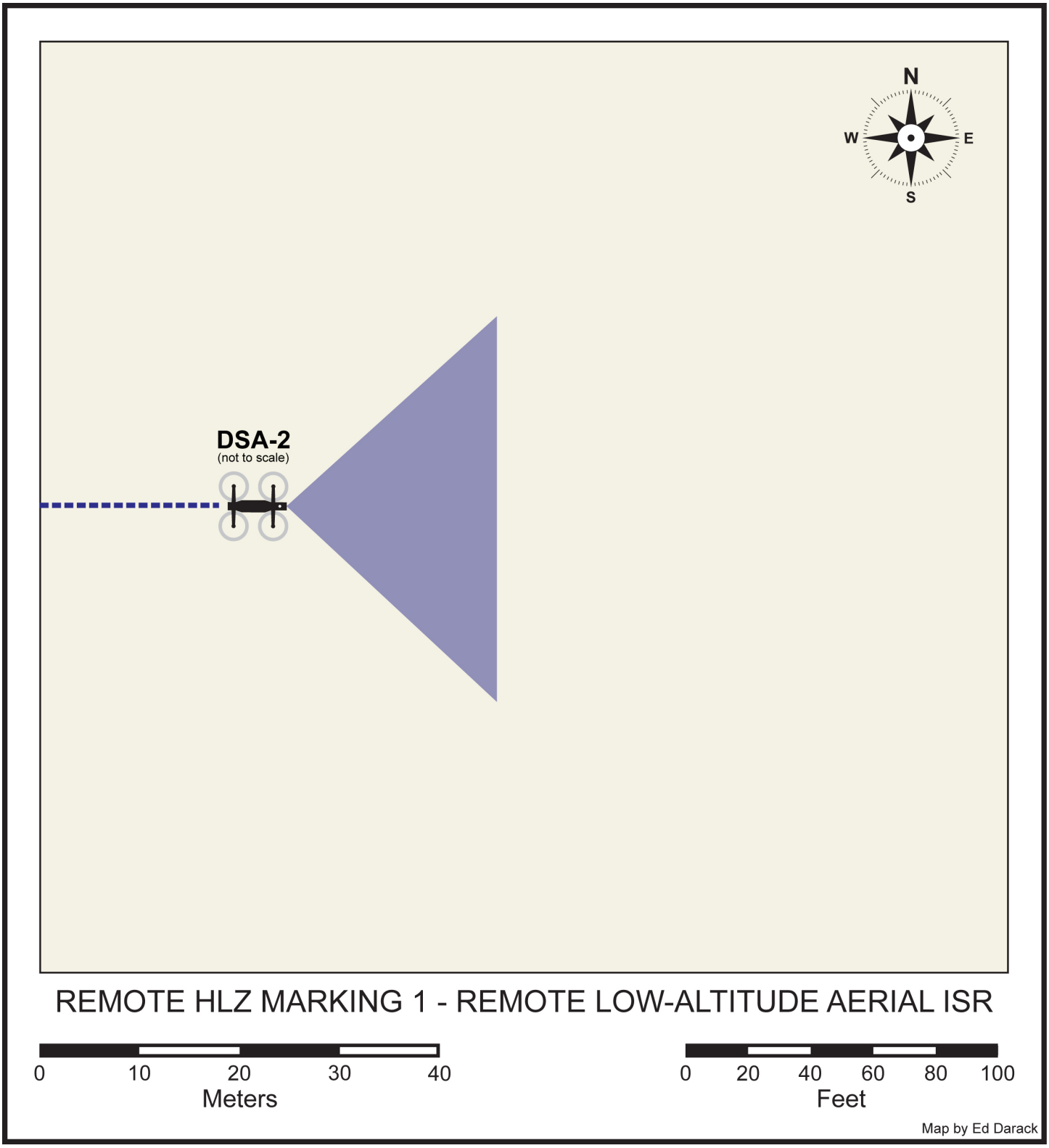
REMOTE TARGET SPARKLE



REMOTE TARGET SPARKLE

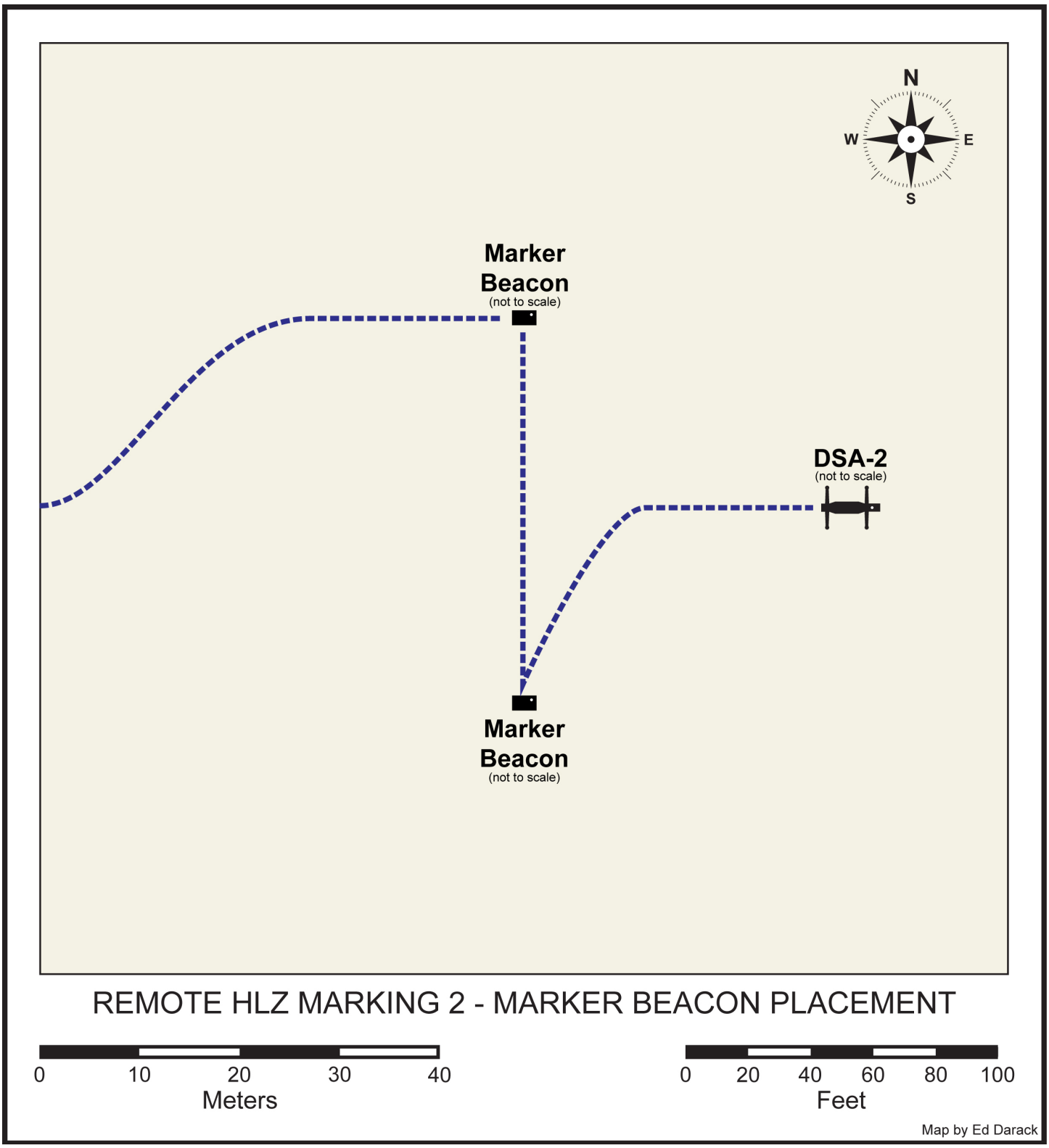


REMOTE HELICOPTER LANDING ZONE MARKING

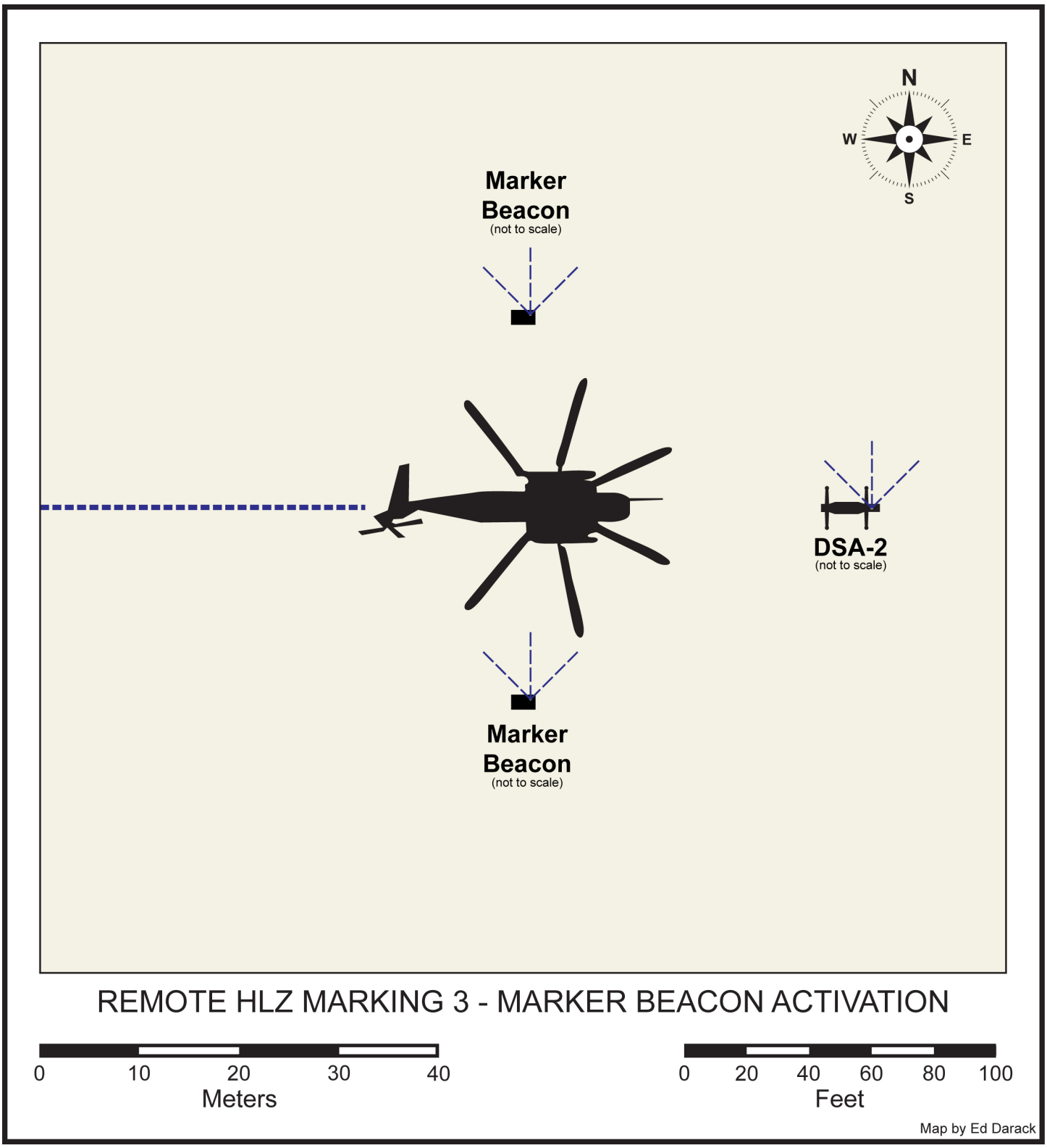


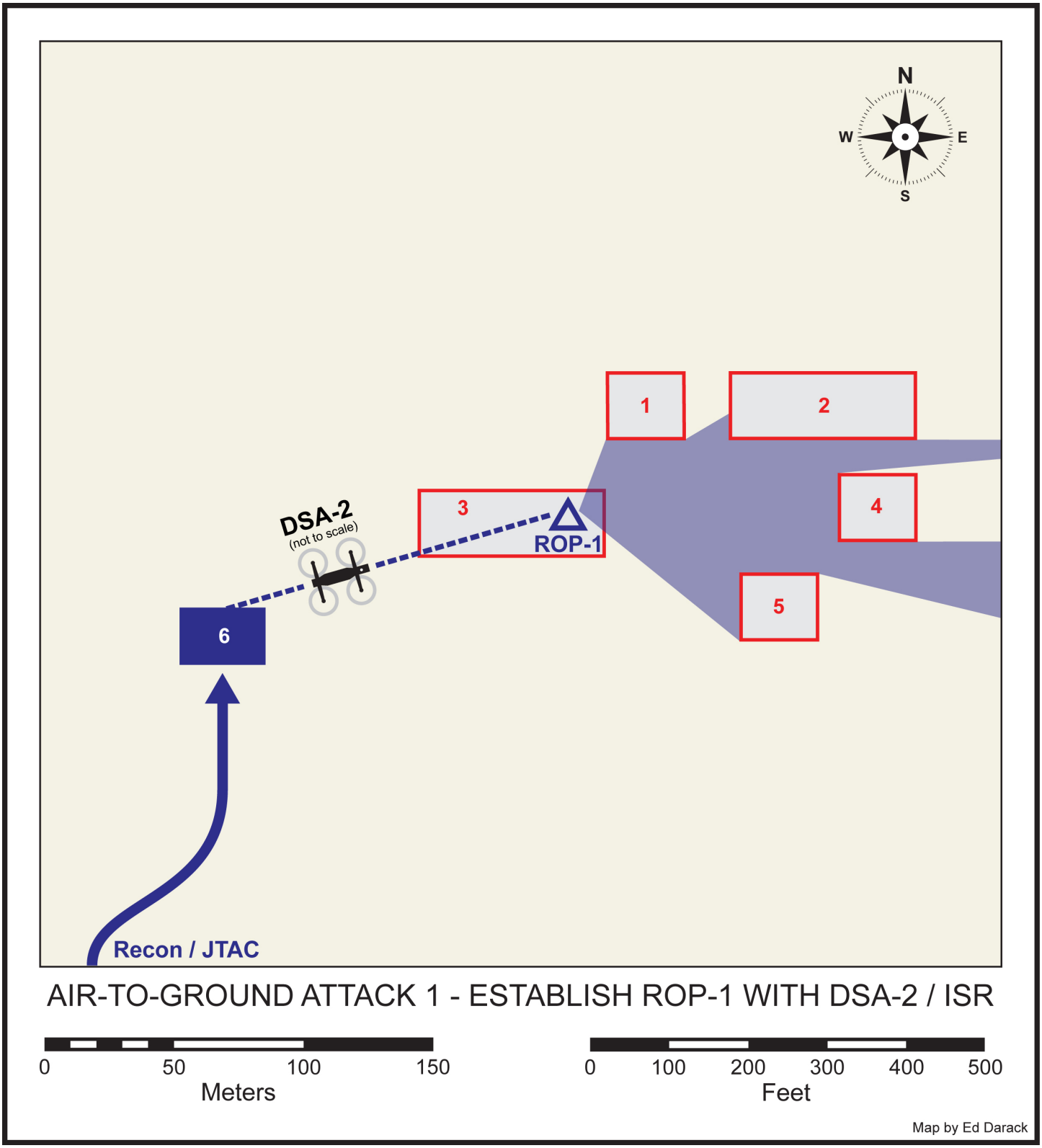
Pages 21, 22, 23: Illustration of the remote establishment of a helicopter landing zone with the DSA-2. The process begins with low-altitude ISR to determine detailed nature of surface, then proceeds to the positioning of remotely activated marker beacons, then the positioning of the DSA-2, and then activation of marker beacons and onboard light pod on the DSA-2. CREDIT: Ed Darack

REMOTE HELICOPTER LANDING ZONE MARKING

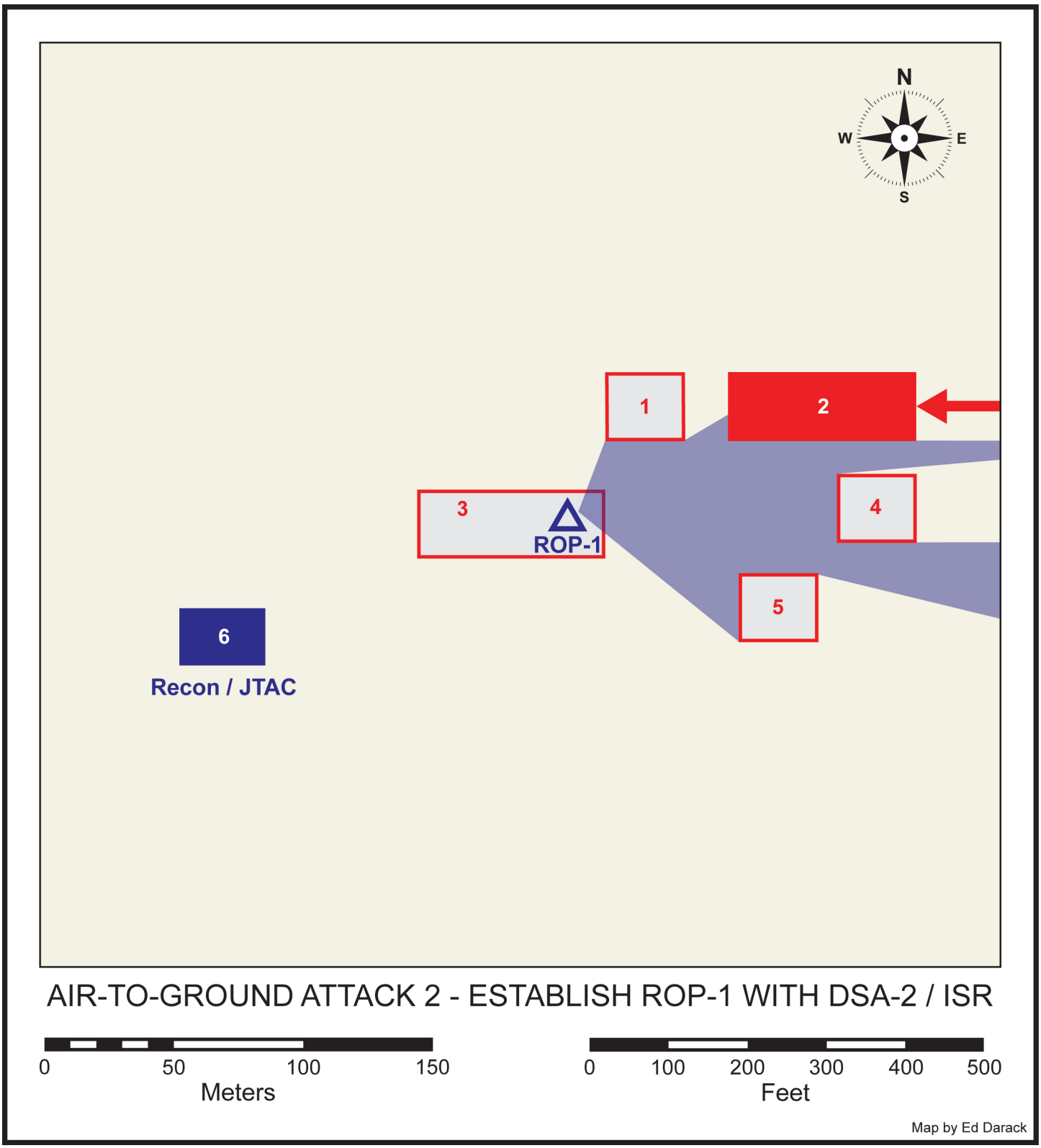


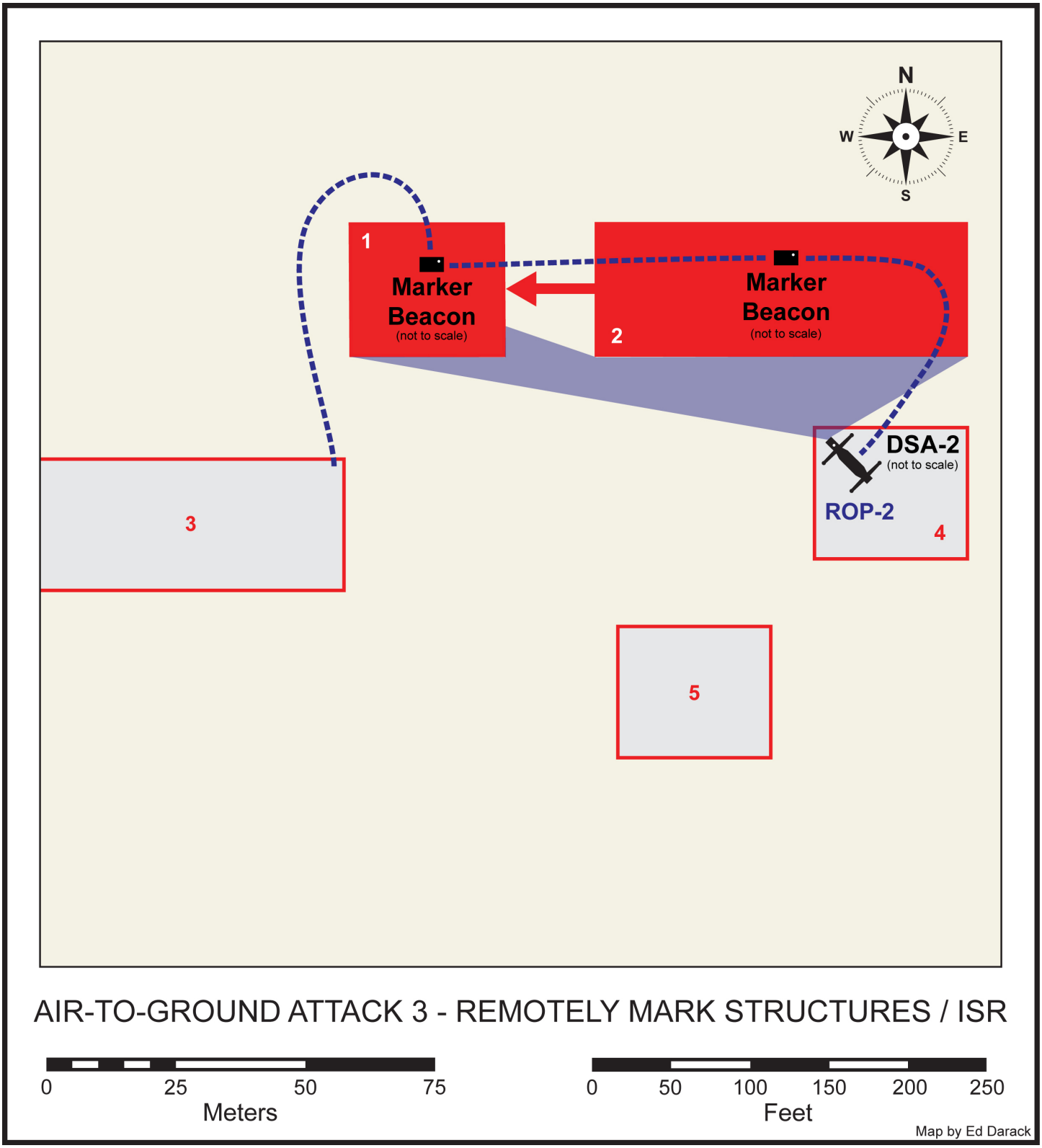
REMOTE HELICOPTER LANDING ZONE MARKING

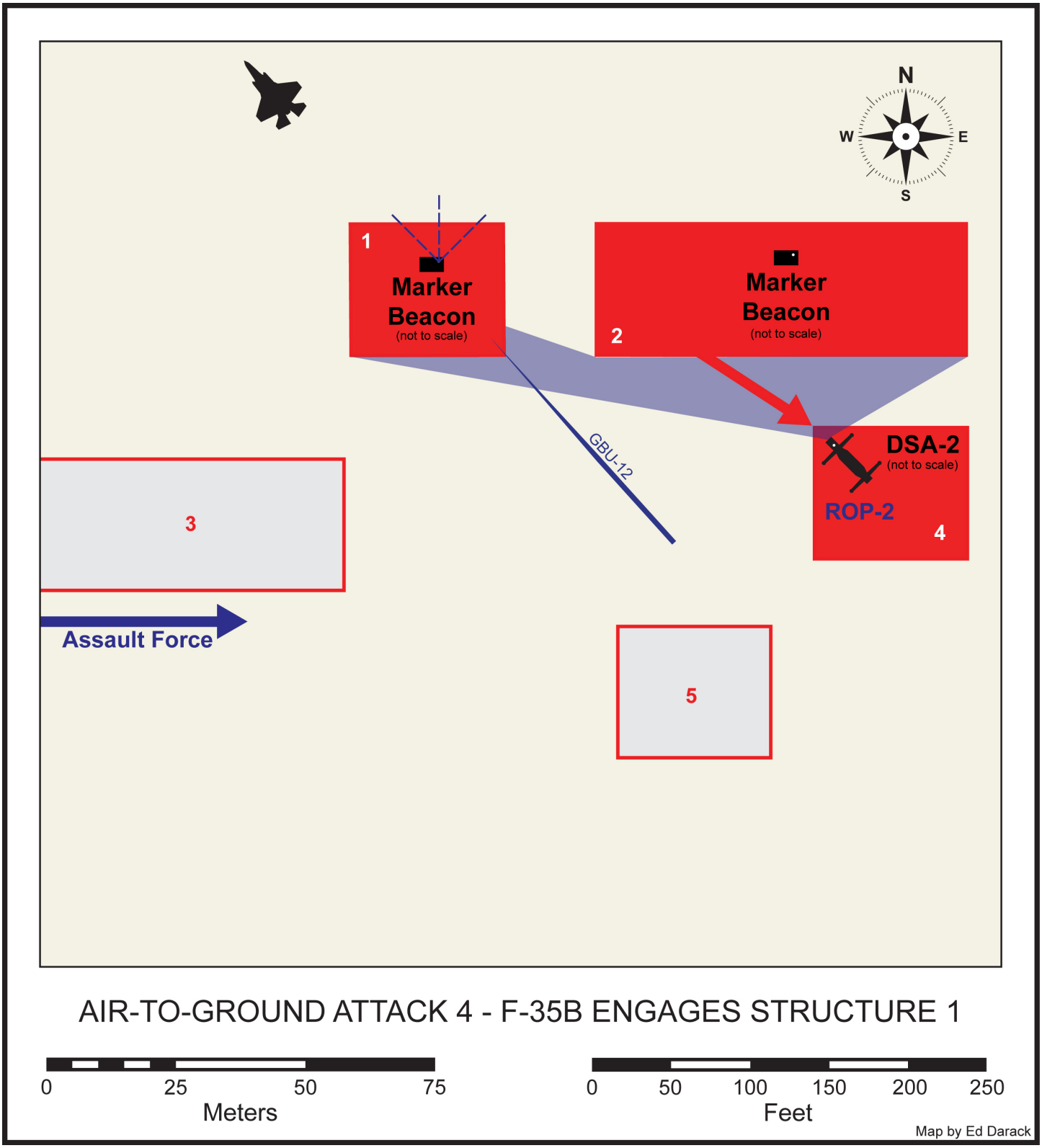




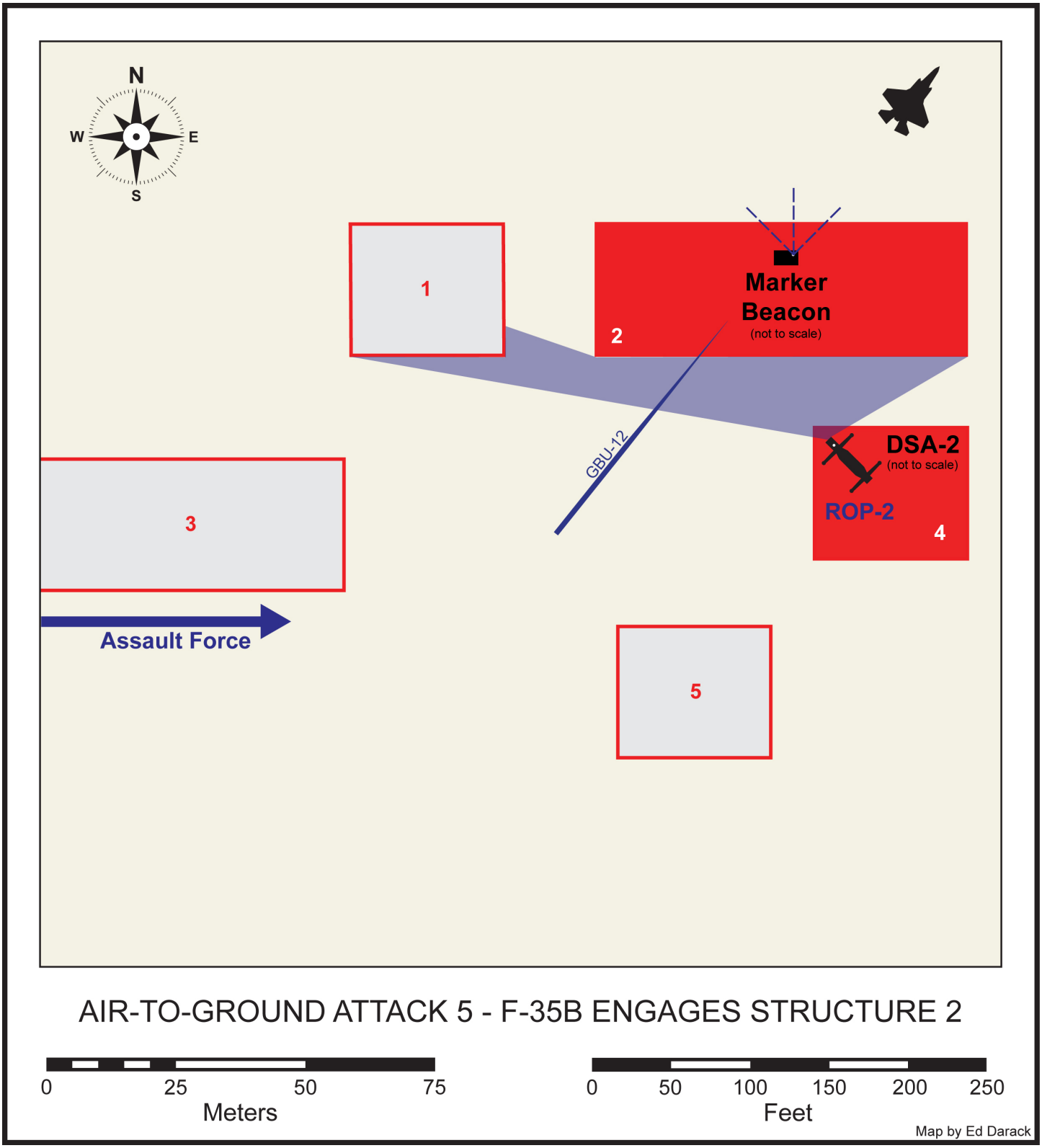
Pages 24-29: Simplified illustration of air-to-ground attack coordinated using DSA-2 employing remotely activated marker beacons and laser pointer. Series begins with the establishment of remote observation post 1 (ROP-1) with the DSA-2. User, co-located with a joint terminal attack controller (JTAC), conducts remote ISR with the DSA-2 (field of view is represented with purple shading). Based on enemy movement (red arrow), user marks targets with marker beacons and then moves DSA-2 to establish ROP-2. User then coordinates air-to-ground strikes with beacons and laser pointer. CREDIT: Ed Darack


N
W
E
S
1
2
3
ROP-1
4
5
6
Recon / JTAC
AIR-TO-GROUND ATTACK 2 - ESTABLISH ROP-1 WITH DSA-2 / ISR
0
50
100
150
Meters
0
100
200
300
400
500
Feet
Map by Ed Darack

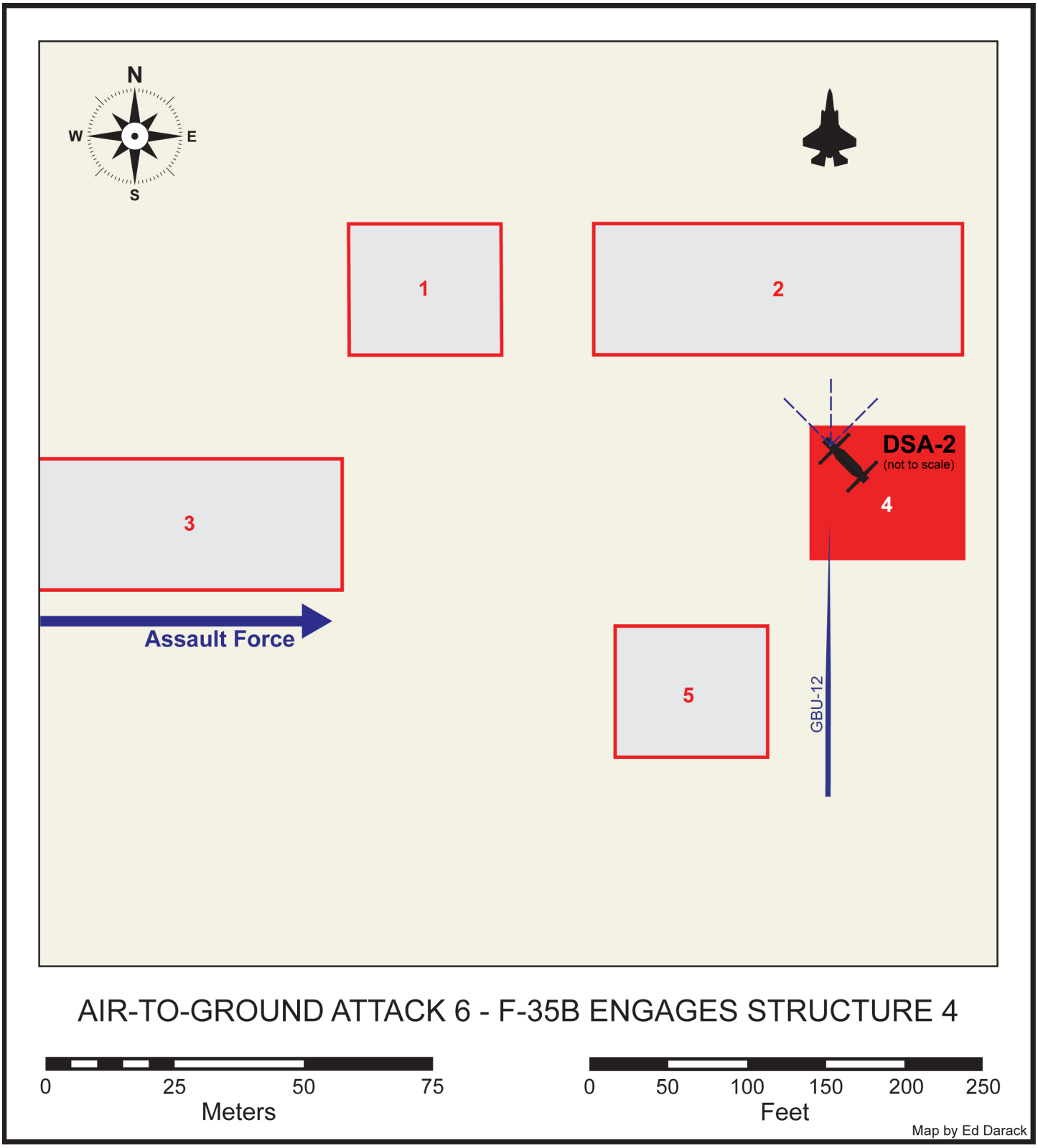

N
W
E
S
1
Marker
Beacon
(not to scale)
2
Marker
Beacon
(not to scale)
DSA-2
(not to scale)
ROP-2
3
4
5
AIR-TO-GROUND ATTACK 3 - REMOTELY MARK STRUCTURES / ISR
0
25
50
75
Meters
0
50
100
150
200
250
Feet
Map by Ed Darack



Activation of marker beacon on structure 1 for F-35B GBU-12 strike. This scenario (where the DSA-2 is providing persistent overwatch of the target and the user activates the marker beacon on the (positively identified) target) optimizes tactical and operational situational awareness in all relevant domains and does so while optimizing the signature of the ground unit controlling the DSA-2. CREDIT: Ed Darack

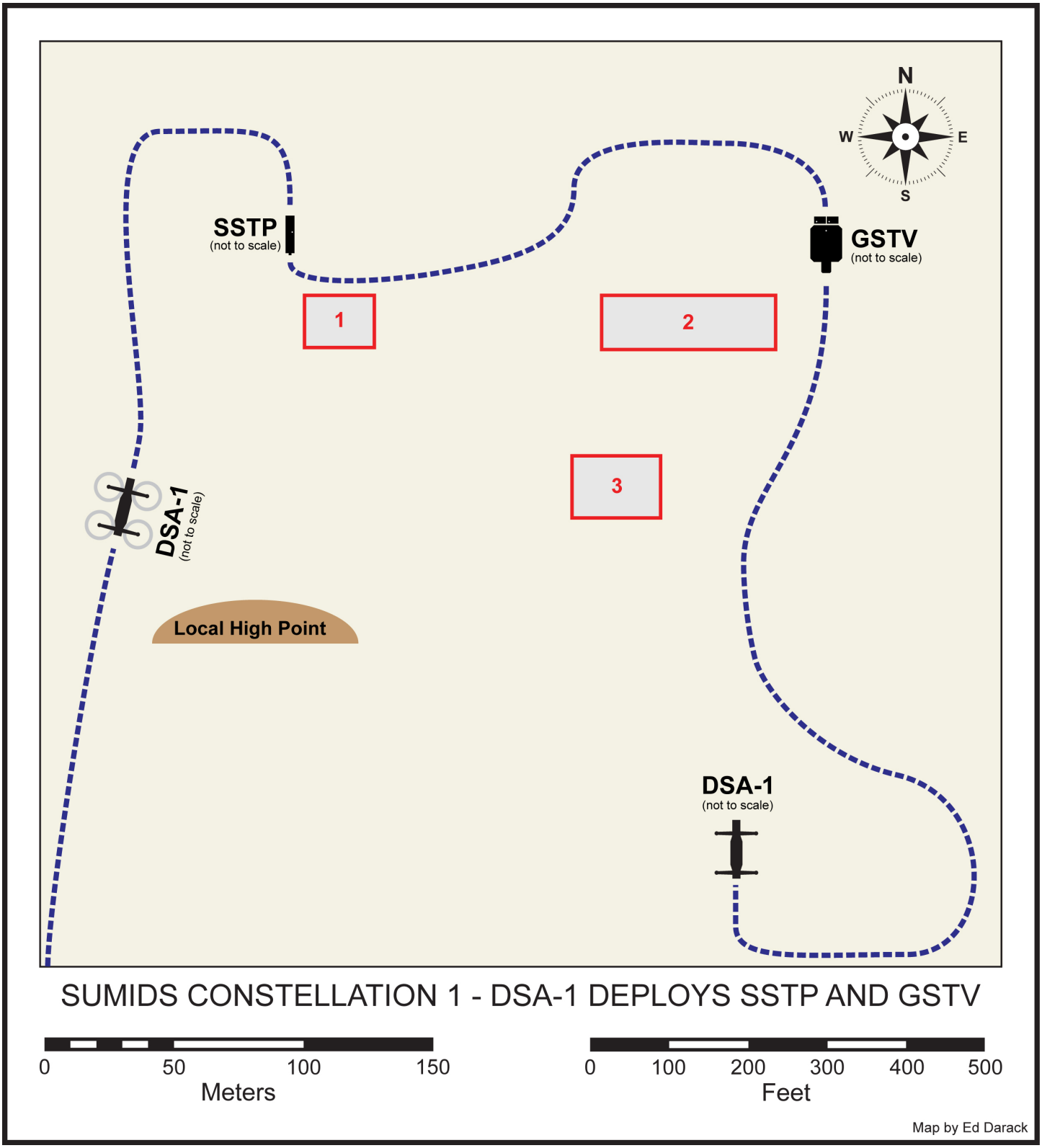


Activation of marker beacon on structure 2 for F-35B GBU-12 strike. This scenario (where the DSA-2 is providing persistent overwatch of the target and the user activates the marker beacon on the (positively identified) target) optimizes tactical and operational situational awareness in all relevant domains and does so while optimizing the signature of the ground unit controlling the DSA-2. CREDIT: Ed Darack



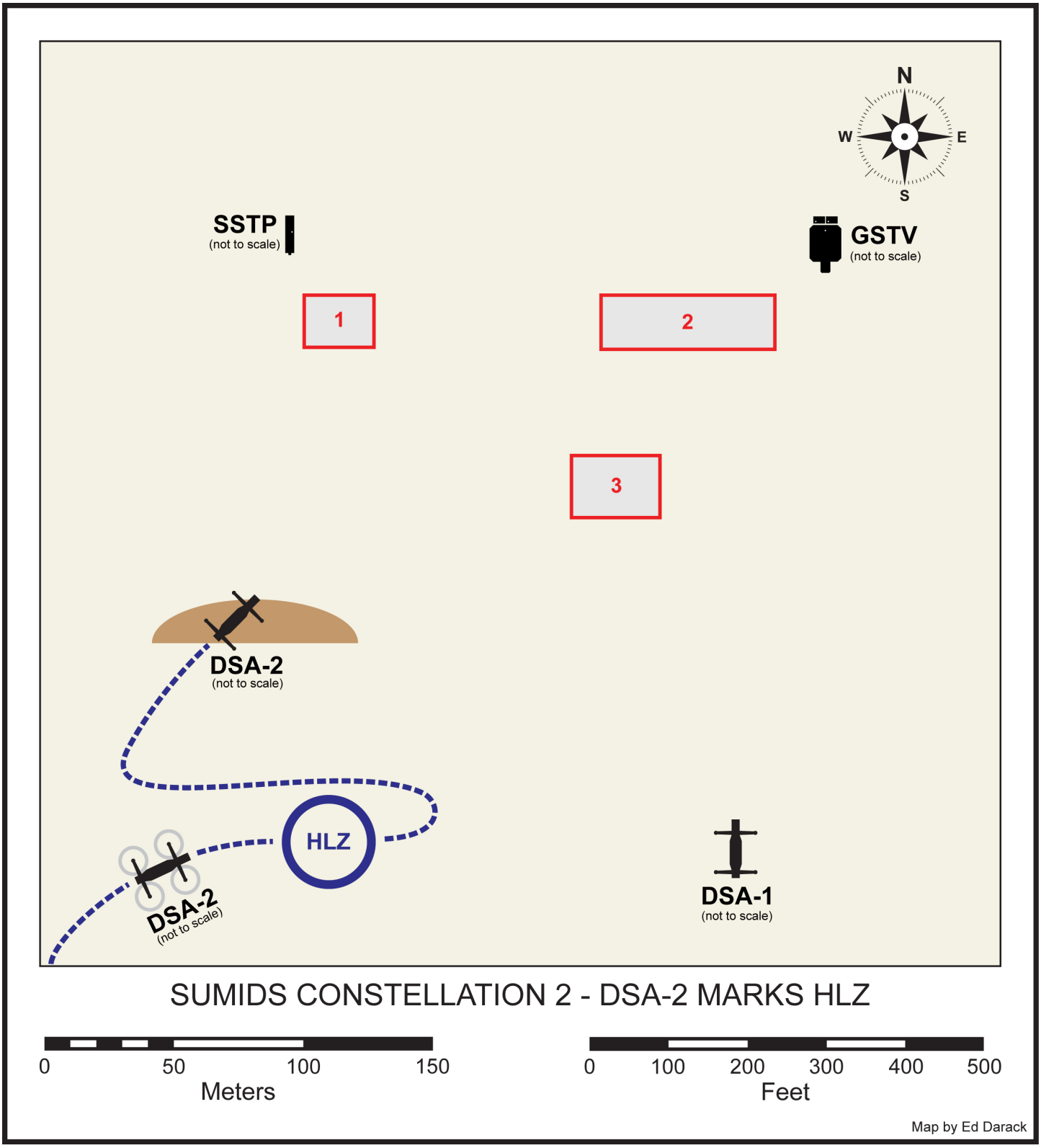
Activation of light pod on the DSA-2, self-marking for an F-35B GBU-12 strike. This is an example of a sacrifical application, where the SUMIDS vehicle is used as the marker for an air-to-ground attack. CREDIT: Ed Darack

SUMIDS CONSTELLATION ILLUSTRATION (DSA-1, DSA-2, GSTV, SSTP, BEACONS)

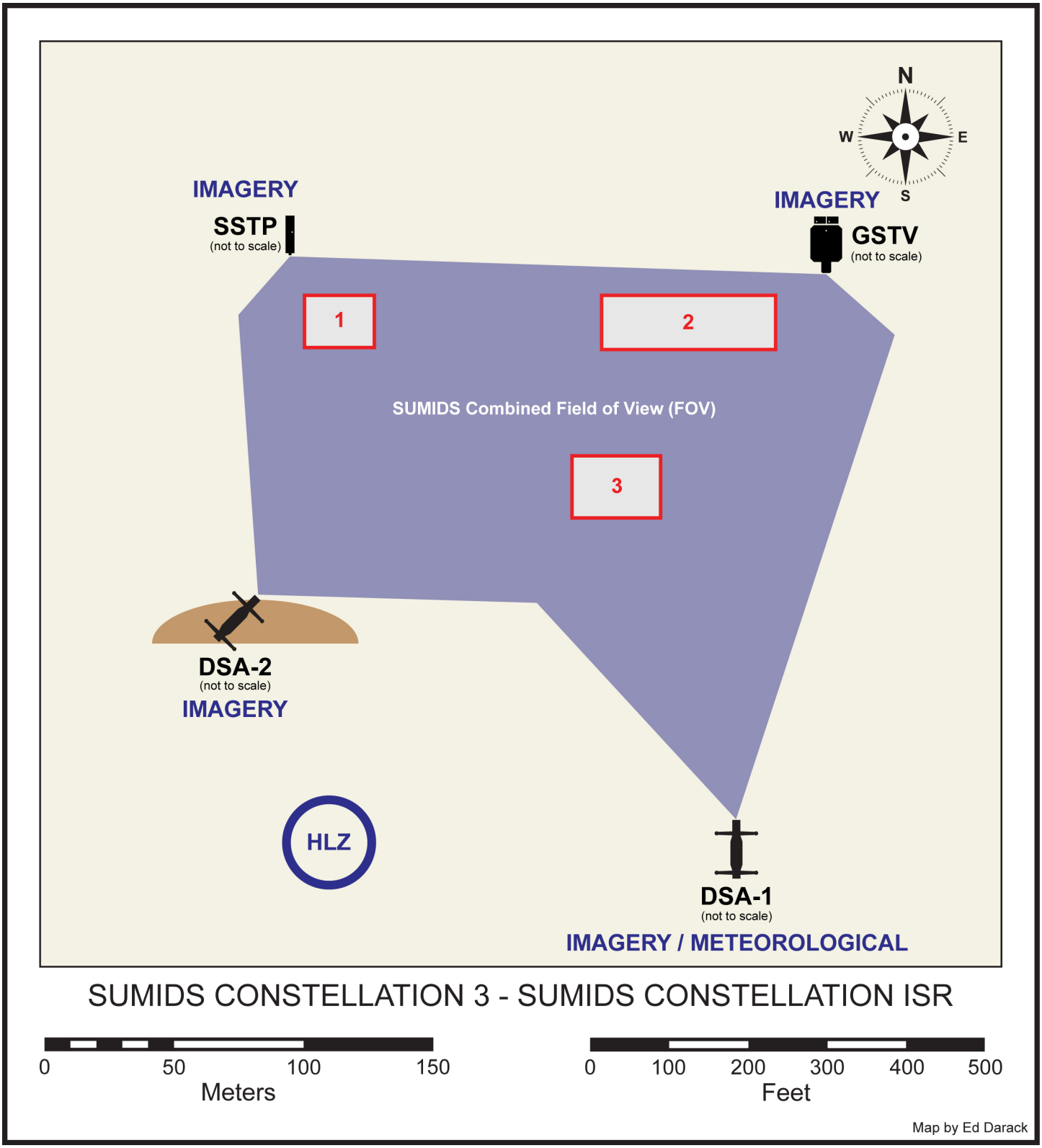


Pages 30-37: Illustration series demonstrating the use of several SUMIDS as a constellation, including the DSA-1, the DSA-2, the GSTV, the SSTP, and beacons. The DSA-1 deploys the SSTP and GSTV (the GSTV being loaded with two remotely activated marker beacons and a light pod for self marking) and then begins ISR and meteorological monitoring. The DSA-2 creates a helicopter landing zone and then conducts stationary ISR. Series illustrates persistent ISR, creation of target reference points, illumination, sparkle, and self marking (self marking to build SA for manned aircraft) CREDIT: Ed Darack

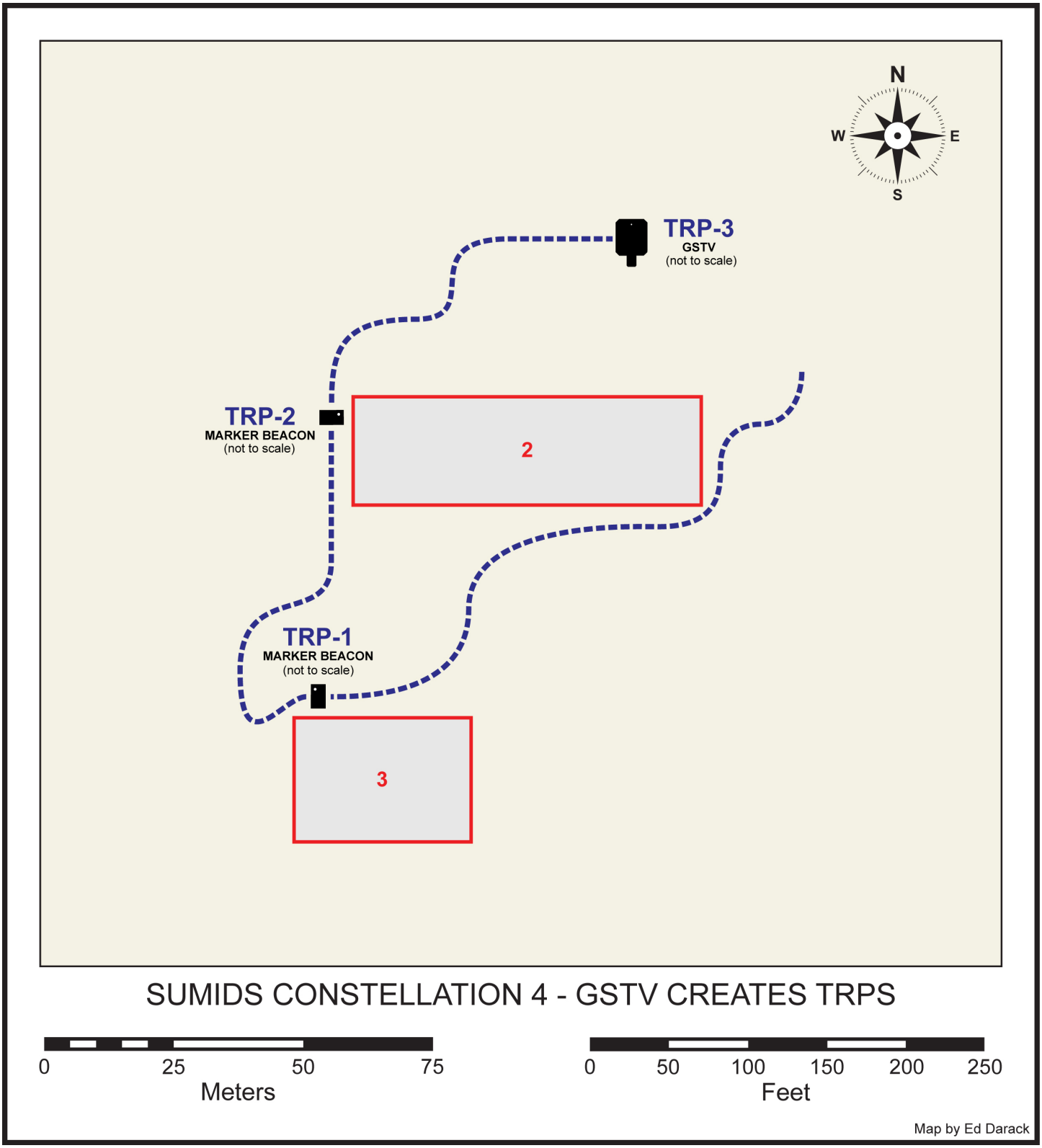
SUMIDS CONSTELLATION ILLUSTRATION (DSA-1, DSA-2, GSTV, SSTP, BEACONS)



SUMIDS CONSTELLATION ILLUSTRATION (DSA-1, DSA-2, GSTV, SSTP, BEACONS)

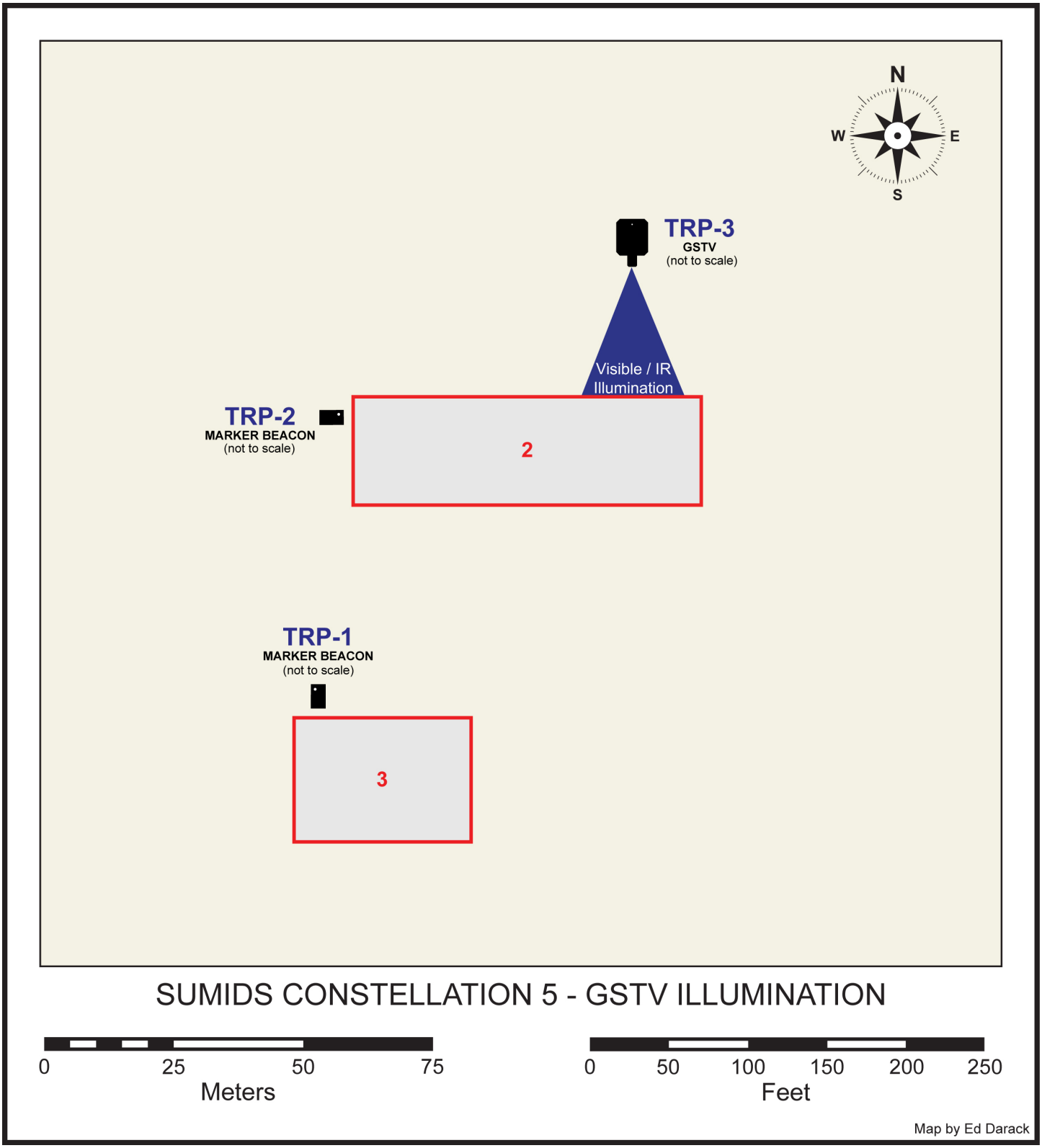


SUMIDS CONSTELLATION ILLUSTRATION (DSA-1, DSA-2, GSTV, SSTP, BEACONS)

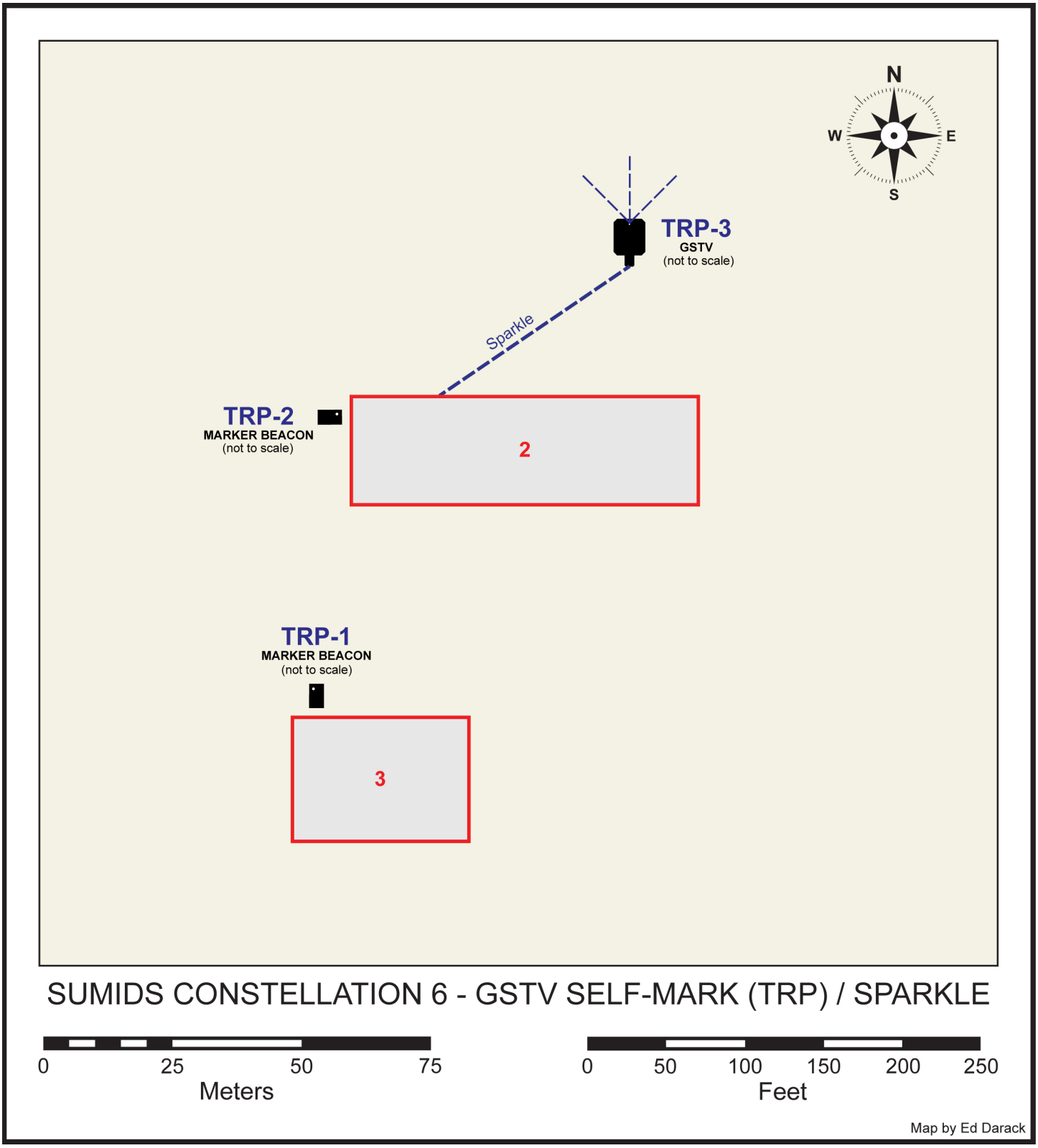


Operator remotely drives the GSTV and deploys remotely activated marker beacons and then positions the GSTV to create target reference points (TRPs). CREDIT: Ed Darack

SUMIDS CONSTELLATION ILLUSTRATION (DSA-1, DSA-2, GSTV, SSTP, BEACONS)

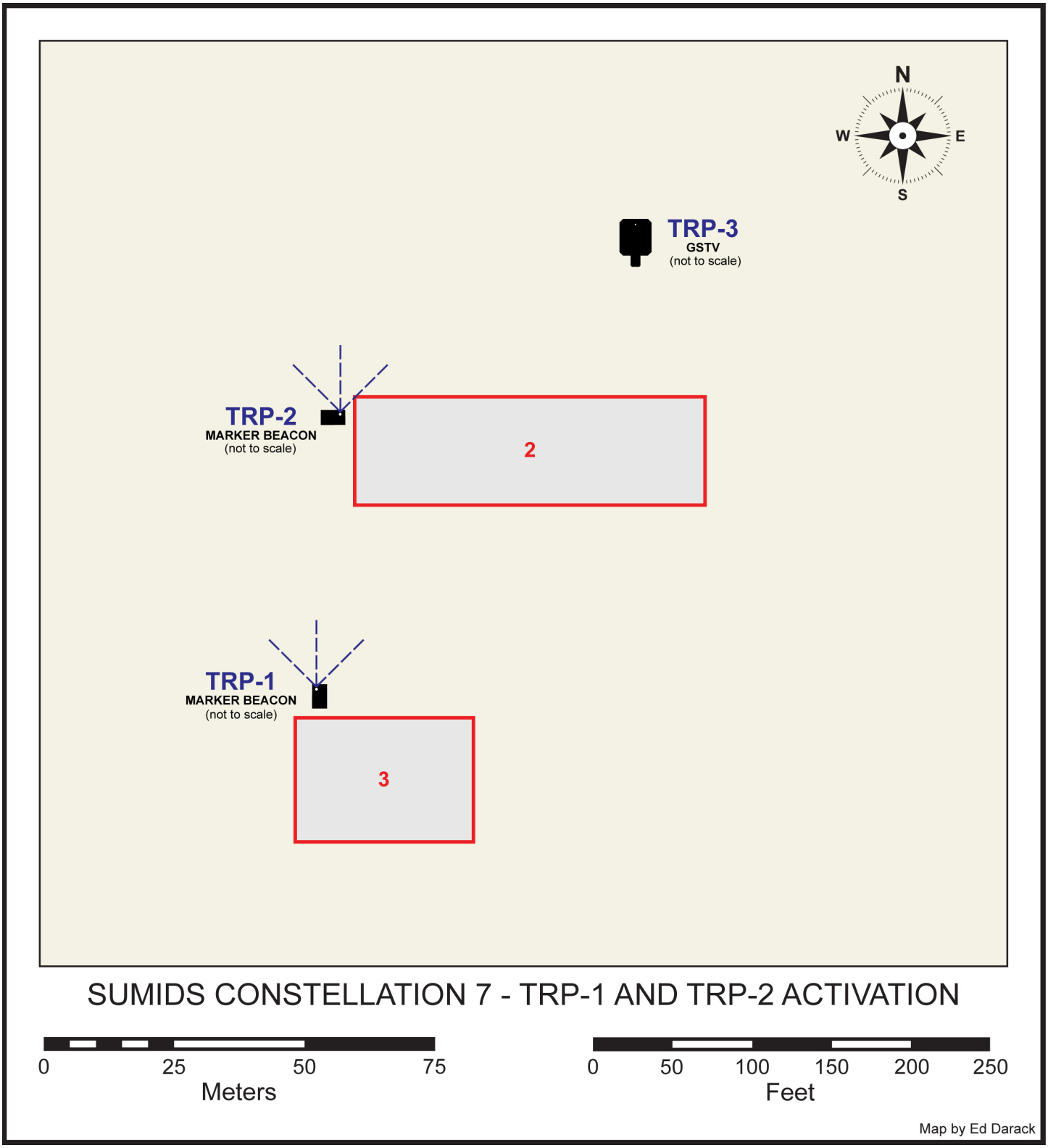


SUMIDS CONSTELLATION ILLUSTRATION (DSA-1, DSA-2, GSTV, SSTP, BEACONS)

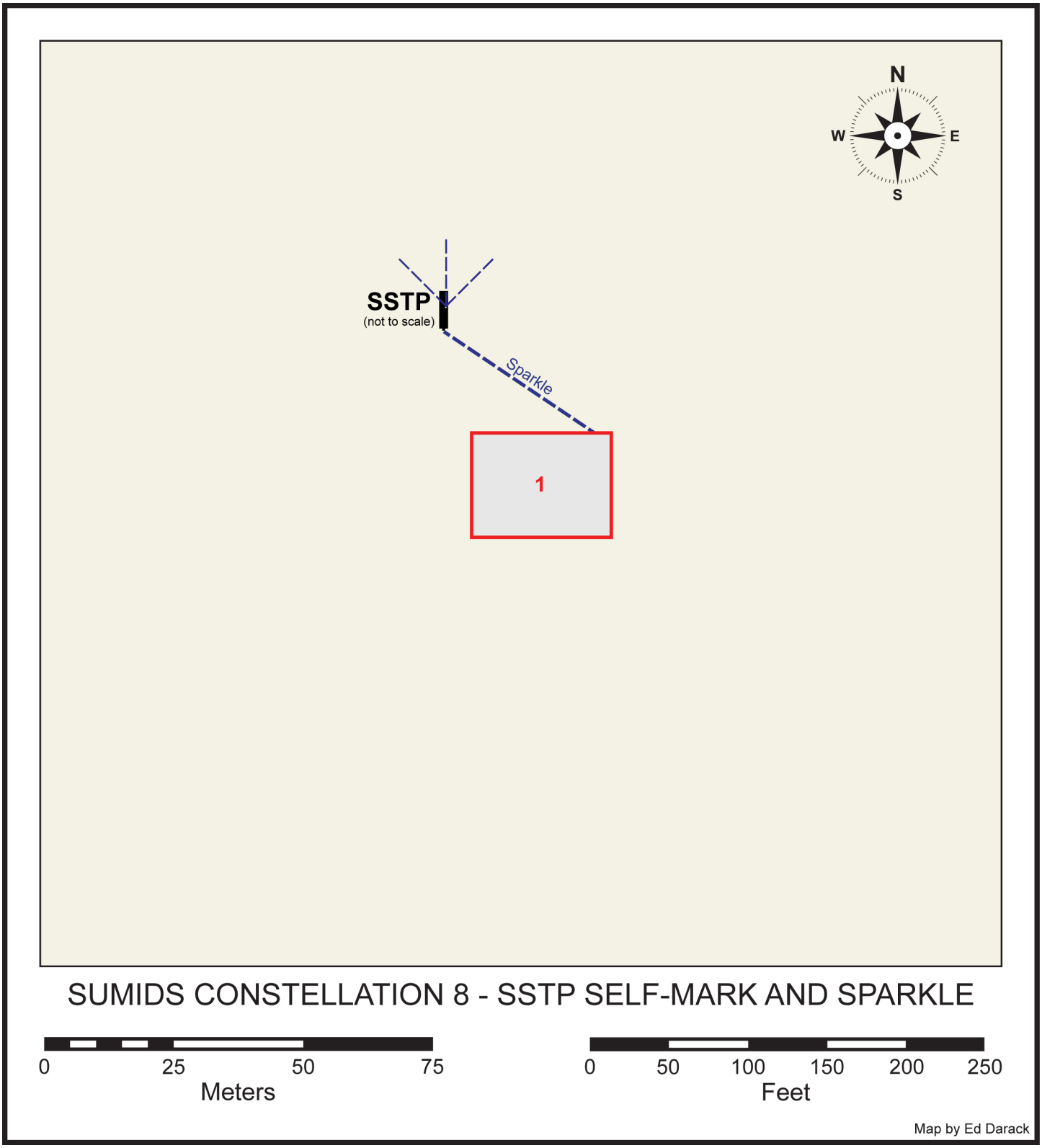


Activation of light pod on the GSTV to build situational awareness of location of system and then target sparkle. Such a scenario provides expedient, intuitive, and effective visual references for aircraft to build optimized situational awareness. A SUMIDS operator can provide general visual references during a talk-on, then flash the light pod on the GSTV to orient the pilot. Once oriented to the position of the GSTV, remote operator can sparkle target and pilot can engage for precision strike, even with obscuration of the target by smoke or meteorological conditions. CREDIT: Ed Darack

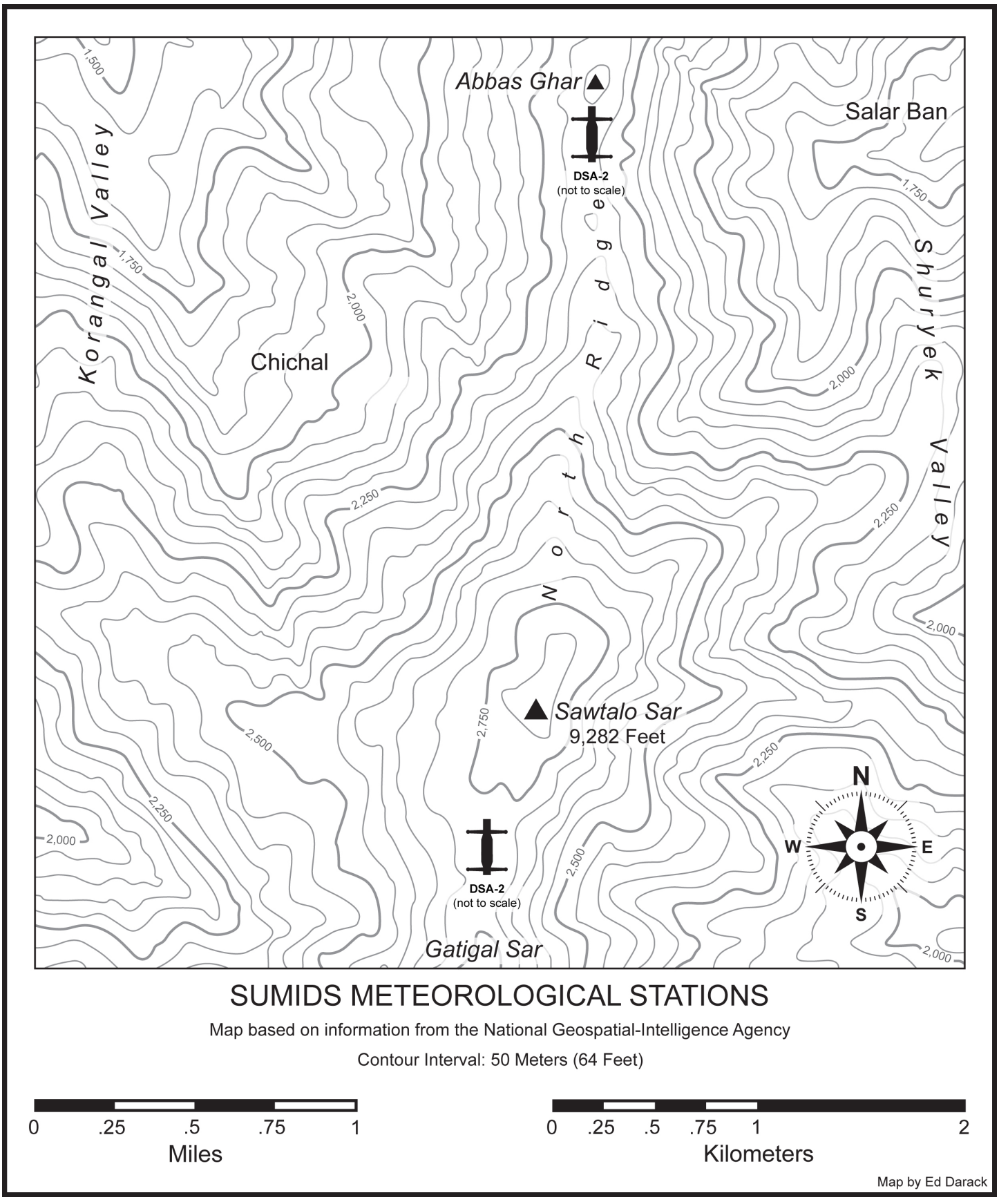
SUMIDS CONSTELLATION ILLUSTRATION (DSA-1, DSA-2, GSTV, SSTP, BEACONS)



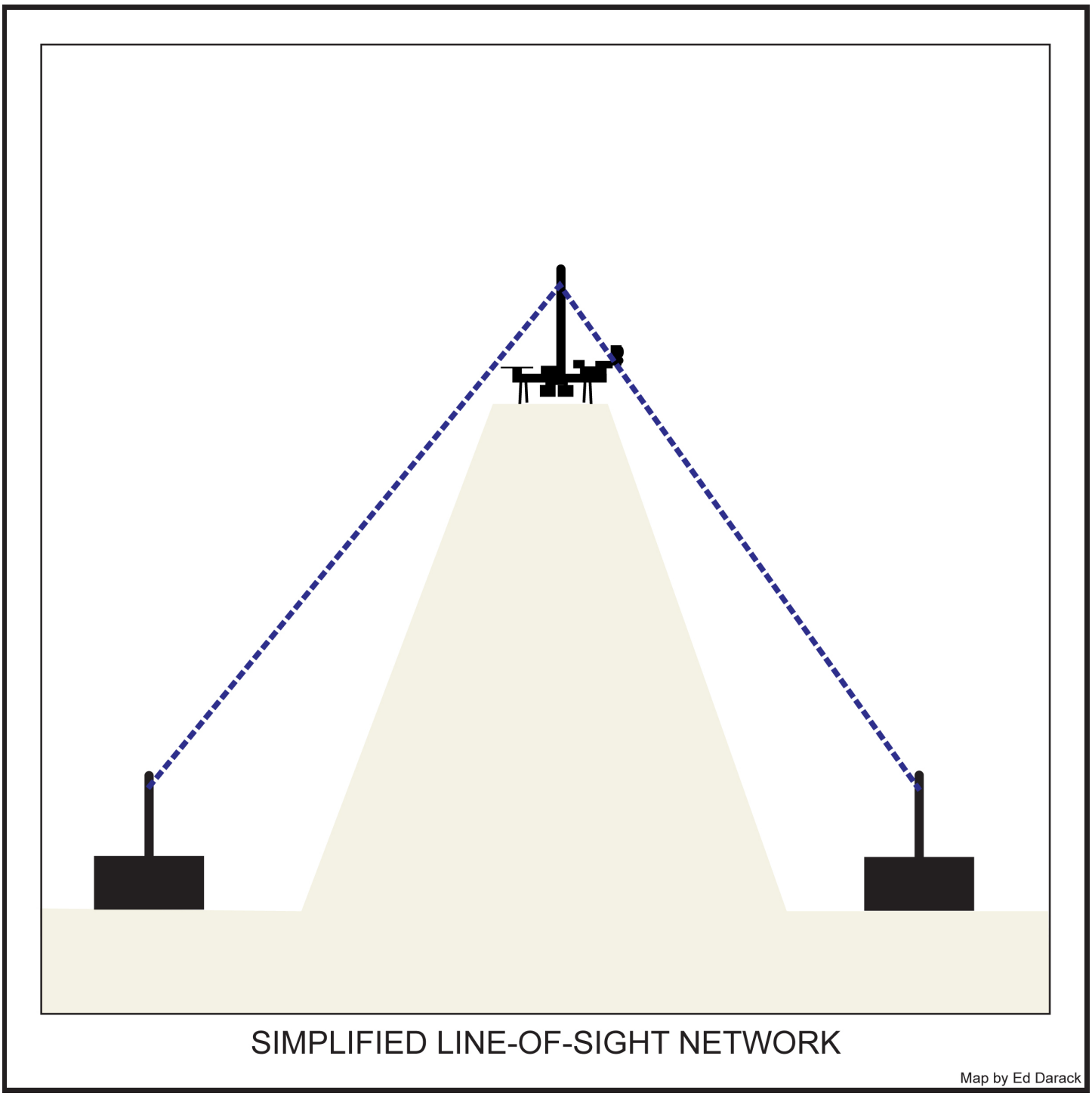
SUMIDS CONSTELLATION ILLUSTRATION (DSA-1, DSA-2, GSTV, SSTP, BEACONS)



Activation of self marker on the SSTP to build situational awareness of location of system and then target sparkle. Such a scenario provides expedient, intuitive, and effective visual references for aircraft to build optimized situational awareness. A SUMIDS operator can provide general visual references during a talk-on, then flash the self marker on the SSTP to orient the pilot. Once oriented to the position of the SSTP, remote operator can sparkle target and pilot can engage for precision strike, even with obscuration of the target by smoke or meteorological conditions. CREDIT: Ed Darack


Abbas Ghar
Salar Ban
DSA-2
(not to scale)
Korangal Valley
Shuryek Valley
North Ridge
Chichal
Sawtalo Sar
9,282 Feet
DSA-2
(not to scale)
Gatigal Sar
N
W
E
S
1,500
1,750
2,000
2,250
2,500
2,750
SUMIDS METEOROLOGICAL STATIONS
Map based on information from the National Geospatial-Intelligence Agency
Contour Interval: 50 Meters (64 Feet)
0 .25 .5 .75 1
Miles
0 .25 .5 .75 1 2
Kilometers
Map by Ed Darack

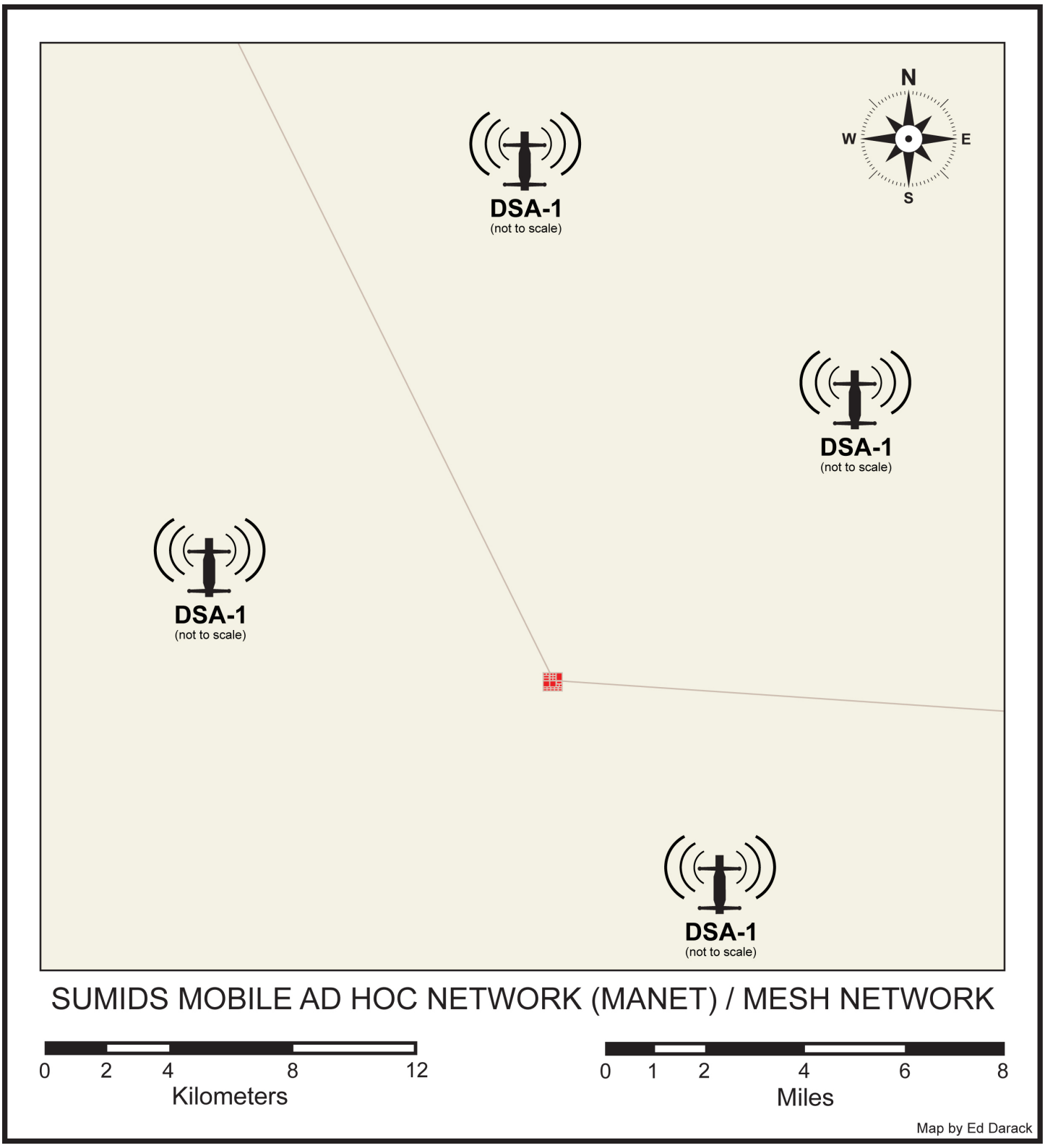
SIMPLIFIED GRAPHIC OF SUMIDS USED FOR A LINE-OF-SIGHT NETWORK



Page 38: Illustration of two DSA-2 SUMIDS being used for meteorological monitoring. In such a case, users will study imagery intelligence collected by satellite or manned / unmanned aerial platforms to determine best locations for SUMIDS fitted with a modular meteorological station, then occupy as many sites as necessary with SUMIDS meteorological stations to optimize environmental situational awareness. CREDIT: Ed Darack

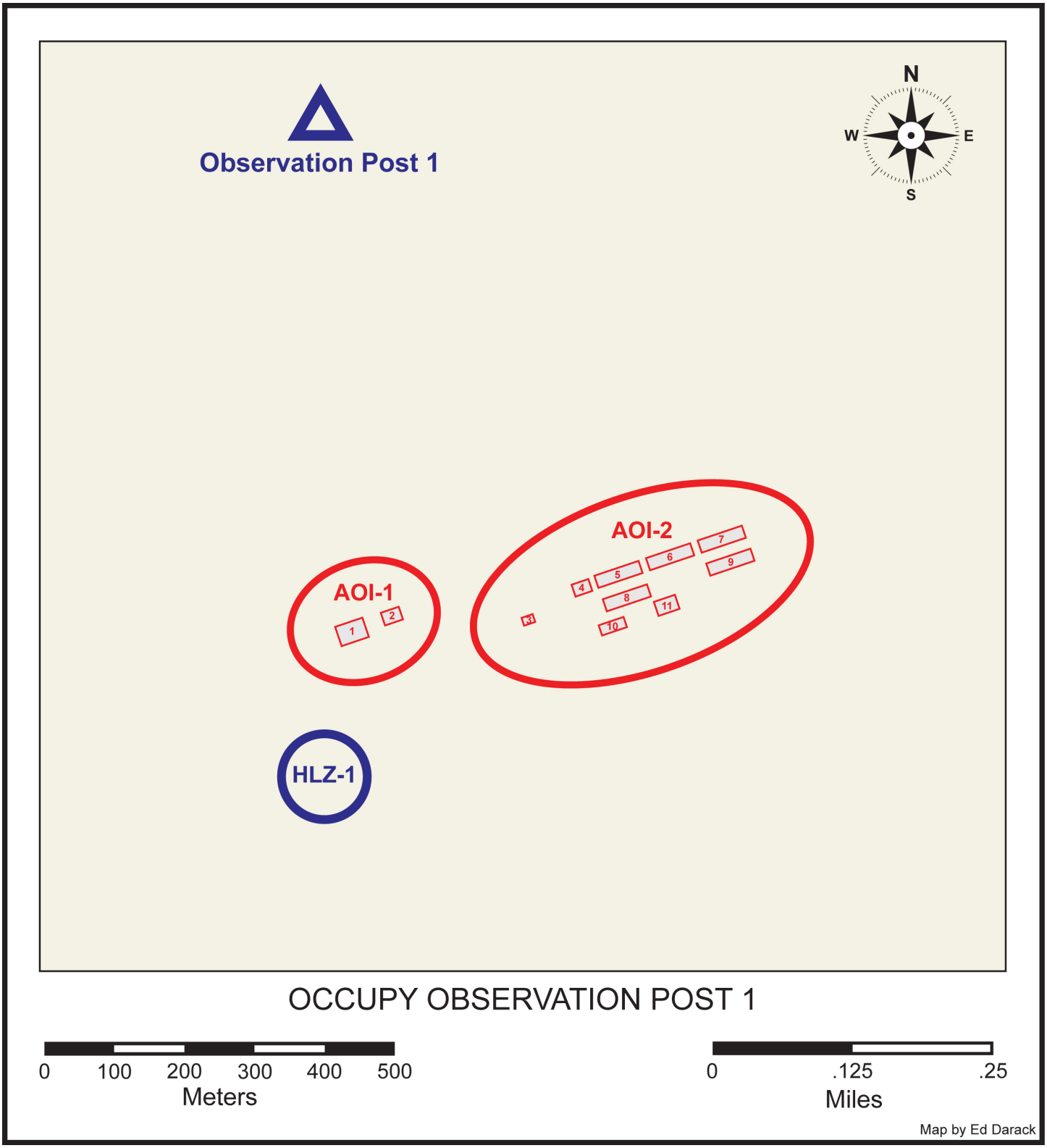
Page 39: Simplified illustration of a DSA-2, loaded with a modular repeater, to create an ad hoc line-of-sight network between two valleys by positioning the DSA-2 atop a peak in view from positions in both valleys. CREDIT: Ed Darack

SUMIDS USED FOR A MOBILE AD HOC NETWORK (MANET) / MESH NETWORK



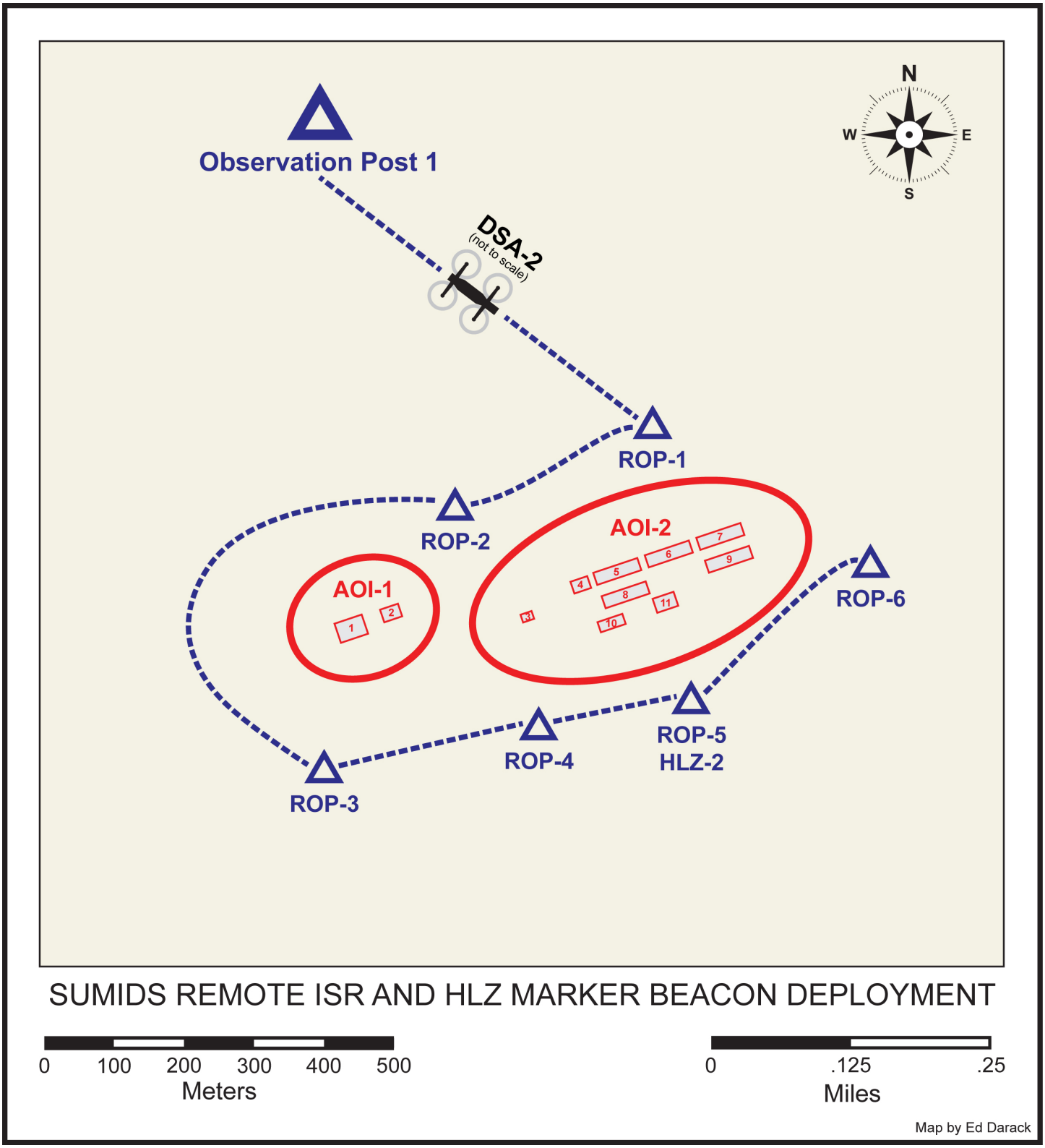
Simplified illustration of four DSA-1 SUMIDS, each loaded with a repeater, creating a mobile ad hoc network (MANET) / mesh network. Such networks may be created at appropriate phases of an operation to establish a robust, resilient, intrinsically redundant command, control, and communications (C3) framework, either as a primary C3 or as a backup C3. Such networks prove critical for low-latency communication needs. CREDIT: Ed Darack

SCENARIO 1: USING SUMIDS TO SUPPORT HELIBORNE RAID

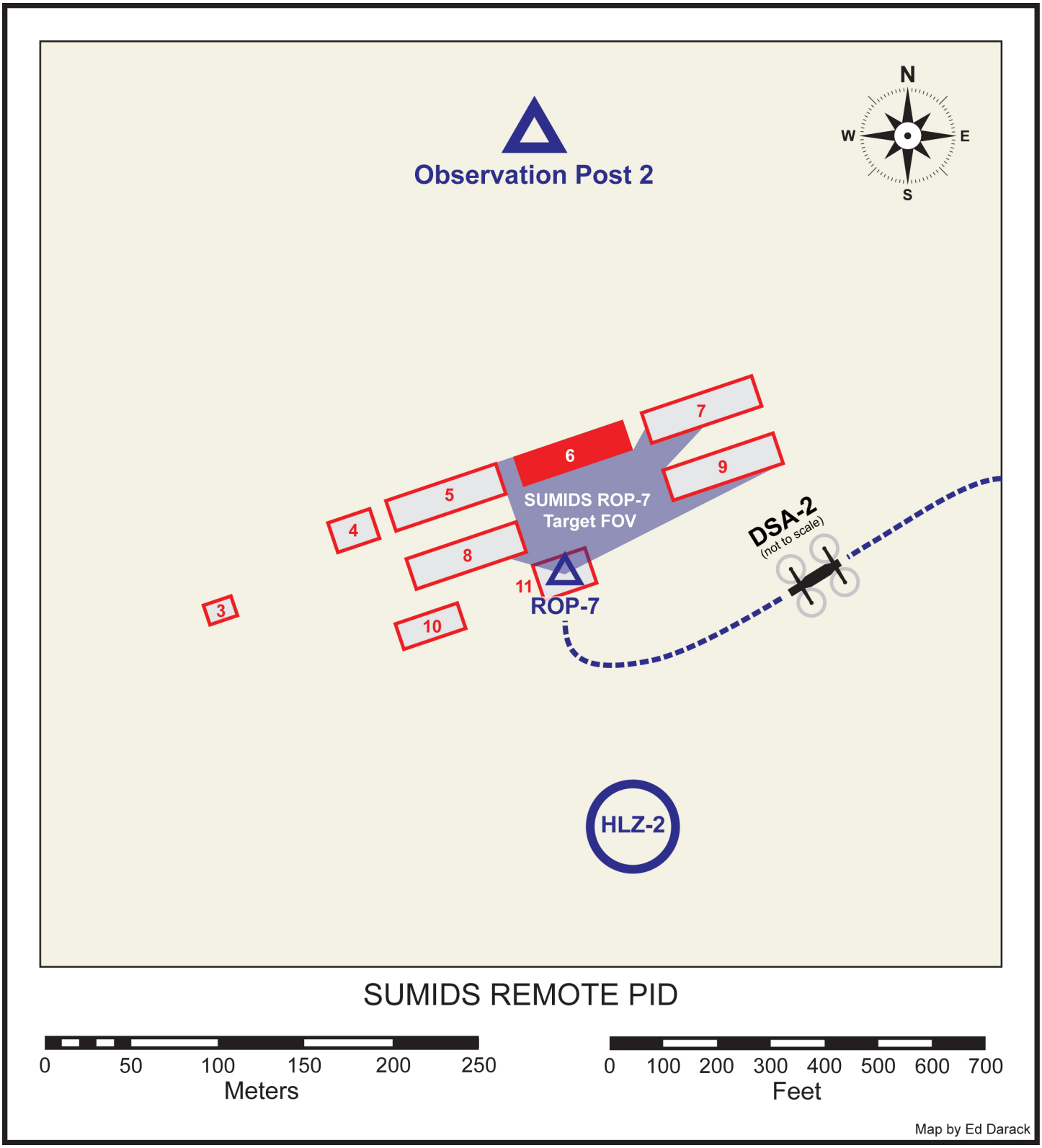


Pages 41-46: Illustration series demonstrating the use of a DSA-2, loaded with remotely activated marker beacons, for the support of a heliborne raid. After occupying an observation post pre-designated through imagery intelligence, operator conducts ISR along several remote observation posts. During this procedure, user creates a new HLZ that is more appropriate based on remote ISR, provides illumination for assault force, then marks a target structure with a laser pointer for a close air support (CAS) package employing an AH-1Z with a UH-1Y for FAC(A). CREDIT: Ed Darack

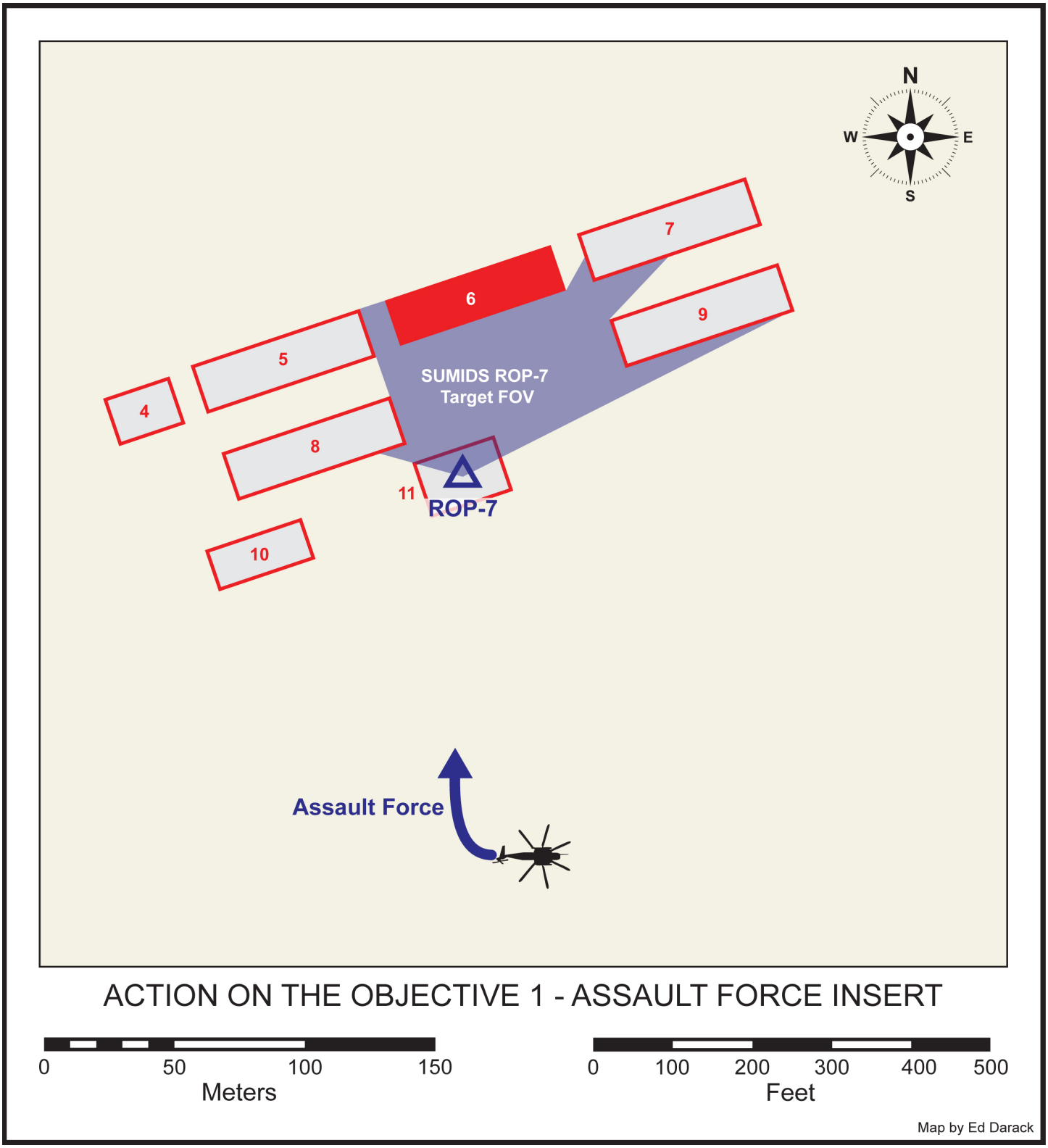
SCENARIO 1: USING SUMIDS TO SUPPORT HELIBORNE RAID



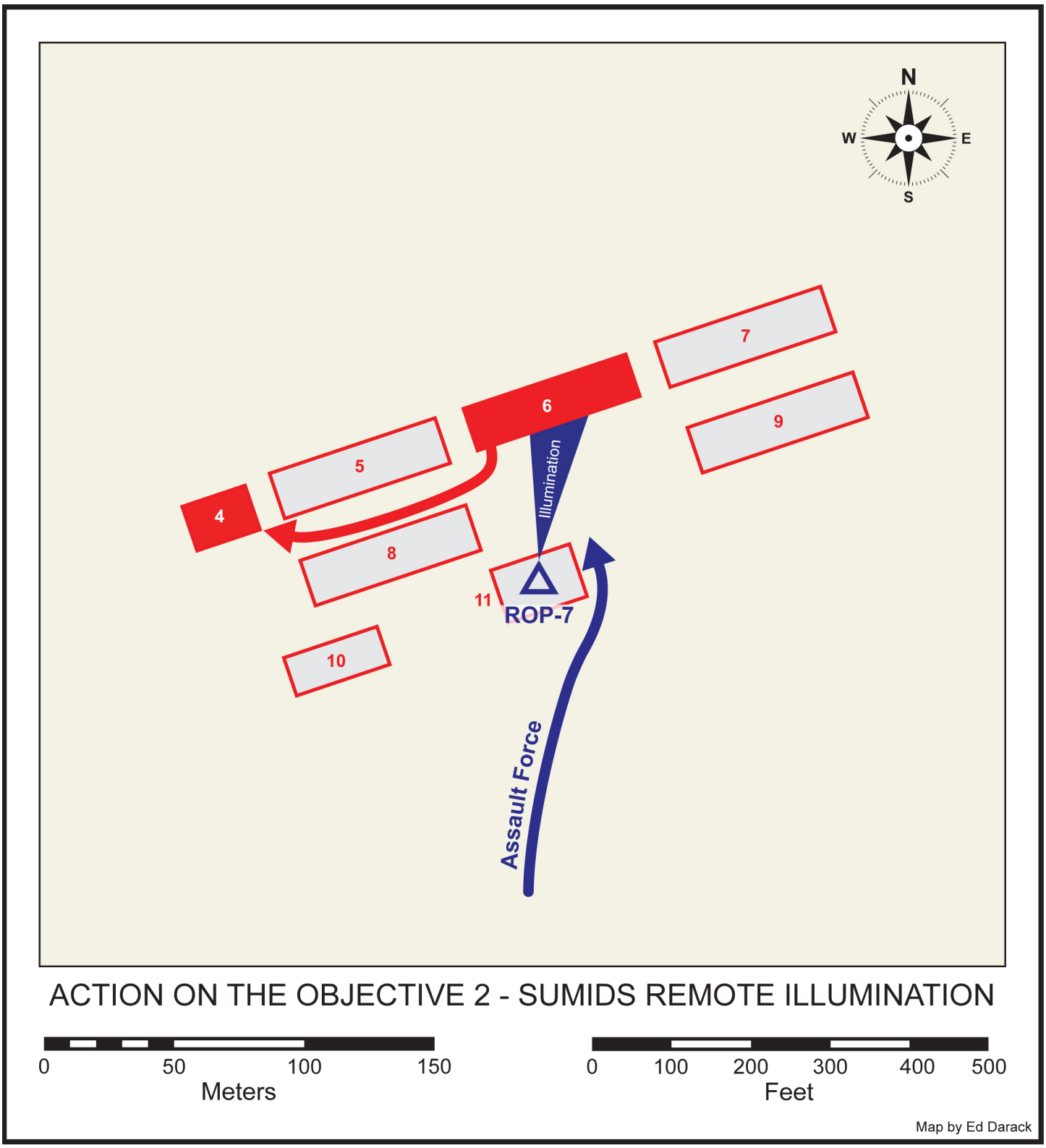
SCENARIO 1: USING SUMIDS TO SUPPORT HELIBORNE RAID



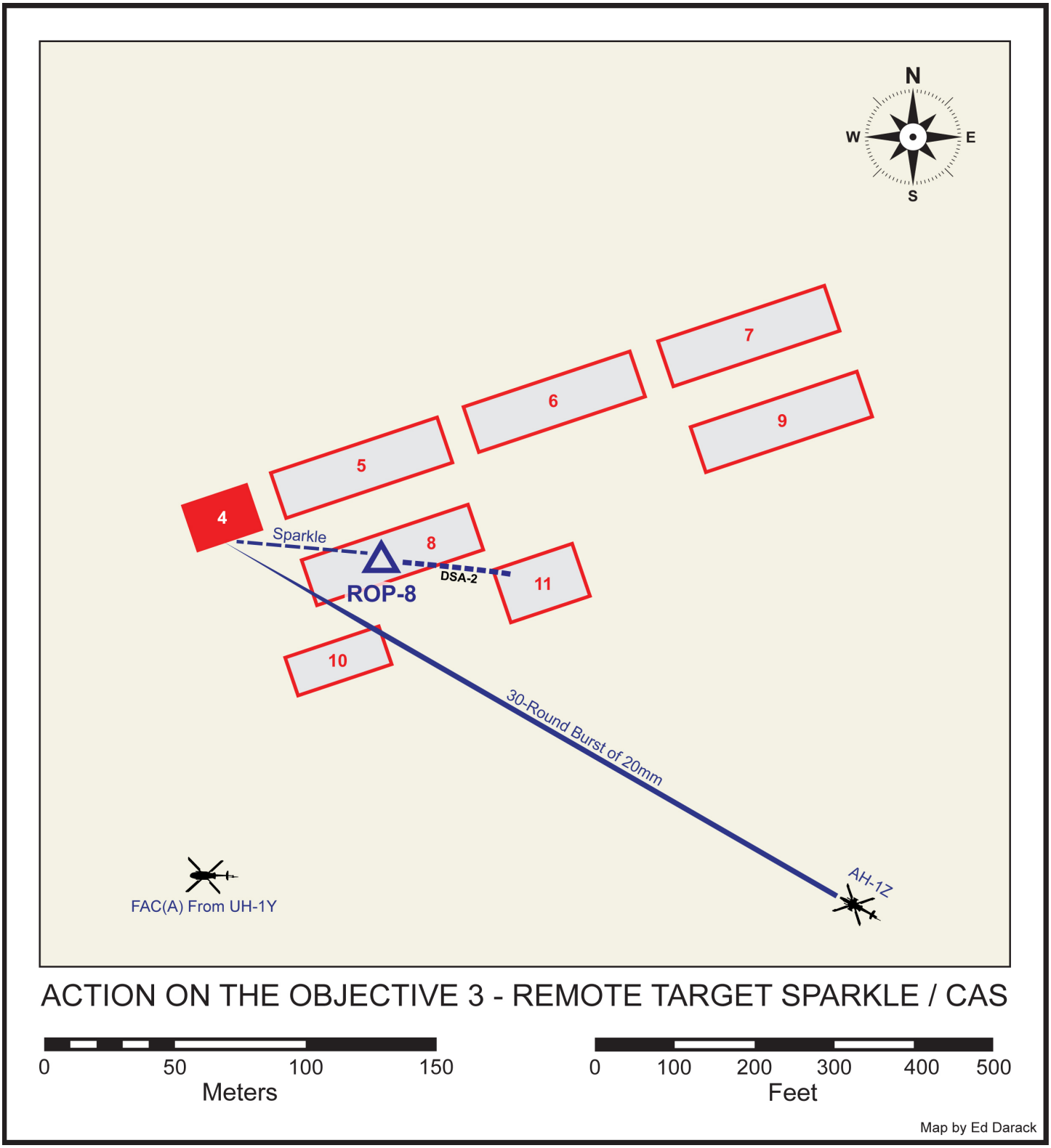
SCENARIO 1: USING SUMIDS TO SUPPORT HELIBORNE RAID



SCENARIO 1: USING SUMIDS TO SUPPORT HELIBORNE RAID



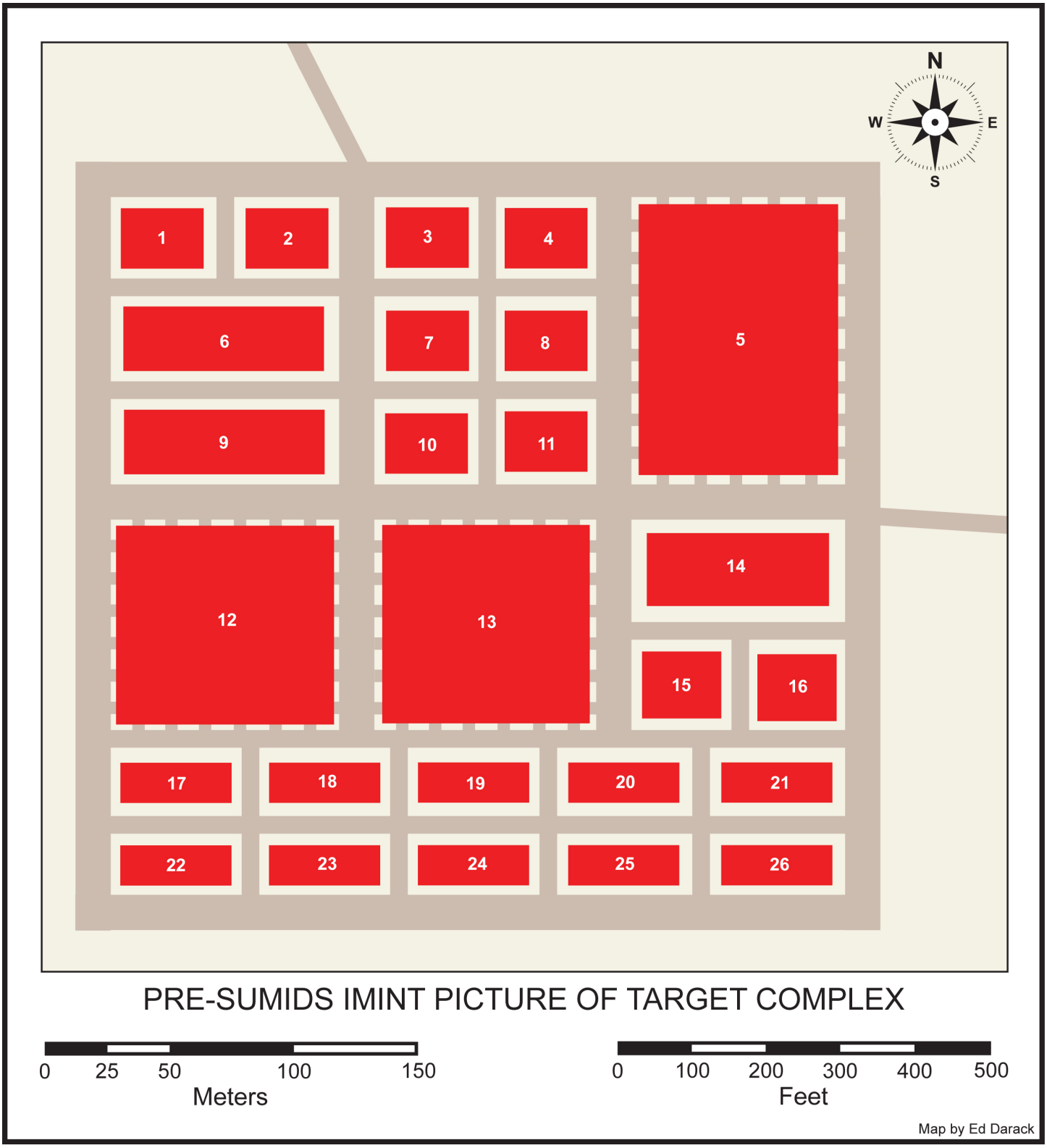
SCENARIO 1: USING SUMIDS TO SUPPORT HELIBORNE RAID



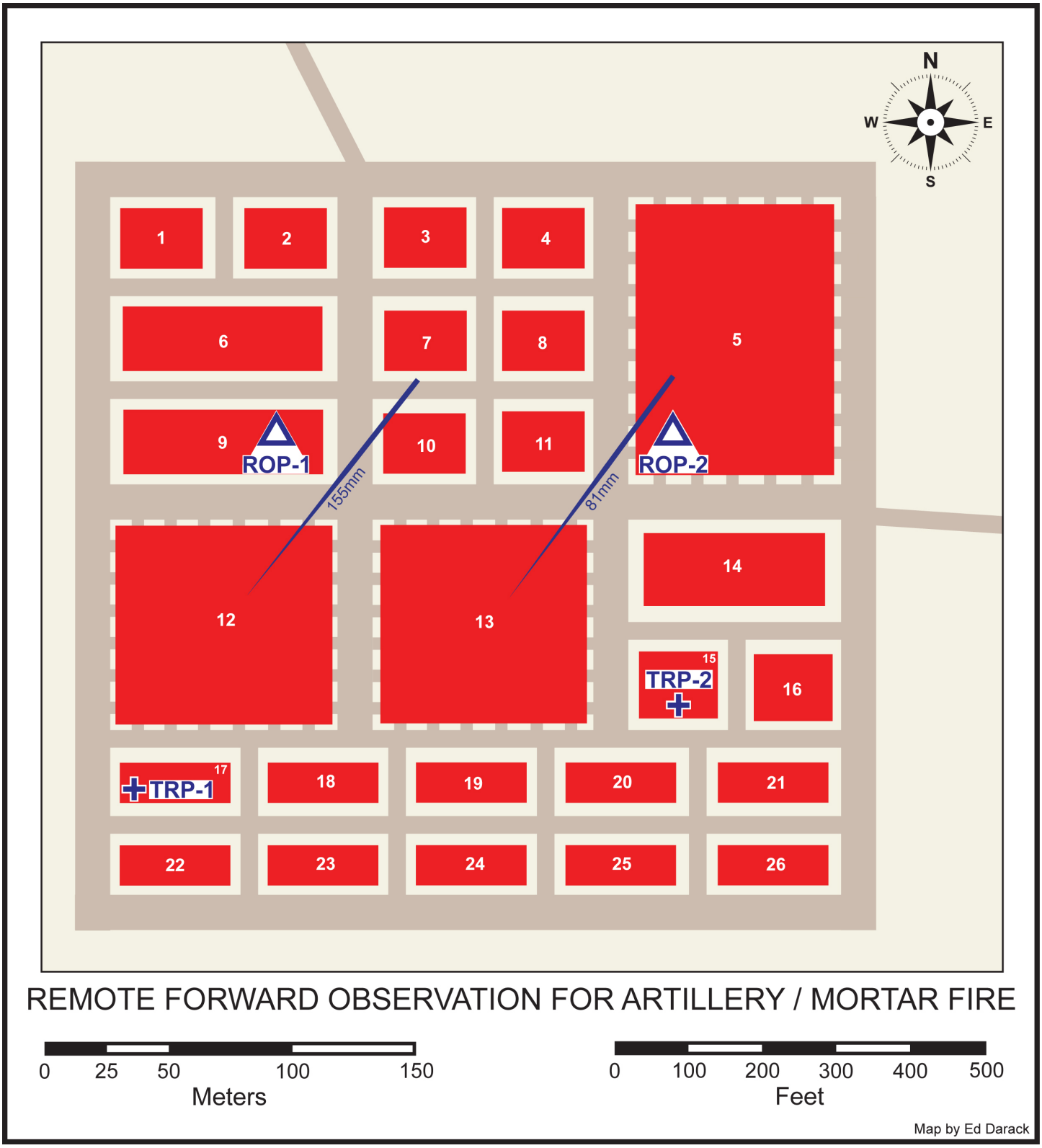
SCENARIO 2: MULTI-DOMAIN, COMBINED ARMS ASSAULT

Pages 47-61: Illustration series demonstrating the use of two DSA-2 SUMIDS, each loaded with remotely activated marker beacons, for the support of a combined arms assault where a mounted unit moves to contact. SUMIDS operators create several remote observation posts, build situational awareness, prioritize targets based on detailed ISR and enemy movement, mark target reference points with remotely activated marker beacons, and conduct remote forward observation for 155mm artillery and 81mm mortar packages / air-to-ground strikes with AH-1Z, UH-1Y, and F-35B. CREDIT: Ed Darack

SCENARIO 2: MULTI-DOMAIN, COMBINED ARMS ASSAULT

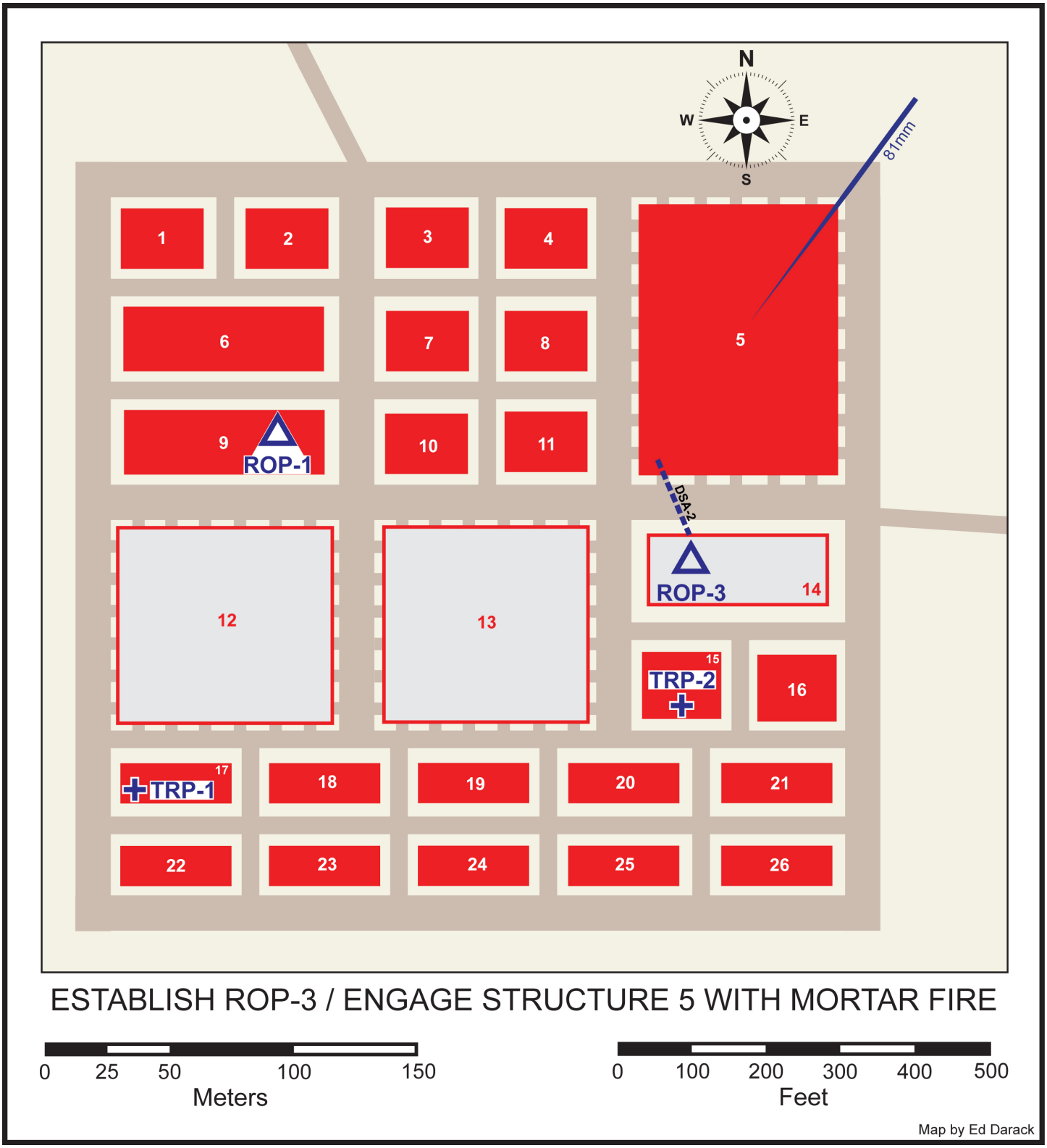


Initial imagery, sourced from collections from NRO and manned and unmanned platforms, provides a limited picture of the target complex. Using SUMIDS provides oblique and ground level views. CREDIT: Ed Darack

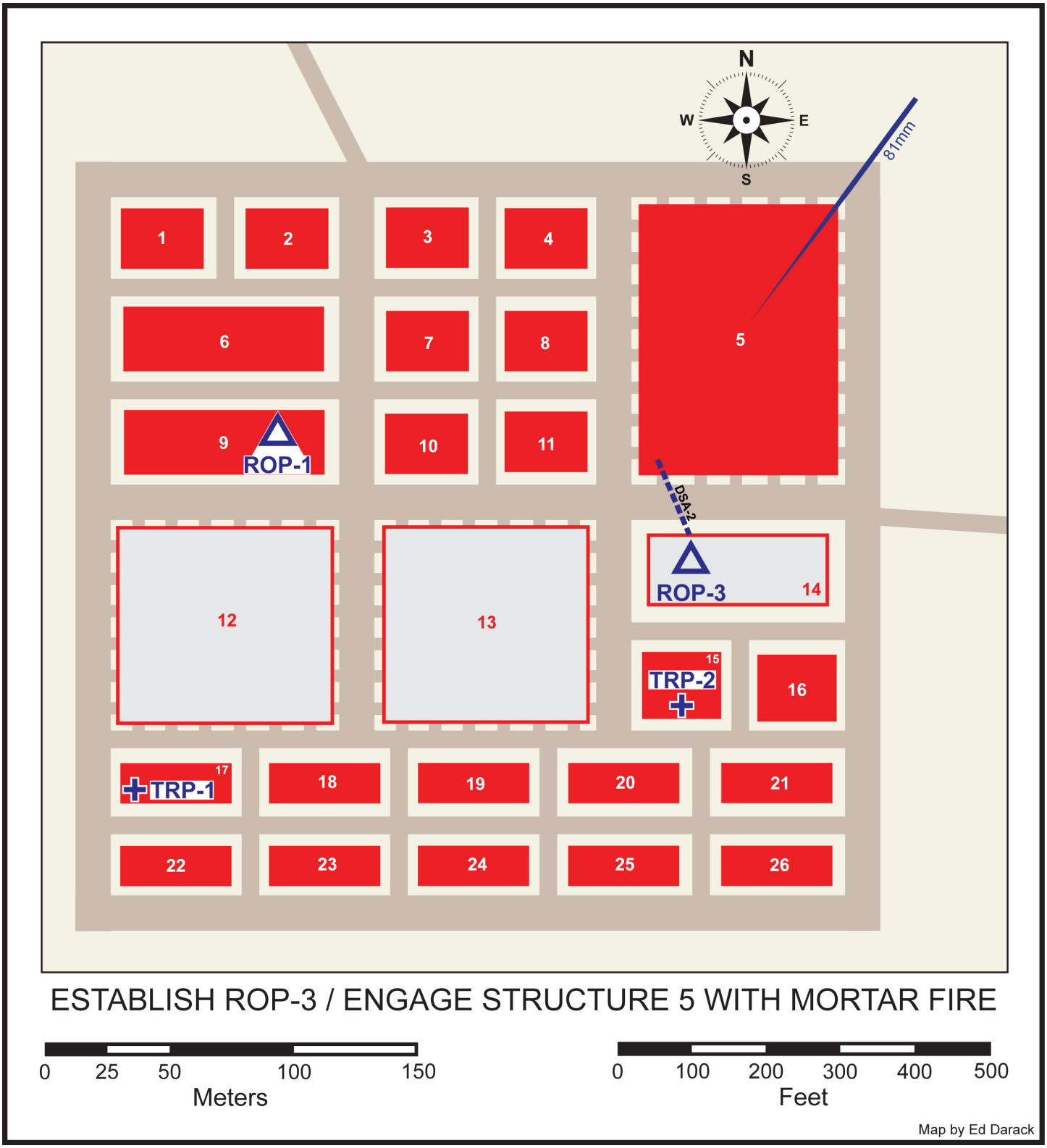


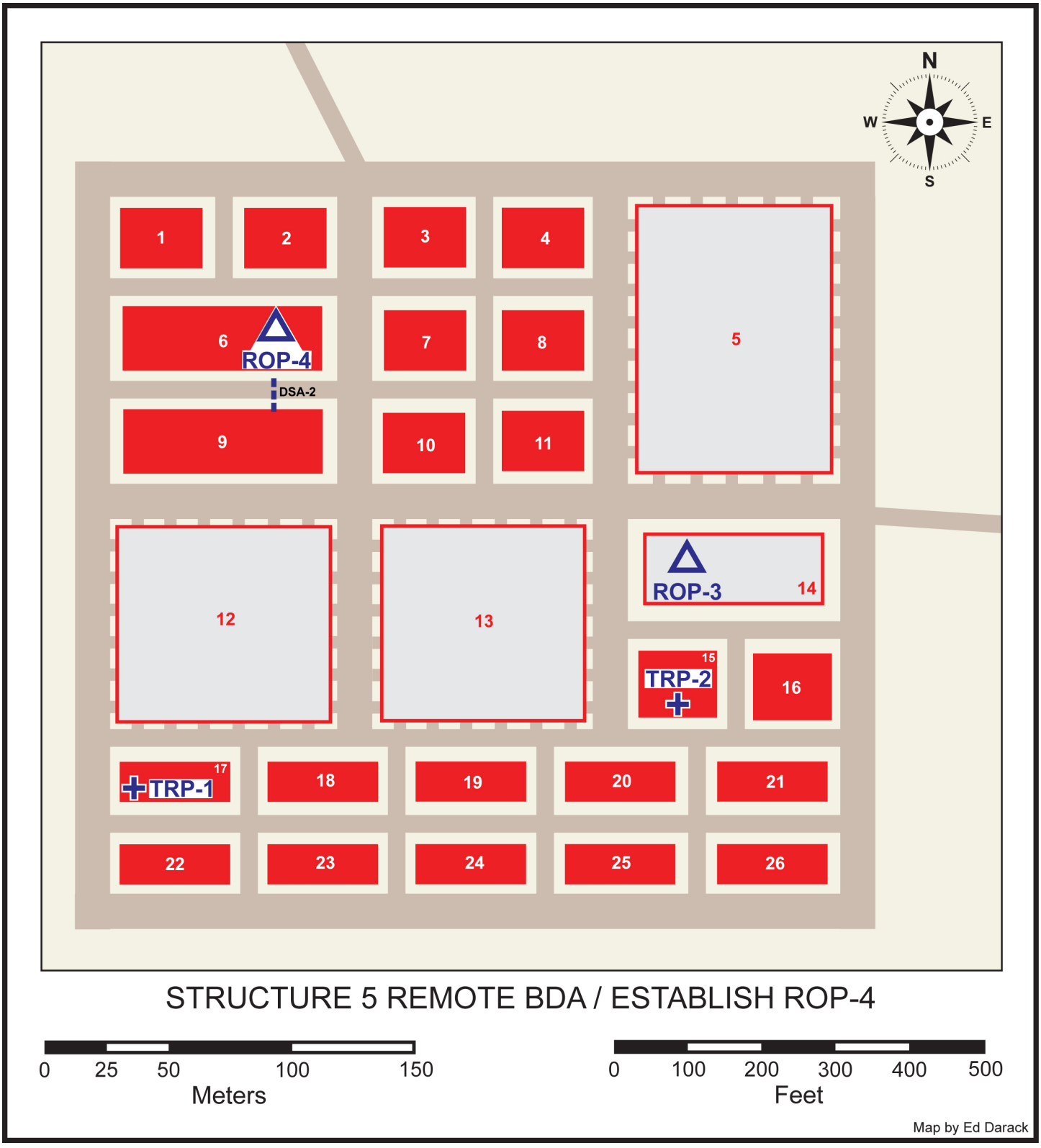
Imagery from SUMIDS enables operators to positively identify and then prioritize targets. In the case of structures 5, 12, and 13, SUMIDS imagery indicates that these are metal canopies, each covering an array of lightly armored vehicles and artillery units. Using DSA-2 SUMIDS, one at ROP-1 and one at ROP-2, for remote forward observation and fires adjustments, force engages with 155mm artillery and 81mm mortar systems. SUMIDS views such as these provide critical detail for appropriate weaponeering unattainable with other platforms. CREDIT: Ed Darack

SCENARIO 2: MULTI-DOMAIN, COMBINED ARMS ASSAULT



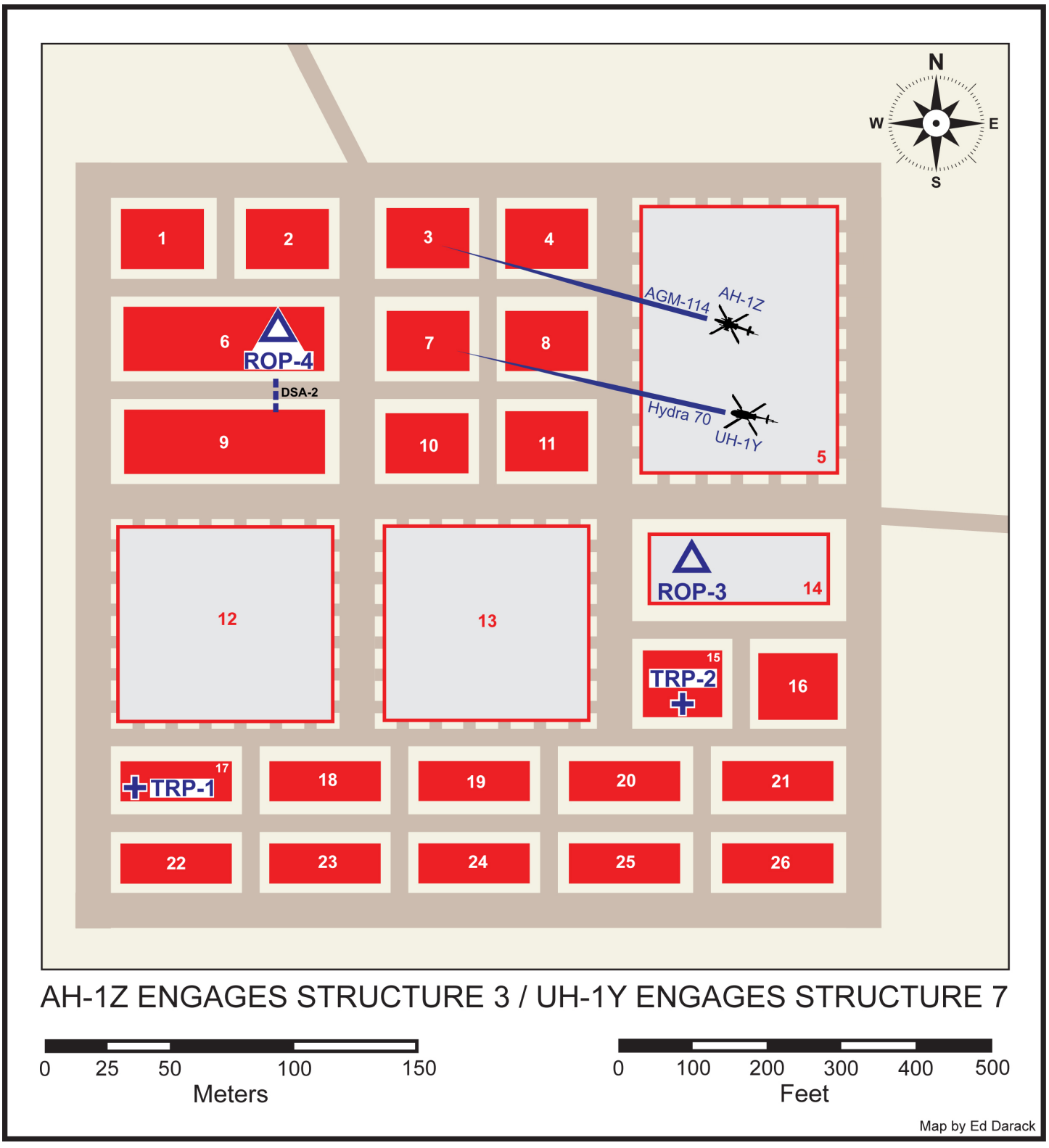
SCENARIO 2: MULTI-DOMAIN, COMBINED ARMS ASSAULT

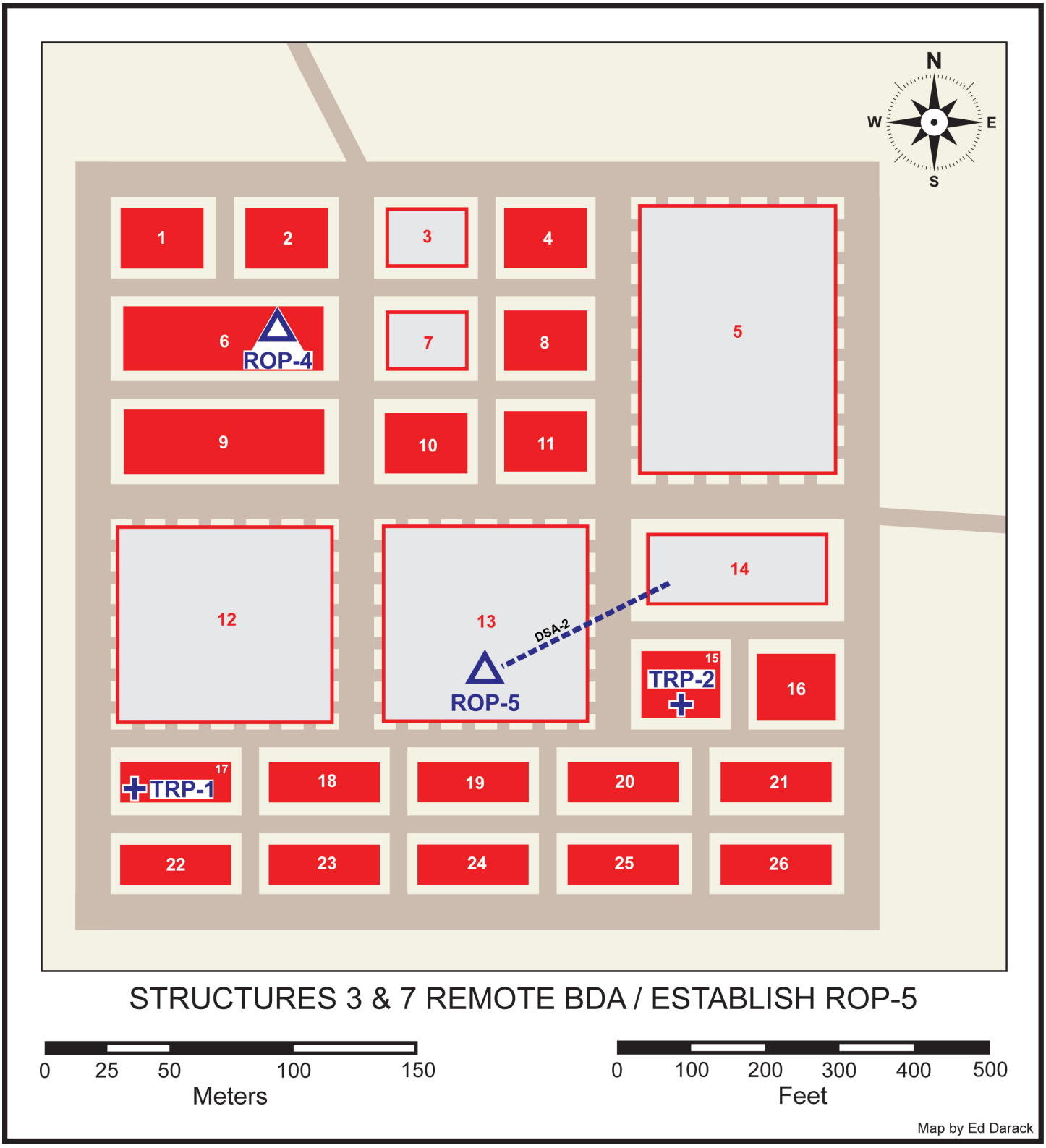




Throughout operation, operators are able to use SUMIDS for remote battle damage assessment. CREDIT: Ed Darack

SCENARIO 2: MULTI-DOMAIN, COMBINED ARMS ASSAULT




N
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ROP-4
7
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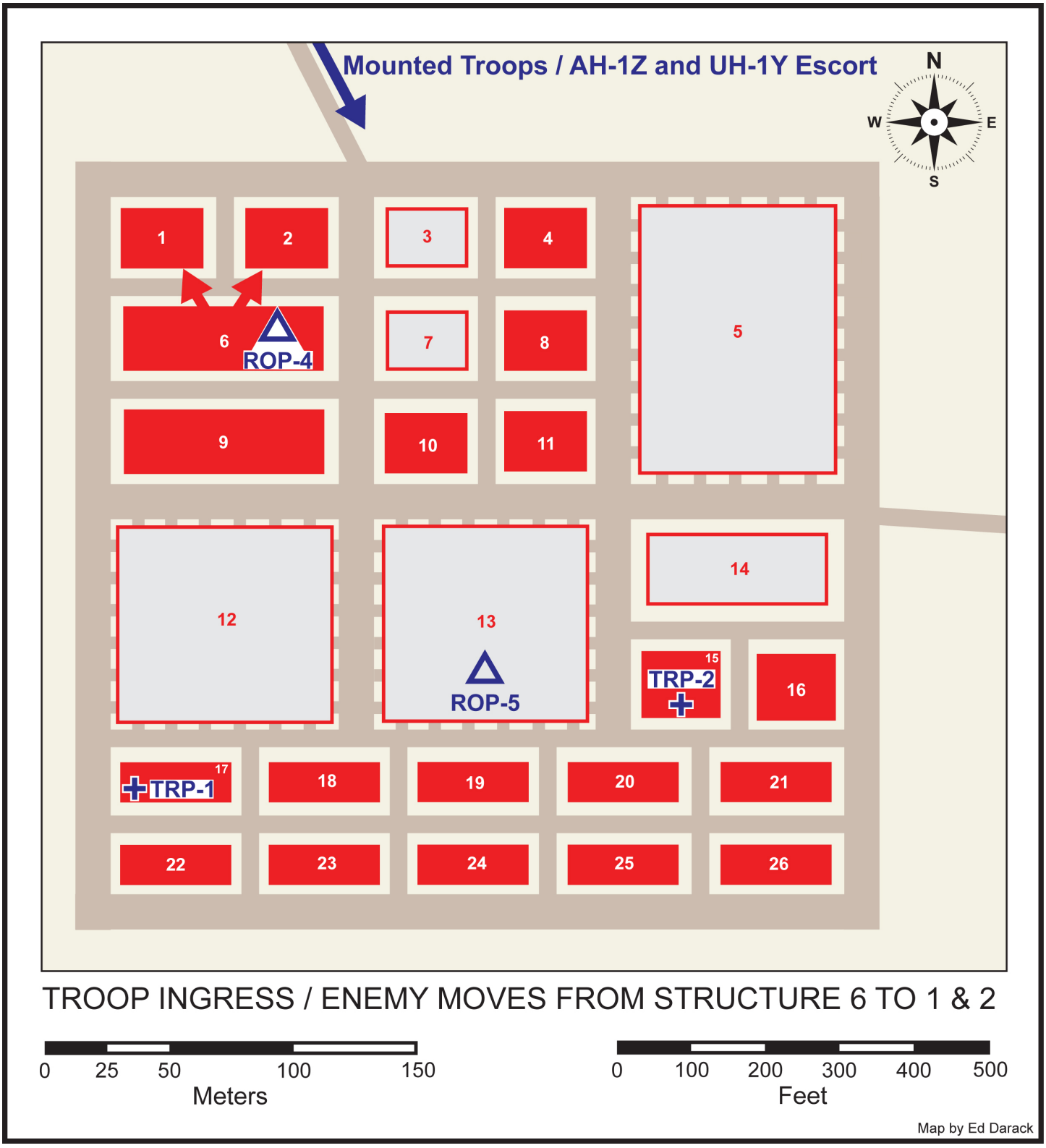
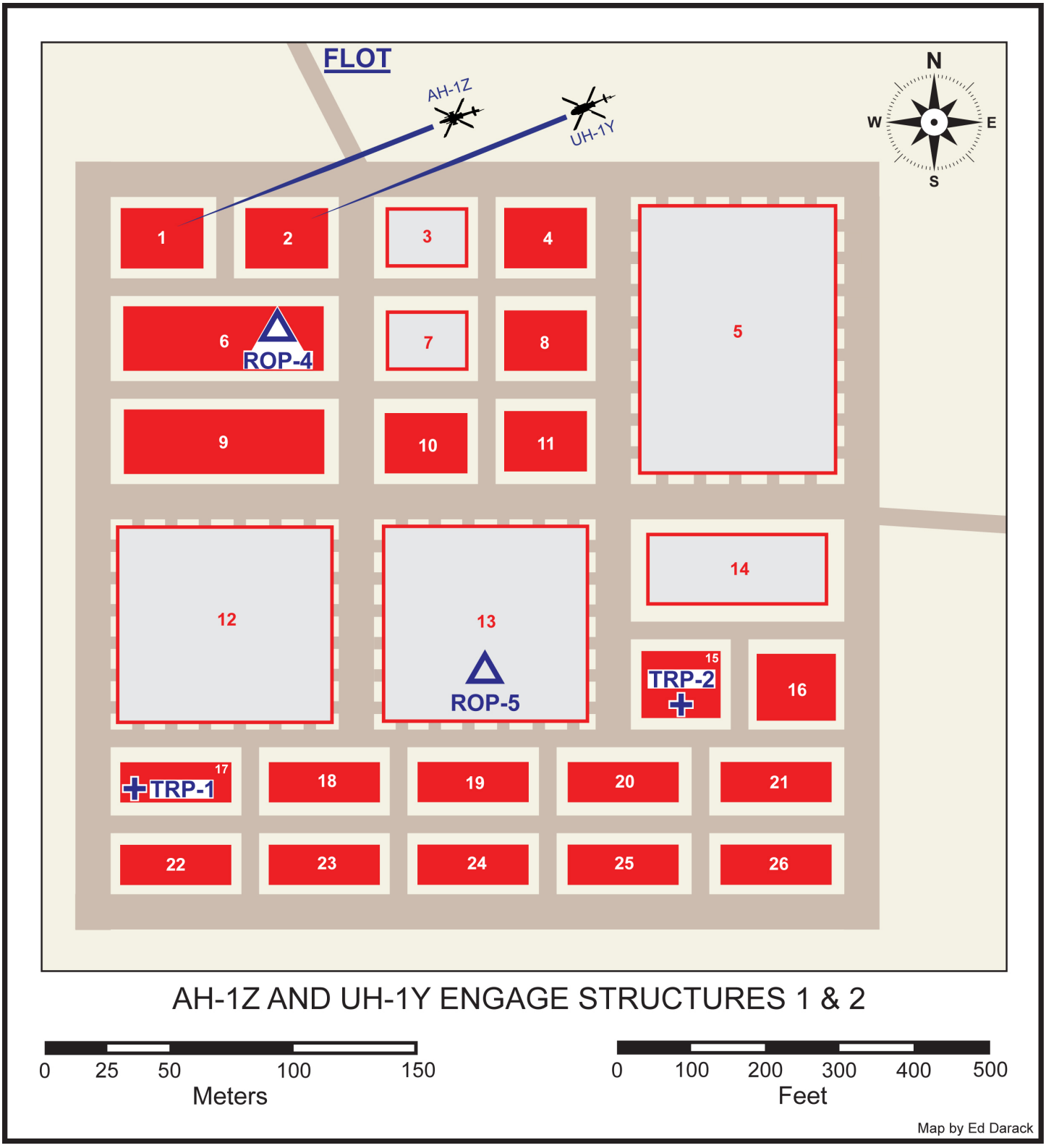
10
11
12
13
ROP-5
DSA-2
14
15
TRP-2
16
17
TRP-1
18
19
20
21
22
23
24
25
26
STRUCTURES 3 & 7 REMOTE BDA / ESTABLISH ROP-5
0 25 50 100 150
Meters
0 100 200 300 400 500
Feet
Map by Ed Darack

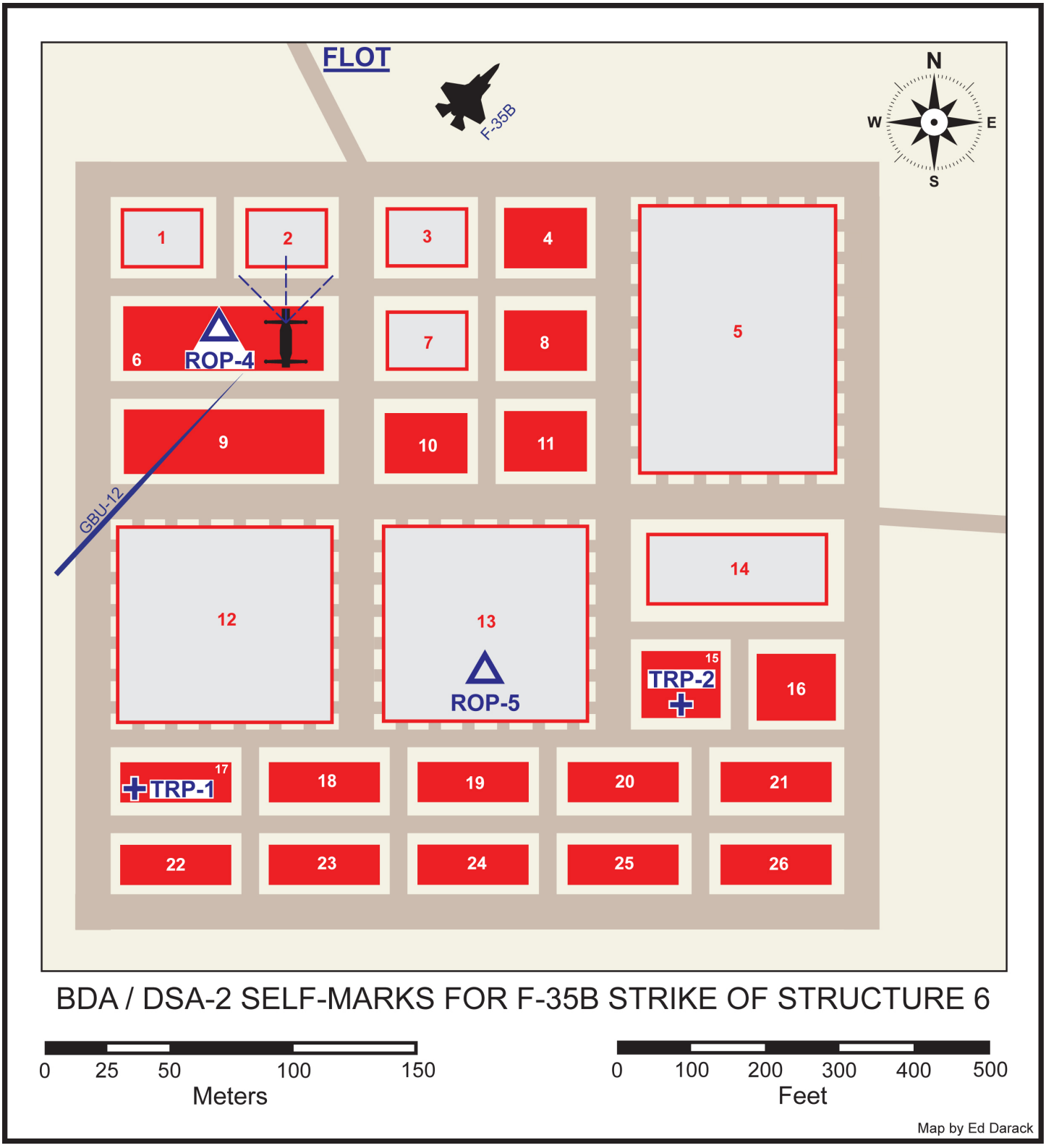


DSA-2 at ROP-4 allows a persistent view of structures 1 and 2 unattainable by troops to the north. CREDIT: Ed Darack

SCENARIO 2: MULTI-DOMAIN, COMBINED ARMS ASSAULT

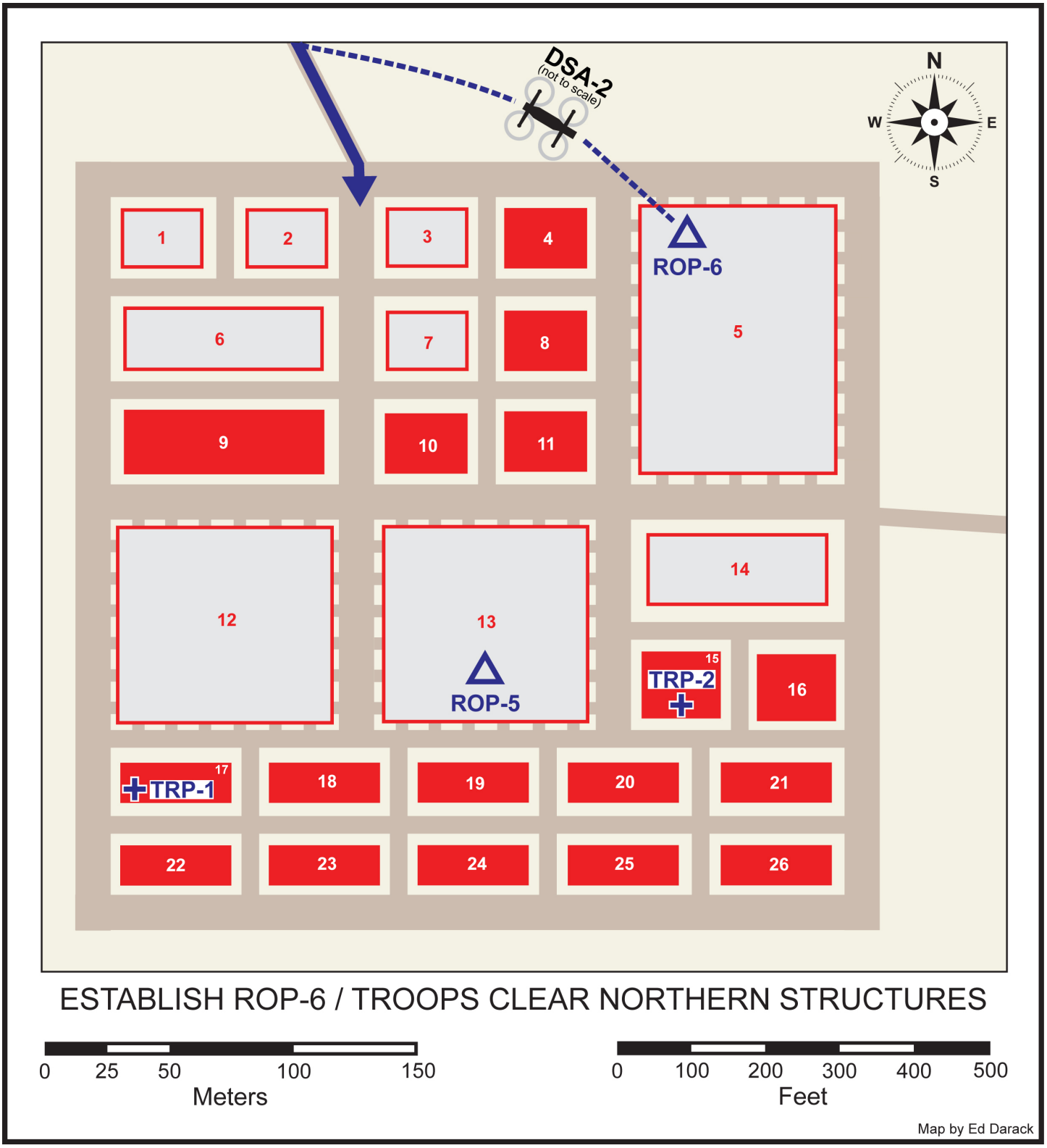


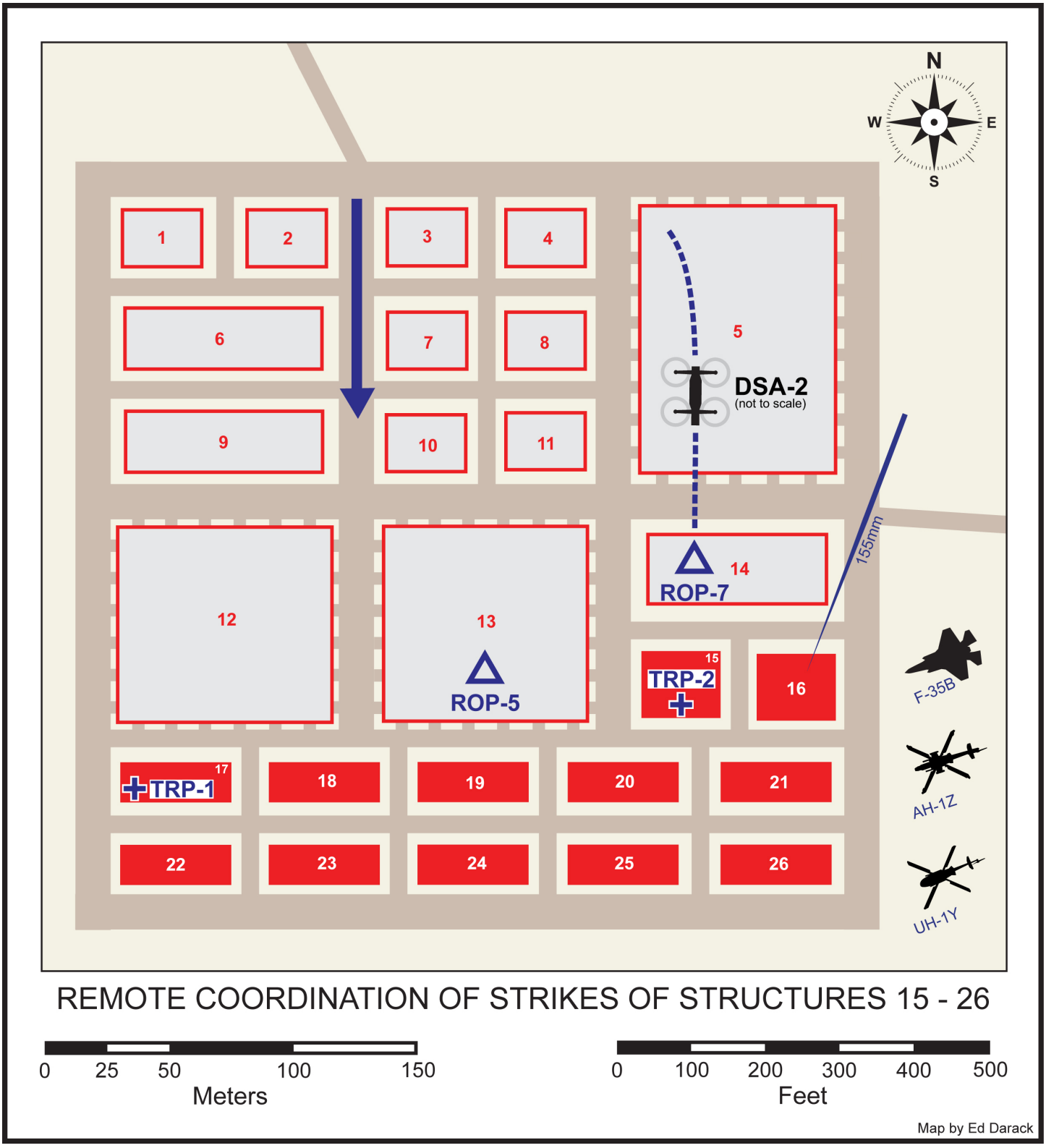
SCENARIO 2: MULTI-DOMAIN, COMBINED ARMS ASSAULT



Self-marking using an onboard light pod provides a high level of situational awareness, and hence confidence, for aerial platforms performing close air support. This component of the operation demonstrates a sacrificial application, where the SUMIDS is used as a target marker. CREDIT: Ed Darack

SCENARIO 2: MULTI-DOMAIN, COMBINED ARMS ASSAULT





Ground force clears north-to-south, using SUMIDS for optimized situational awareness to tightly integrate 155mm artillery, 81mm mortars, F-35B, AH-1Z, and UH-1Y to prosecute targets on-the-fly in this highly dynamic multi-domain, combined arms assault. CREDIT: Ed Darack

SCENARIO 2: MULTI-DOMAIN, COMBINED ARMS ASSAULT