AARMS
Vol. 10, No. 1 (2011) 31–59

SECURITY

Force protection solutions with HESCO Bastion Concertainer

SÁNDOR SZABÓ, RUDOLF TÓTH, ZOLTÁN KOVÁCS

Miklós Zrínyi National Defence University, Budapest, Hungary

The "HESCO Bastion Concertainer" – as it is called in Hungarian "HESCO-bástya" or "HESCO típusú gyorstelepítésű építőelem" – is originated from Leeds, England in 1989. Fundamentally it has been developed for the purposes of flood protection and erosion control, but military experts started to analyze its possibilities to use for Force Protection purposes. Since 1990 HESCO Bastion Ltd has been developing and manufacturing Concertainer units for the purposes of force protection, flood protection and erosion control. Concertainer units have become the most popular means within the military for protecting personnel and facilities against secondary fragmentation, saving countless lives and mission critical assets. HESCO Concertainer can be installed in various configurations to provide effective and economical structures tailored to the specific threat and level of protection required. It is used extensively in the protection of personnel, vehicles, equipment – Force Protection – and facilities in military, peacekeeping, humanitarian and civilian operations. This type of structure provides good resistance to ballistic and fragmentation penetration. For increased physical security, barbed wire coils are often attached to the wall.
The article wishes to give a short overview about the military field applicability of the HESCO Bastion Concertainer.

1. Introduction

The Concertainer was invented 20 years ago in England by Jimmy Hesselden to protect U.K. shorelines against erosion and for flood protection. It didn't take long for the British military to see the potential for the product in force protection. They started using it – redemption sandbags – in Bosnia during the first Persian Gulf War, placing it around the perimeters of camps and bases to protect aircraft and other machinery as well as personnel.

Received: November 3, 2010

Address for correspondence:
SÁNDOR SZABÓ
E-mail: szabo.sandor@zmne.hu

Figure 1. Firing position[1]

Figure 2. Personnel protective bunker[2]

Hesco Bastion Concertainer units are currently in service with many military organisations including the US Army, USMC, USAF, NATO and the United Nations. Units have been used for protection in many countries around the world including Afghanistan, Iraq, Bosnia, Kosovo, Yemen, Sri Lanka, Jordan, UAE and Turkey.

The U.S. military experts said "Concertainer units from HESCO are acknowledged as the most significant development in field fortifications since WWII."[3]

2. HESCO Bastion Type Concertainer construction and characteristics

Since 1990 HESCO Bastion Ltd has been developing and manufacturing Concertainer units for the purposes of force protection, flood protection and erosion control. Concertainer units have become the most popular means within the military of protecting personnel and facilities against secondary fragmentation, saving countless lives and mission critical assets.

In the military and civilian life it is widely used as a modular building system. HESCO Concertainer is a prefabricated, multi-cellular system, made of Alu-Zinc coated steel welded mesh – which is a folding and collapsible system – and lined with non-woven polypropylene geotextile. It can be delivered flat-packed on standard timber skids/pallets or in RAID configuration. Units can be extended and joined using the provided joining pins and filled with available material using minimal manpower and commonly available equipment.

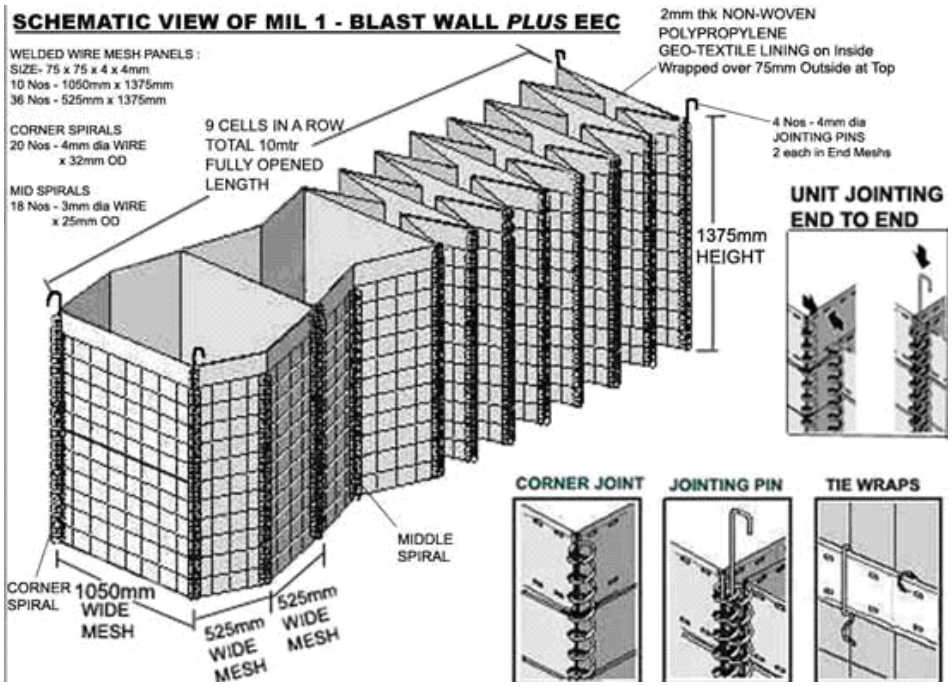

Figure 3. HESCO Bastion Concertainer unit[4]

Available in 12 sizes and delivered flat-packed on pallets or stacked vertically inside a RAID container, units can be easily extended and joined using the provided joining pins and filled with available material using minimal manpower and commonly available equipment. Units are given the "Mil" prefix to differentiate them from their civil market counterparts.

Table 1. Characteristics of the HESCO Bastion Concertainer unit[5]

Unit type	One cell data			Flat packed individual unit		
	Height (m)	With (m)	Length (m)	Number of Cells (pc)	Weight (kg)	Approximate filling material required (m^3)
1	1.37	1.06	10	9	156	22
1.9	2.74	1.06	3.3	3	180	6
EPW 1	2.1	1.06	33	30	840	14
2	0.61	0.61	1.21	2	10	0.46
3	1	1	10	10	105	12.06
4	1	1.5	10	10	160	20
5	0.61	0.61	3.05	5	23	1.6
6	1.68	0.61	3.05	5	51	3.12
7	2.21	2.13	27.74	13	950	190
8	1.37	1.22	10	9	155	25
9	1	0.762	9.14	12	101	9
10	2.12	1.52	30.5	20	1060	147

HESCO Concertainer can be installed in various configurations to provide effective and economical structures tailored to the specific threat and level of protection required. It is used extensively in the protection of personnel, vehicles, equipment and facilities in military, peacekeeping, humanitarian and civilian operations.

Figure 4. Deploying HESCO elements[6]

Figure 5. Before filling[7]

The Concertainer units can be deployed syde by side or onto each other. Each set of Concertainer units comes with joining pins for connecting individual units.

The units fold flat when empty, so that several fit on a standard pallet or skid. On site, Concertainer units can be quickly installed, since they are fully assembled during manufacturing and use standard backhoe loaders or similar equipment for filling.

The manufacturer proves the fast installation on the firm's web page: "A typical wall of Concertainer units, equivalent to 1,500 sandbags, can be erected and installed by two men using a standard front loader in just 20 minutes. A similar wall made with sandbags would take 10 men around seven hours to build."[8] They can be filled with locally available material such as rocks, rubble, sand, gravel, or soil. When filled, the cellular structure results in a sturdy wall. The standard unit size is three feet square and comes in a set of five to create a wall 15 feet long, and in turn, these can be linked to create a wall of unlimited length.

Since its first deployment it has been extensively used in a wide variety of applications and is considered to be the most significant development in field fortifications.

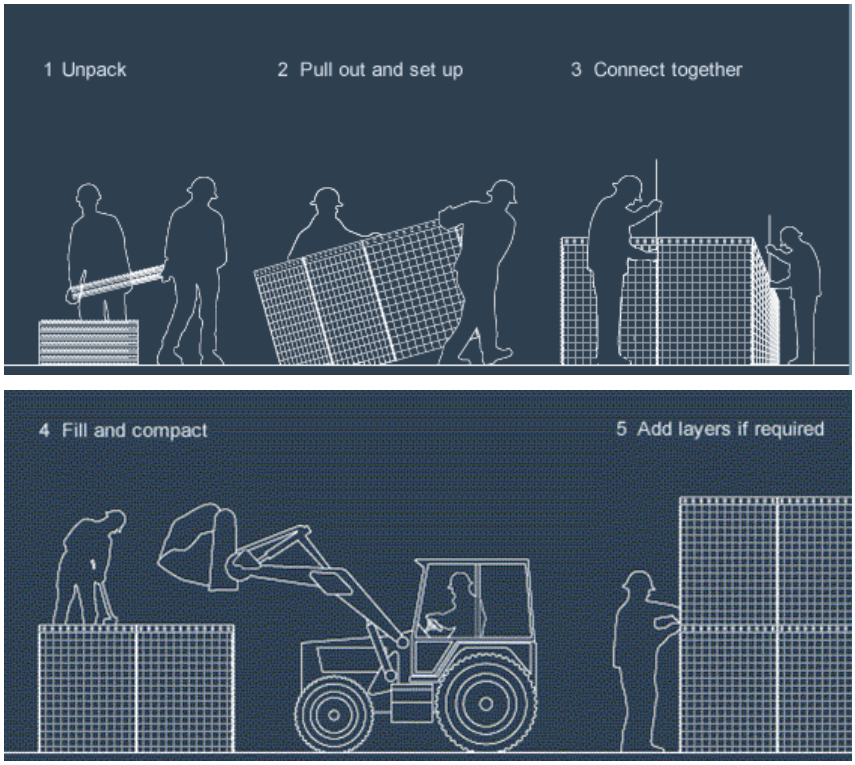

Figure 6. Installation process of HESCO elements[9]

3. The military field applicability of the HESCO Bastion Concertainer

The HESCO Concertainer is the most common used field fortification element, because it is a simple construction, easily transportable and installable, variable, requires minimal workforce and can be used for a long time.

In many cases local conditions or operational situations may dictate modification of the construction of normal structures, and one of the most useful features of HESCO Concertainer is its flexibility to adapt to an environment or requirement.

The most common application for HESCO Concertainer within a military environment is that of a defence wall, used to protect personnel and equipment from the effects of weapons and to increase security around a perimeter. For maximum strength and ease of construction, defence walls are generally constructed from multiple courses, and in a pyramid configuration. This type of structure provides good resistance to

ballistic and fragmentation penetration. For increased physical security, barbed wire coils[10] are often attached to the wall.

Typical military applications include:

- Perimeter Security and Defence Walls;
- Equipment Revetments;
- Ammunition Compounds;
- Personnel and Material Bunkers;
- Observation Points and Guard Posts;
- Defensive Firing Positions;
- Explosives and Contraband Search Areas;
- Highway Checkpoints;
- Border Crossing Checkpoints;
- Protecting Existing Structures;
- Highway Traffic Management;
- Accommodation facilities;
- COLPRO (Collective Protection);
- Medical facilities.

3.1. Special buildings and structures for military use

In addition to the standard Concertainer units, HESCO Bastion Ltd provides several specialised products designed to meet a number of requirements identified by operational users. A variety of off the shelf sets have been configured which include Concertainer components and the required additional components tailored to create protective structures quickly and efficiently.

3.1.1. Defence walls and security fences for Force Protection

The oldest and most established usage of HESCO Concertainer units of all sizes is to create defence walls and security fences. It is possible to design and construct walls that give complete protection from small arms, cannon, RPG, mortars and shrapnel and fragmentation from larger types of shells or bombs.

Mostly they are used around military camps, ammunition, explosive and fuel storages, guard posts, hospitals, stores and key public buildings.

The developed security walls and fences are to prevent the important areas, objects (in camps, barracks, warehouses, etc.) to hinder access by unauthorized persons and/or technical devices,[11] but also able to provide effective protection to the various buildings, equipment, ammunition, fuel storages during a possible attack, suicide bombing or accidental explosion effects (blast wave, shrapnel and splinter effects).

Figure 7. Defence of a camp[12]

Figure 8. Defensive wall[13]

Figure 9. Helipad from HESCO Bastion[14]

Figure 10. Defence object with HESCO wall[15]

Figure 11. Covered storing[16]

Besides, we can use them to mark areas, to prevent overlook and shoot-in to the important objects or keep back movement of people and equipment.

It is possible to design and construct walls that give complete protection from small arms, cannon, RPG, mortars and shrapnel and fragmentation from larger types of shells or bombs using Concertainer units.

Designs created may be in a one or multi-storey and one or multi-line fences or walls. Their effectiveness with use of other tools – for example barbed wire entanglement, anti-sniper netting, etc. – considerably increasable.

Figure 12. Defence wall with barbed wire[17]

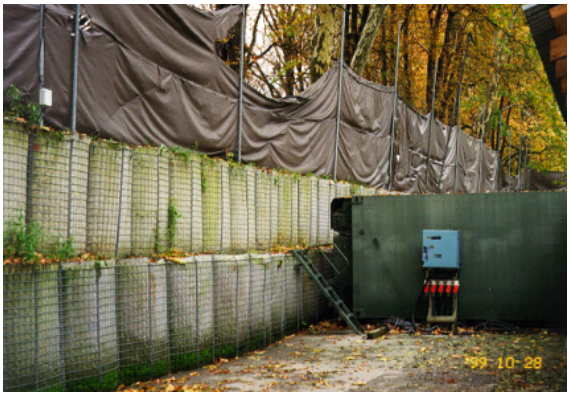

Figure 13. Fence with net against a sniper[18]

3.1.2. Bunkers and shelters for protection of personal, technical equipment and material

The appearance of the new generations of the destroying weapons and their permeation, and changes in the battle processes (the appearance of the asymmetric warfare, suicide bombers, etc.) demanded increased protection for the fighting strength, combat vehicles and material stores.

It is not possible to build a structure to totally protect against the effects of blast from larger explosive devices. However, the construction of a competent defence wall may substantially reduce the effects of weapons and explosions.

Years of hard work and hundreds of live-fire field trials at DRDC (Defence Research and Development Canada) Suffield produced four new protective structures that provide deployed Canadian Forces with better shelter against the threat of Enhanced Blast Weapons (EBW). EBWs generate strong shock waves that travel through the atmosphere and produce high overpressures and extreme aerodynamic drag forces on objects in their path.

Designed to protect against blasts from both improvised explosive devices and conventional military ordnance, the new structures consist of: Ground Observation Post (OP) and Fighting position; Elevated Observation Post; HESCO ISO Bunker; and Suffield Rocket, Artillery, Mortar (RAM) Shelter.

They tested the structures' static stability and resistance against of the weapons.

Their design solutions took into consideration both military and terrorist weapon threats and will vastly improve deployed forces' protection against EBWs.

All four structures are pre-engineered kits that are simple to build using the resources available on deployed operations. Construction time for each structure ranges from four to fifteen hours, based on a section of eight soldiers and factors such as experience and available equipment.

a) Suffield ISO Bunker Construction

Containers often were used and are still used for people accommodation and material storage. Practical experience has shown that the containers do not provide adequate protection against blast and weapons effects.

The container fencing around and cover from top with HESCO Concertainer units significantly increases defense capability of the container.

The HESCO ISO Bunker constructed to offer greater protection from enhanced blast and fragmenting munitions and is designed to minimize blast ingress.

The Suffield ISO Bunker is a modernized upgrade to traditional bunker designs that use steel International Organization for Standardization (ISO) shipping containers.

The Suffield ISO Bunker represents the evolution of the common bomb shelter. DRDC Suffield scientists have optimized the wall and roof designs of this ISO container based bunker to provide increased soldier protection from blast weapons. Even with the poorest quality of fill, it continues to provide substantial protection from direct fire and fragmentation munitions. The roof resists the detonation of large artillery and mortar shells, and the thick walls protect from small arms fire and ground-burst fragmentation hazard.

At the heart of the Suffield ISO Bunker is a 20 ft ISO shipping container. These readily-accessible containers offer protection from the elements but their thin walls offer very little blast and fragment defence. Placing HESCO Bastion Concertainers around the walls greatly increases ballistic protection and shielding from blast effects.

The heavy and simple sheet pile based roof design has overcome many of the difficulties of panning large distances.

The Suffield ISO Bunker specifies that the doors of the ISO container remain open, and that a rear door is cut out (left). This flow-through design relieves blast pressure accumulation within the bunker and gives personnel easier access and escape. There is also no direct line of sight for fragmentation or direct fire weapons.

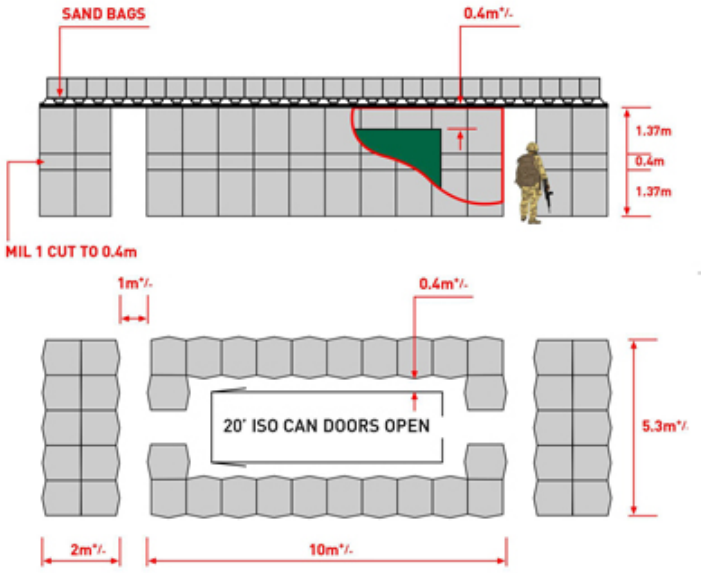

Figure 14. Design of the Containerised Bunker Kit[19]

A containerised kit has been developed which offers an effective means of transporting all the components required to construct a bunker. The ISO container has a fully opening side, facilitating rapid deployment of all components. The container also comes complete with a pre-fabricated personnel door and a rear escape hatch, both of which can be opened from inside.

Figure 15. Containerised Bunker Kit[20]

Table 2. Suffield ISO Bunker Resource Requirements[21]

Personnel	8
Time to construct	15 hrs
Ground footprint	6 m × 18 m
Heavy equipment	Front End Loader or equivalent to deliver fill and hoist roof. Bobcat or other forked equipment
Materials	20 ft ISO Container 16 Mil 1 HESCO Bastion (9 cells each) 32 Mil 2 HESCO Bastion (2 cells each) 140 m^2 sheet pile 300 m^3 fill (dirt)

Figure 16. Suffield ISO Bunker for materials[22]

b) Suffield Rocket, Artillery and Mortar (RAM) Shelter

The Suffield RAM shelter is similar in design to the ISO bunker, but with a smaller footprint and use a modular tunnel liner instead of an ISO container. A particularly attractive feature of the shelter design is that it can be made longer by adding sections of modular tunnel liners during construction. Both bunker designs incorporate flow-through entrance designs to minimize blast ingress.

The Suffield RAM Shelter was developed to provide increased soldier protection from blast weapons. It also provides substantial protection from small arms fire and fragmentation munitions. The RAM shelter is capable of withstanding the rooftop detonation of large artillery and mortar shells. The Suffield RAM Shelter can comfortably offer protection to twenty soldiers

The Suffield RAM Shelter uses the strength of an arched tunnel liner to support both the heavy weight of the roof and the impact from artillery and mortar shells. The arch is made from steel and can easily be assembled using hand tools. The 4 mm thick steel also offers considerably more ballistic protection than the commonly used ISO container. Using modular tunnel liner and HESCO Bastion Concertainers, the length of the Suffield RAM Shelter can vary depending on operational needs. A distinct advantage of the Suffield RAM Shelter is that aside from the fill, all materials for up to three structures can be fit into one 20 ft ISO container, thereby minimizing logistics concerns for shipment into theatre. The Suffield RAM Shelter is intentionally straightforward to construct, catering to the equipment and skills available on deployed operations. The table below gives an indication of the resources required to build a Suffield RAM Shelter as table and pictured.

Table 3. Suffield RAM Shelter Resource Requirements [23]

Personnel	8
Time to construct	12 hrs
Ground footprint	5 m × 12 m
Heavy equipment	Front End Loader (or equivalent to deliver fill)
Materials	20 ft ISO Container 16 Mil 1 HESCO Bastion (9 cells each) 32 Mil 2 HESCO Bastion (2 cells each) 140 m^2 sheet pile 300 m^3 fill (dirt)

Figure 17–20. RAM shelter developing[23]

c) EOPS – Extended Overhead Protection System

In last years military experiences had shown that increasing the security of the troops, equipment and materials is basic in the military operations.

Nowadays the terrorist attackers, suicide bombers and insurgents engaged in a growing number, continue guerrilla warfare and use artillery, missile equipment, improvised explosive devices, therefore it became necessary to review the Force Protection and to developed new procedures, methods.

Today's terrorist and insurgent are employing targeted mortars and artillery rockets, resulting in casualties being sustained inside hitherto safe camps. This has resulted in many countries with troops deployed in hostile environments demanding the provision of overhead protection, for either living accommodation or for cabins housing camp critical or mission critical assets.

The best solution would be using HESCO to strengthen the structure and their plate floor. For this was born the Extended Overhead Protection System. It was developed as a response to the threat of attack by Vehicle Born Improvised Explosive Device (VBIED), defense walls built from Concertainer units were developed, and have

become the standard equipment for protecting personnel, equipment and facilities from a wide range of munitions and Improvised Explosive Devices (IED).

Concertainer units are already qualified as a barrier wall system. The EOPS concept provides a roof structure with defined overhead protection for larger facilities. EOPS is built around existing, ISO container-buildings such as Mobile Expandable Container Configurations (MECC), or even basic sea container units. The frames of such ISO units combined with a steel superstructure provide the necessary support for the roof.

EOPS provides overhead protection against all mortar bombs and super-quick-fused 155 mm artillery shells. EOPS was originally designed to withstand an attack from an 81 mm mortar bomb, typical of the size used by insurgents. However, testing and development has shown that EOPS can withstand a much heavier explosive force of 30 kg NEQ.

EOPS provides a roof structure with defined overhead protection for larger facilities. EOPS is built around existing, ISO container-buildings such as expandable container systems, or basic sea container units. The frames of such ISO units combined with a steel superstructure provide the necessary support for the roof.

Figure 21. EOPS shelter[24]

Figure 22. EOPS roof installation[25]

MIL 3 and MIL 4 Concertainer units have been used for protection purposes on the system. A specially designed and manufactured locating cup is fitted to the four corners of an ISO container frame or similarly configured product. These cups provide the central support to the steel roof beams. The roof beams in turn locate into the Concertainer units. In addition, two short roof beams are used to bridge the access points.

The roof structure consists of a two 11 m long roof beams. Two 3 m-roof beams, with the same grade of steel are used to bridge the access point. 11 m long steel sheet piles (made of the same grade of steel as the roof beams) are used to form the base of the overhead cover by placing them across the structure.

A parapet is then formed using MIL 3 units and finally the internal roof cavity is filled with soil until it is level with the top of the MIL 3 units.

EOPS covers a footprint of approx 11×11 m, with an internal space of 8×8 m. The walls are built from 1.5×1×10 m long MIL 4 units on the base, with 2 layers of 1×1×10 m MIL 3 units on top.

At the heart of the design is a unique locating cup, which has been specially designed and manufactured to integrate the roof structure with any stackable ISO container-building unit.

An EOPS installation forms, as a minimum, a triple wide structure. Because EOPS is essentially modular, there is no limit to the area of the installation to be protected. EOPS can be right-sized to implement any single storey plan.

Typical uses:

- Living quarters/mess facility;
- Headquarters communications centre;
- Medical facility;
- Equipment/ammunition area;
- Secure detention area;
- Safe Haven.

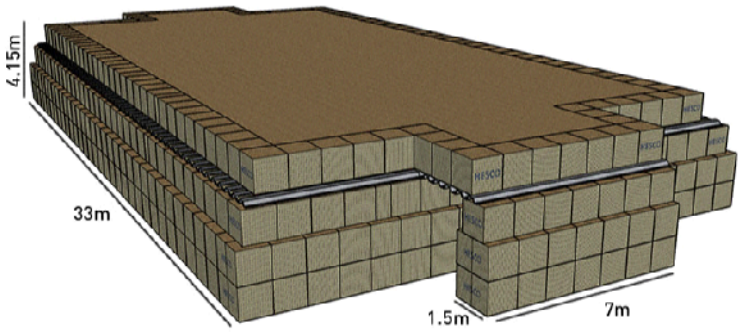

Figure 23. Another shelter structure[26]

Figure 24. Field hospital[24]

Figure 25. The shelter inside wiev[27]

Multiple cabin offices, living and dining quarters, command and communications posts or field hospitals can be placed under the EOPS protective structure, allowing operations to continue unhindered. Internal walls built from Concertainer units can divide the interior space and increase protection.

The development of EOPS has resulted in a system that can accommodate multiple containers placed side-by-side and end-to-end to form a large complex of shelters under one common protective roof cover, offering greater flexibility and utilisation of space.

d) HAB – HESCO accommodation bunker

Nowadays the security and accommodation of the persons and crews, who participate in different military missions is a very important question for the modern military forces.

HAB has been developed by Hesco Bastion Ltd as a result of the ever increasing threat to deployed personnel from indirect fire weapons.

The bunker is designed to provide safe living accommodation for up to 8 persons giving each person a space of around 2 m square. There is up to 2.16 m of headroom inside the bunker.

A HAB has a footprint of 12.4 m long and 6.2 m and an overall height of around 3.5 m. HAB will provide protection from weapons systems up to and including large mortar rounds. It has side walls formed from Mil 6 Concertainer units and a specifically engineered (lightweight aluminium) roof structure to combat the effects of indirect fire weapons.

It is provided in kit form and is delivered in 2 wooden crates. These crates hold all the components for the bunker and indeed form part of the structure themselves. Everything required is provided in the kit less the fill material.

A simple toolkit is also provided to ensure that those constructing the bunker have such tools as string lines, tape measures and spirit levels.

Two bunkers can be built in two days by one section of soldiers assisted by a loading shovel. The bunker can be fitted out for air conditioning, heating and other services by using the factory formed aperture placed at one end.

The modular design of the HAB allows more complex structures to be built. In its most simplistic form this would entail joining units end to end.

Two HABs can be shipped inside one standard 20 ft ISO container, and can also be deployed by parachute.

HESCO Accommodation Bunker

Figure 26. From outside[28]

Figure 27. From inside[28]

3.1.3. Observation, guard and firing posts

To protect the camps, stores, command posts, important buildings and constructions is a very important task during of military operations.

For successful execution of these tasks the observation, guard and firing posts are very important parts.

Depending on places and purpose they may be established, for example at the Buffer Zones, Boundaries, Perimeter Security and Defence Walls, Observation Points, Defensive

Firing Positions, Guard Posts, Explosives and Contraband Search Areas, Highway Checkpoints, Border Crossing Checkpoints, Highway Traffic Management etc.)


Figures 28–29. "Sangar" type Guard Post[29]

The guard post sangar establish a small firing or observation point, based on the Concertainer system.

The components of this set provide a small protective emplacement with 0.6 m walls and 0.45 m of overhead cover. Embrasure (firing/observation point) forms are included in the set as are roof joists and roofing material. The interior space is 1.2 m by 1.8 m, with 1.98 m of headroom.

The complete set is delivered on a single pallet weighing 375 kg and is typically constructed in around 3 hours. To construct a 2 man Sanger kit will take approx 20 m^3 of fill material. Detailed instructions for the assembly of the guard post set are supplied.

To improve effectiveness and to increase distance of observers, there had been developed many others observation post structures, for example Ground Observation Post (OP) and Elevated Observation Post (EOP).

The function of the OP and Elevated OP structures is to improve soldiers' observation capabilities by offering 360-degree surveillance and maximum blast protection.

The Elevated Observation Post is an elevated version of the OP and offers improved ground surveillance because of its height.

The ground OP has been designed to provide all-around surveillance while mitigating the effects of blast waves. It is a defendable fighting position that resists the penetration of small arms fire and known artillery and mortar shell fragments. The robust roof has also been proven to resist the detonation of artillery and mortar delivered munitions.

In an effort to ease the strain on the logistics tail that supports all deployed operations, special care was taken during the design phase to minimize the types of materials used. As a result, the OP requires only four materials: two types of HESCO Bastion Concertainers, steel sheet pile, and fill.

The ground OP is straightforward to construct, catering to the equipment and skills available in theatres of operation. Table shows the manpower and resources needed to build the ground OP, and recommends the ideal specialized heavy equipment required to complete the task.

Table 4. Ground OP Resource Requirements[30]

Personnel	8
Time to construct	12 hrs
Heavy equipment	Front end loader (or equivalent to deliver fill) 40 m^2 sheet pile
Materials	3 Mil 1 HESCO Bastion (9 cells each) 12 Mil 2 HESCO Bastion (2 cells each) 50 m^3 fill (dirt)

Elevated Observation Post is another structure. This structure offers increased fields of surveillance and fire. Of all possible applications for the elevated OP, it is most likely that this structure will be built into the perimeter wall of a deployed camp or forward operating base.

The elevated observation post variation uses the same materials as the original, ground-based observation post. Inset image shows columns in base of structure, and friendly-side step-up entrance.

Several types of guard and observation posts can be developed, according to the actual of the operation activity.

Developed observation posts

Figure 30. Ground Observation Post[30]

Figure 31. Elevated Observation Post[30]

Figure32. Field Guard Post[31]

Figure33. Observation Post[32]

Beside the guard and observation posts, the Firing positions play an important role in military operation, when we establish HESCO Concertainer units for the personnel and technical equipment.

Figure34. "Temporary" firing position[33]

Figure35. Combat vehicle firing position[13]

Created designs may be opened or covered. The covered firing positions can provide protection against the effects of the high trajectory of projectiles as well.

The variability of the structures can be designed from the HESCO Concertainer units are endless.

The researches are ongoing today and surprising new results were produced.

Let's shortly see the latest developments and application possibilities.

3.1.4. RAID – Rapid in-theatre deployment of concertainer units

This is a new development. Currently there two basic types are used – the RAID 1 and RAID 7.

RAID utilises a specially designed and engineered container to provide significant increases in the quantity of Mil units that can be transported in a 20' container footprint. In addition, the container conforms to all ISO stacking and transportation standards.

The unique rapid delivery system of RAID gives a reduction in the requirement for valuable manpower and equipment during the execution phase of the mission.

Deployment in the field is simple. The container is delivered to site by either load handling systems or by conventional truck, the container doors are opened and all transportation strapping removed.

Alternatively, where the container has been delivered by conventional truck, the container is off-loaded on to the ground and then pulled to the start point by a suitably sized vehicle with adequate traction and power. Equipment such as wheeled and tracked earthmoving equipment, wheeled logistic vehicles and wheeled and tracked combat vehicles should be suitable. Once the container is at the start point, RAID is deployed in the manner described previously.

The unit being deployed is connected into a length of 333 m. However, this can be split by the removal of 2 pins. These pins are placed every 5 cells (approx 11 m). This ability to split the unit provides excellent flexibility during construction: corners can be formed, more units can be joined, gaps in the wall can be created (for entry points etc). Splitting units also provides the benefit of only having to deploy what is required – the remainder is left on board for future use.

In recent trials, RAID deployed approximately 333 m of Concertainer Mil 7 units in just under one minute – that's 333 m of cover from view, 2.2 m high, in just less than one minute.

RAID stores

Figure36. RAID 1 type[34]

Figure37. RAID 7 type[34]

Figures 38–39. Employing RAID store[34]

Table 5. Main data of the RAID stores[34]

Technical Information & Features	RAID 1	RAID 7
Deployed length	406 m (when filled)	333 m (when filled)
Deployed wall height	2.1 m	2.21 m
Deployed wall width	1.06 m	2.13 m
Segment length	5.5 m (5 cells)*	10.65 m (5 cells)*
No. of 5 cell segments	74	31
Gross weight	Circa 12 tonnes	Circa 14 tonnes
Ability to curve	Yes	Yes
Ability to form corners	Yes	Yes
Ability to split the unit into shorter lengths	Yes	Yes
Ability to form wider walls	Yes	Yes
Ability to form higher walls	Yes	Yes
Instant cover from view	Yes	Yes
Fork lift required	No	No
Crane required	No	No
Manual handling required	Very limited	Very limited
Towing vehicles	Tracked and wheeled earthmoving equipment, DROPS, HEMTT, LVS, tracked and wheeled armour	Tracked and wheeled earthmoving equipment, DROPS, HEMTT, LVS, tracked and wheeled armour
Container supplied	Yes	Yes
Container to be returned	No	No

* All lengths nominal. All ratios approximate

The RAID system is available for the other unit sizes.

The benefits of RAID:

- Increase in deployable quantity of Concertainer units from one 20' ISO container (ACCHs);
- Reduction in truck movements when moving material forward;
- 3:1 reduction in manpower – only two soldiers required on the ground;
- 2:1 reduction in MHE requirement when building – no requirement for a dedicated fork-lift to move units;
- Reduction in fork-lift movements when loading logistical vehicles;
- Reduction in storage yard requirements – containers can be stacked up to five high;
- Rapid cover from view;
- Secure storage system;
- Reduction in wastage – no packaging removal or disposal;
- Hugely reduced manual handling;
- Empty container for other use after units deployed.

4. Conclusion

The examples above clearly show that the achieved results of the HESCO Concertainer units are satisfying.

The HESCO Concertainer is the most common used field fortification element, because it is a simple construction, easily transportable and installable, variable, requires minimal workforce and can be used for a long time.

It is popular because it has a simple structure, versatile, quick and easy to use and provides reliable defense capability of the personnel, technical equipment and property protection.

HESCO Concertainer can be installed in various configurations to provide effective and economical structures tailored to the specific threat and level of protection required. It is used extensively in the protection of personnel, vehicles, equipment and facilities in military, peacekeeping, humanitarian and civilian operations.

HESCO Bastion Concertainer units are currently in service with many military organisations including the US Army, USMC, USAF, NATO and the United Nations. Units have been used for protection in many countries around the world including Afghanistan, Iraq, Bosnia, Kosovo, Yemen, Sri Lanka, Jordan, UAE and Turkey.

It is a truly new fundamental engineer equipment of the force protection.

The researches, analyses prove that their professional application may save lives unambiguously, and they successfully may protect the multitude of material goods.

References

1. http://img1.photographersdirect.com/img/15009/wm/pd553981.jpg. Downloaded 12.03.2010.
2. http://www.globalsecurity.org/military/library/report/call/call_99-12_bunker4.gif. Downloaded 12.03.2010.
3. http://www.army-technology.com/contractors/infrastructure/hesco/. Downloaded 09.03.2010.
4. http://www.hescobarriers.com/admin/products/prodimg/militaryblastcon big.jpg. Downloaded 22.08. 2008.
5. Made by SÁNDOR SZABÓ on a basis of: http://www.hesco.com/enter.html. Downloaded 11.04.2010.
6. http://1.bp.blogspot.com/_k07pirzBU34/SmJOkg22QcI/AAAAAAAABus/qSR6gcBclDs/ s400/seabees align-hesco-barrier.jpg. Downloaded 12. 03. 2010.
7. ZSIROS SÁNDOR mk. őrnagy: *A Magyar Honvédség műszaki technikai eszközei és fejlesztési lehetőségük a katasztrófavédelem tükrében*. Diplomamunka, ZMNE, Budapest, 2006, 42. p.
8. http://www.hesco.com/US_CIVIL/sandbags.html. Downloaded 12.04.2010.
9. Made by Dr. SZABÓ SÁNDOR on a basis of: http://www.hesco.com/US_CIVIL/simple.html. Downloaded 12.04.2010.
10. KOVÁCS ZOLTÁN: Gondolatok a drótzárakról. *Műszaki Katonai Közlöny*, 2001/3–4, 41–55. pp.
11. LUKÁCS LÁSZLÓ: Gondolatok a fontos objektumok védelméről, különös tekintettel a műszaki zárak telepítésére. *Műszaki Évkönyv*, 1995, Budapest, Az MH Műszaki Főnökség, 1996, 182–216, pp.
12. http://en.wikipedia.org/wiki/File%3ACamp_marmal02.JPG?powerset. Downloaded 14.03.2010.

13. http://www.hesco.com/enter.html. Downloaded 15.03.2010.
14. http://www.armedforces-int.com/article/2006-hesco-photo-competition.html. Downloaded 14.03.2010.
15. http://www.blogs.mod.uk/.shared/image.html?/photos/uncategorized/2008/04/16/afghani stan6.jpg. Downloaded 15.03.2010.
16. http://www.hesco.com/enter.html. Downloaded 14.03.2010.
17. PADÁNYI JÓZSEF: Újszerű műszaki eszközök a békefenntartásban. *Haditechnika*, 2001/4, 16. p.
18. HORVÁTH TIBOR, PADÁNYI JÓZSEF: Műszaki eszközök a béketámogató műveletekben és a fejlesztés lehetőségei I. *Katonai logisztika*, 2006/4, 105. p.
19. http://www.suffield.drdc-rddc.gc.ca/Research-recherche/Products-produits/MilEng/ RD2006_08/index_eng.html. Downloaded 15.03.2010.
20. http://www.hesco.com/images/hesco_bunkerkit.jpg. Downloaded 15.03.2010.
21. http://www.suffield.drdc-rddc.gc.ca/Research-recherche/Products-produits/MilEng/ RD2006_08/FS 2006_08_fra.pdf. Downloaded 13.03.2010.
22. http://www.combatreform.org/ISOcontainerbunkersformunitionsiraqcroppedtn.jpg. Downloaded 15.03.2010.
23. http://www.suffield.drdc-rddc.gc.ca/Research-recherche/Products-produits/MilEng/ RD2006_07/ index_eng.html. Downloaded 18.03.2010.
24. http://www.armedforces-int.com/article/eops-protection-mortar-bombs-155mm-artillery-shells-122mm-rockets.html. Downloaded 18.03.2010.
25. http://www.expose-the-war-profiteers.org/archive/government/2005-2/20051100.pdf. 231.p. Downloaded 18.03.2010.
26. http://www.hesco.com/eops/004.html. Downloaded 15.03.2010.
27. http://www.hesco.com/eops/003.html. Downloaded 13.03.2010.
28. http://www.hesco.com/enter.html. Downloaded 13.03.2010.
29. http://www.armedforces-int.com/article/constructing-sangar-guardpost-concertainer-units.html. Downloaded 19.03.2010.
30. http://www.suffield.drdc-rddc.gc.ca/Research-recherche/Products-produits/MilEng/ RD2006_06/ index_eng.html. Downloaded 19.03.2010.
31. SOUCZ FERENC főhadnagy: 267 méteres falat építtettek a magyarok. http://www.honvedelem.hu/cikk/0/16018/ujra_falazott_a_prt.html. Downloaded 19.03.2010.
32. http://www.michaeltotten.com/images/Post%20Outside%20Karmah.jpg. Downloaded 21.03.2010.
33. http://img25.imageshack.us/img25/7174/51139110.jpg. Downloaded 18.03.2010.
34. http://www.hesco.com/raid/. Downloaded 19.03.2010.