

Ad hoc hiding places as part of collective protection

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Abstract

The overview article deals with the topical issue of how to protect the population under extraordinary threats which are natural disasters, but also the threat of war. There is a real threat of the possibility of using weapons of mass destruction in a local conflict from Russia. The article characterizes collective protection, as an element of protection at workplaces and as an element of protection of the population in case of extraordinary threats. On the basis of available legal acts, standardization and standardization documents, the means for collective protection were characterized. The application of the PSP for finding and classifying objects to serve as means of protection was analyzed, using examples. Examples of domestic solutions for the construction of so-called "home shelters" were presented.

Keywords: chemical sciences, stealth, collective protection, crisis management

1 Introduction

The changes that have taken place in recent years (and even months) in military-political relations in the world have necessitated a new look at civilian protection.

Suggestions that Russia might use nuclear weapons have been around since the beginning of the Russian invasion of Ukraine. The first were made back in 2014, after the annexation of Crimea. In February of that year, Vladimir Putin announced a strong response if the West became involved in the conflict. Russia even suggested an "escalation" in response to arms supplies to Ukraine. Is this just cynicism designed to intimidate the international community? Also in February this year, Russia is withdrawing from the New START treaty, which, on Russia's part, has not been complied with, as the U.S. State Department states that the U.S. has not been able to inspect Russia's nuclear arsenal for at least 3 years.

Tracing the conflict in Ukraine, it can be seen that mostly missile and drone attacks are directed at civilian facilities, including residential infrastructure, schools, hospitals, etc., as the U.S. Department of State states (Figure 1).

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Fig. 1. Examples of damage to "civilian" infrastructure in Ukraine [1,2].

The consequences are civilian casualties and huge material losses, and this enforces the need for temporary protection of the population.

2 Collective protection

In the event of extraordinary threats, such as natural disasters or wars, people seek refuge in places that appear to be safer than their own homes or move to places far from threatened areas.

Defining collective protection itself can encounter difficulties. In legislation, we encounter collective protection of workplaces. For example: "On the basis of the general regulations of occupational safety and health, the employer is obliged to use methods to protect his employees from various hazards, thereby ensuring a safe organization of work. Every employer has the task of protecting the life and health of his employees. He should use all possible measures that will help reduce the risks so that they reach the minimum values that are permissible. To this end, the employer may use collective protection measures, which include administrative, organizational, legal and technical measures that reduce the impact of hazards on the health and safety of employees. At all times, the employer should ensure that the use of collective protection measures takes precedence over individual protection measures" [3,4,5].

Collective protection measures are understood as measures designed to simultaneously protect a group of people, including individuals, from dangerous and harmful factors occurring singly or in combination in the working environment, being technical solutions used in work premises, machinery and other equipment. Administrative, organizational and legal measures can include all legal acts, intra-company regulations, control activities and

ensuring compliance with OSH regulations by employees. **Technical measures**, which in fact make up collective protection measures, are designed to protect workers from the hazards of the working environment. We can include a wide variety of measures, which often result from local conditions [6]. Among the basic elements of collective protection, we can include lighting, ventilation and air conditioning, smoke extraction, lightning protection, smoke and fire detection (fire protection), building (facility) access control, and structural, shielding and insulation solutions used in buildings and machinery.

This applies to workplaces, not to collective emergency protection in general.

It is worth leaning over, the law "On Civil Protection" (still a draft) announced for introduction in 2022. Chapter 1 "General Provisions" in Article 2. of the government draft states:

"1. Civil protection is an integrated activity of public administration bodies and entities carrying out civil protection tasks aimed at ensuring the safety of citizens, public order, protection of life and health of persons residing on the territory of the Republic of Poland, and protection of property, natural environment and cultural heritage in case of emergency situations, by:

- 1) ensuring the conditions necessary for the protection of human life and health and providing basic conditions for survival in emergency situations;
- 2) ensuring cooperation of all rescue, monitoring, warning and alarm systems, emergency notification, as well as bodies, services and other entities carrying out tasks in the field of civil protection;
- 3) substantive, organizational, material and financial support of non-governmental organizations in the performance of tasks in the field of civil protection, in particular, social rescue, humanitarian and volunteer organizations;
- 4) organizing and coordinating humanitarian assistance;
- 5) providing resources that can be used to carry out civil protection tasks;
- 6) educating the public on the formation of awareness of threats and desirable behavior in case of their occurrence" [7].

In Chapter 2 "Tasks related to civil protection" in Art.5:

1. As part of civil protection, tasks are performed:
 - 1) related to the possibility of emergencies, consisting of:
 - a) monitoring of threats and estimation of the risk of their occurrence;
 - b) organizational and material preparation for response;**
 - c) preparation of conditions for the protection of the population, including conditions for evacuation of the population, places of temporary residence and protective structures, securing property;**
 - d) training of civil protection entities and their preparation for interaction, including conducting exercises;
 - e) development and implementation of civil protection programs;
 - f) creation of reserves of resources for civil protection;
 - g) conducting education of the public in the field of civil protection, including the formation of awareness of threats and desirable social behavior, including those arising from war-time threats;
 - h) planning and preparing the process of raising the level of response readiness of civil protection entities;
 - i) planning and preparing the process of transforming civil protection entities into civil defense organizations.
- 2) related to the occurrence of an emergency situation, consisting of:
 - a) informing, warning and alerting the population;
 - b) exchange and analysis of information from emergency monitoring systems between civil protection entities;
 - c) identifying and marking danger zones;
 - d) response and intervention and rescue operations by relevant civil protection entities;
 - e) ensuring the operation of public utility services;
 - f) ensuring public safety and order;
 - g) ensuring protection against the effects of chemical, biological and radiation hazards, as well as eliminating the consequences caused by their occurrence;**
 - h) conducting evacuation of the population;
 - i) providing emergency assistance to the affected or evacuated persons;
 - j) providing medical and psychological care, as well as legal assistance to the affected persons;
 - k) informing families about the injured;
 - l) providing conditions and opportunities for the identification of injured persons;

- m) organizing or coordinating the provision and reception of humanitarian aid;
- n) ad hoc burial of the dead [7].

In Chapter 8 "Providing shelter for the population and securing property in emergency situations" a Article 21.

1. In order to ensure the protection of the population and the safeguarding of movable cultural relics, particularly important documentation, valuable and important equipment, the safeguarding and protection of food and medical supplies from the effects of emergency situations involving, in particular, events of a terrorist nature, contamination caused by industrial accidents, and acts of war, the authorities referred to in Article 6, paragraph 1, and the other ministers shall plan the necessary technical and organizational measures adequate to the existing risks concerning:
 - 1) *use of parts of communication, commercial, service, storage and other facilities;*
 - 2) *preparation of existing protective structures;*
 - 3) *ad hoc adaptation of premises that can be used for civil protection purposes;*
 - 4) *planning of means of transportation for evacuation from places of danger to people and property;*
 - 5) *anticipated evacuation sites.*
2. In the case of local government units, the projects referred to in paragraph (1)(1) and (2) shall be undertaken insofar as they result from the relevant multi-year civil protection programs.
3. The conditions for the use for specific purposes of the facilities referred to in paragraph (1)(1) and (2) shall be determined by the civil protection authority if it is the owner or manager of the facility, and in other cases the civil protection authority having jurisdiction over the location of the facility shall conclude a civil law agreement with the owners, specifying the terms, conditions of financing and use of the facility.

Unfortunately, this document, too, does not define the means to protect the population in case of extraordinary emergencies.

3 Collective protection facilities

In the appendix to the outdated Guidelines of the Head of National Civil Defense dated 4.12.2018 on the principles of dealing with protective construction resources "Technical conditions to which protective structures should correspond", you can find a definition of protective structures and their classification, namely:

§ 1.1 A protective structure shall be understood as a room or set of rooms intended for the protection of persons, equipment, material stockpiles or other material goods from the effects of military action, extreme weather events, environmental, industrial disasters or other hazards.

1. Protective structures are divided into shelters and hideouts:
 - 1) shelter - is a protective structure with a structurally closed, airtight enclosure, providing protection of persons, equipment, material stocks or other material goods from the presumed agents of destruction acting from all sides;
 - 2) shelter - is a protective structure with a non-hermetic enclosure, equipped with the simplest installations, providing protection of persons, equipment, material stocks or other material goods from the presumed agents of destruction acting from certain sides.
2. The following classes of resistance of shelters are distinguished:
 - 1) shelters of category P - basic resistance, protecting against:
 - a) air shock wave overpressure of $\Delta p_m \geq 0.03$ MPa,
 - b) the effects of shock,
 - c) the effects of secondary loads from falling elements of building structures and crumbling,
 - d) debris from bombs and missiles,
 - e) penetrating radiation from radioactive fallout, ensuring the attenuation factor of penetrating radiation $K \geq 100$,
 - f) effects of fires within the building in which the shelter is located and in the area around the shelter,
 - g) toxic warfare agents, and if equipped with appropriate devices - protecting also against other toxic substances;
 - 2) shelters of category A - with increased resistance, meeting the requirements specified for shelters of basic resistance, and in addition, protecting against overpressure of a shock wave with a value $\Delta p_m \geq 0.1$ MPa

propagating in the air and ground or, in addition, the impact of other assumed gross factors, used to protect the infrastructure requiring increased protection due to the purpose or location.

3. The following classes of immunity of concealments are distinguished:
 - 1) hides of category I - basic resistance, protecting against:
 - a) air shock wave overpressure of $\Delta p_m \geq 0.03$ MPa,
 - b) the effects of secondary loads from falling elements of building structures and crumbling,
 - c) shrapnel from bombs and missiles,
 - d) penetrating radiation from radioactive fallout, ensuring the attenuation factor of penetrating radiation $K \geq 100$,
 - e) effects of fires within the building in which the hiding place is located and in the area around the hiding place;
 - 2) hides of category II - protecting mainly against penetrating radiation from radioactive fallout, while ensuring the attenuation coefficient of penetrating radiation $K \geq 100$, also providing protection against conventional means of destruction, in particular, shrapnel from bombs and missiles and clutter;
 - 3) ***Category III cavities - anti-shrapnel, providing protection only against conventional means of destruction, in particular, bomb and missile fragments and clutter.***
 - 4) ***ad hoc concealments - without specific resistance and performance requirements, protecting against certain means of destruction and the effects of extreme weather events (hurricanes, tornadoes), providing a degree of protection that corresponds to the technical and performance capabilities.***
4. In systems for the protection of critical infrastructure facilities it is recommended to use protective structures of a special type adapted to protect against the effects of threats of a terrorist nature (e.g., shelling from small-caliber weapons, the penetration of vehicles posing a threat), while it is permissible to use different protective, structural and functional solutions adapted to the type of threat and use of the facility.
5. In the case of existing protective structures, it is recommended to apply the technical requirements that were in force at the stage of their design and construction, while in the case of reconstruction as part of modernization or renovation, the currently applicable technical requirements should be applied [8].

NATO doctrinal documents, standardization and tactical-technical instructions, due to the nature of collective protection, are classified, and deal with the protection of individuals from the effects of conventional weapons, mainly weapons of mass destruction.

In the defense standard NO-01-A006:2010, the protection in question is defined as "the application of concepts, doctrines, procedures or equipment to provide individual and collective protection against the effects of weapons of mass destruction and the protection of victims of the use of such weapons, also includes taking medical countermeasures to preserve life and function in an environment contaminated with chemical, biological, radiological and nuclear substances" [9]. Publication Szkol. 978/2020 defines collective protection against contamination as follows: "protection against contamination using collective means of protection against contamination is intended to increase the ability of troops to survive while continuing operations in a contaminated area, as well as to provide them with rest. The use of collective means of protection against contamination makes it possible to reduce the psychological and physiological effects of operating in contaminated terrain, which arise during prolonged stay in individual means of protection against contamination" [10].

The preface to the allied tactical publication ATP-70 defines the purpose and objective of collective protection as:

1. any incident resulting from the use of chemical, biological, radiological and nuclear (CBRN) weapons or devices; the emergence of secondary threats resulting from counter-targeting; or the release of toxic industrial materials (TIM) remains a real threat to NATO forces. Protecting against the resulting threats by using only individual protective equipment can result in unacceptable performance degradation and may allow the adversary to shape the battlespace to his advantage. CBRN collective chemical, biological, radiological and nuclear protection (COLPRO) systems offer a means of balancing the need for protection with the requirement to maintain momentum.
2. The purpose of ATP-70 is to provide NATO users with common guidelines for the use of fixed and mobile COLPROs. The guidelines include planning factors (for commanders and staffs), minimum technical

standards (for engineers constructing and maintaining COLPROs on operations), and operational procedures (for COLPRO staffs) [11].

NATO documents for collective protection measures use classification criteria for the purpose and method of implementation of human protection:

1. fixed (stationary) collective protection facilities against contamination. These are collective protection facilities not intended to be moved, with which units are equipped in places of permanent dislocation (such as airfields, command and control facilities, hospitals, material bases). They should be available to units that need to carry out their tasks continuously, even when they are in a contamination area. They need to have improved protective characteristics against conventional attacks and weapons of mass destruction (WMD) strikes. They are divided into heavy, medium and light types. Heavy- and medium-type facilities provide protection not only against WMD, but also against conventional warheads; light-type facilities do not provide such protection, and their main purpose is to protect people from WMD missiles.
2. Mobile (mobile) collective means of protection against contamination. This group includes land vehicles (tanks, combat vehicles and others), aircraft and ships equipped with sealing systems designed to prevent internal contamination, and having air filtration systems. These systems should allow for use on the move and at a standstill. Based on the degree of protection provided and the way they are integrated into the base platform, they are divided into:
 - respiratory support (in masks) - installed in vehicles or aircraft to provide the crew with purified air in sufficient quantity. These systems are used in cases where it is not possible (or expedient) to provide positive pressure and filtration throughout the vehicle (aircraft) in the event that it is necessary to allow greater airflow for personnel (crew) using
 - using individual respiratory protective equipment. They supply purified air to the mask filter-absorbers, which reduces the breathing resistance in the mask, in addition, in cold conditions the supplied air can be heated;
 - positive pressure - a positive pressure is created inside the system, which prevents contaminated air from getting inside;
 - hybrid - are a combination of respiratory support systems
 - and positive pressure systems, which can operate simultaneously or separately;
 - full (complete) - these are positive pressure or hybrid systems equipped with air conditioning. Cooling the air supplied to the interior reduces heat stress on working personnel.
3. Transportable (transportable) collective means of protection against contamination (adapted for transport - container and tent) are protective systems that can be set up and rolled up, and then transported as needed, as a stand-alone, independent of installations in buildings. They can also include wheeled or tracked vehicles.
4. ***Ad hoc (temporary) - in FM Publication 3-11.4 in permanent facilities Class I-C, Expedient (ad hoc, temporary) sealing of selected parts of the building with temporary means such as plastic films or tape, sandbags, etc. is required. Filtering and heating/cooling equipment can be installed in the facility, as mobile (portable). In a facility of this type, the organization of a temporary contamination control area (CCA - Contamination Control Area) is required. In facilities classified as class I-D, additional sealing enclosures will be required, for example, in the form of portable interior enclosures or a lining system [10,12,13,14].***

4 Collective protection measures, hiding places - current status

In 2022, the State Fire Service did an inventory of hiding places for the population. The October 2022 report stated that there were more than 62000 shelters, which could accommodate about 1.3 million people, or 3,4 percent. In the posted app, one could search, by residential address, for the class of shelter. The app was shut down after a month. In April 2023, a new application was posted at the Internet address www.strazpozarna.maps.arcgis.com and the information "there are more than 300000 places in shelters in Poland, and more than 1.1 million people can take shelter in places of hiding, and more than 47 million people in places of emergency shelter." [15].

The application is accompanied by a category of facilities [16]:



MDS - The definition of these facilities has been defined by the Fire Department as "places of temporary shelter (MDS)," which act as cover against extreme weather events such as windstorms, orcas, tornadoes, as well as detached structural elements of buildings and broken trees.



(U) concealment - is a protective non-hermetic structure, equipped with the simplest installations to ensure the protection of persons, equipment, material stockpiles or other material goods from the presumed factors of destruction acting from certain sides.



(S) shelter - is a protective structure with a structurally enclosed, airtight enclosure, providing protection for persons, equipment, material supplies or other material goods from the presumed agents of destruction acting from all sides.

Using the application, during the month of April, it was possible to obtain technical data regarding the selected object - Fig. 2.

Place of emergency shelter (KA-2023-0.89) - CSV data place of emergency shelter

Protection structures including MDS

(26,56 m)

Object category	[3] - MDS	
Region	MAZOWIECKIE	
District	Warszawa	
Address	ulica Rodła 1, 01-496 Warszawa, Mazowieckie, POL	
Destination (MZ)	[1] - M	
Type of access to the facility	[2] - another paved road	
Type of inventory	[1] - Operational reconnaissance	
Estimated capacity in persons	467	
Estimated area m.sq.	700	
Facility quality assessment	3	

Place of emergency shelter (KA-2023-0.89) - CSV data place of emergency shelter

Protection structures including MDS

(41,61m)

Object category	[3] - MDS
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Fig. 2. Technical data of the selected facility [16].

In the month of May this year, the same application shows only a map of the site and the category of the site as MDS - a place of temporary shelter.

Does the data provided in the application correspond to reality? The stated estimated area of 700 m² refers to the basement of the entire building. It does not take into account tenant basements, CO nodes, handy storage rooms, etc. The basement area is significantly limited by "tenant buildings" (shelving, cabinets, etc.) or accumulated "treasures" (Fig. 3).



Fig. 3. basement "treasures".

Estimating, the claimed area of 700 m² may be limited to about 150 - 200 m², and this, with the accepted criterion of about 1,5 m²/person, would reduce the estimated number of people from 467 to 100 - 130.

In addition, the basement of the building contains all the installations, namely gas, electricity, water, central heating and sewage (Fig. 4), which may pose additional risks: explosion, fire or flooding.

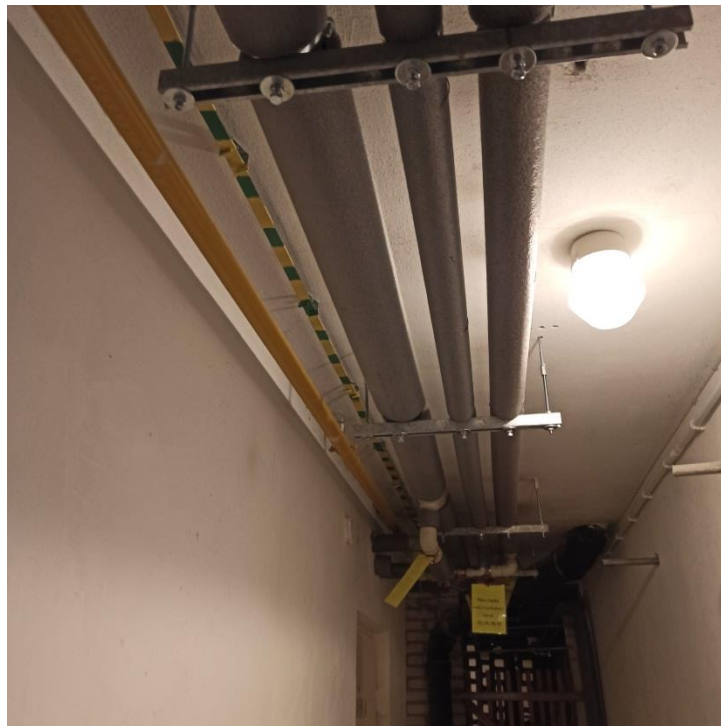


Fig.4. Installations in the basement of the facility.

The building has only exits through the stairwell, which, if it collapses, cuts off the escape route. There are windows in the sub-basement that could be part of an escape route, but they have permanent glazing, Figure 5.



Fig. 5. A fixed grille in a room window.

In this condition, the facility cannot be considered, as an MSD.

Buildings with garages under the facility were classified as places of temporary shelter (MDS). It would seem that the tenants of these buildings are in a better situation. They have, at least, two evacuation routes: through the stairwell and out of the garage, but there are cars with fuel in the garage. Getting them out will be possible, provided the exit is unobstructed. Otherwise, they will be a huge threat to residents and the building. Parking a vehicle can be a serious problem, as parking lots at housing developments will most often be occupied by the rightful owners. That is, this type of facility cannot be treated, as an MSD. The work of educating the residents of a given building with an underground garage and practical training about safe exit from the garage to the place designated for emergency parking must be carried out, and then adjusting the underground parking to the existence of people. It is important to ensure the organization of occupancy, peaceful existence, access to drinking water, medicine, coordination in eating, using the toilet, and protection of existing installations from damage and possible consequences of failure. In addition, there must be continuous monitoring of the situation outside and contact with emergency services (at least along the lines of the rescue platform within the building's fire protection).

5 Backyard hides

As of 2023, changes to the construction law are in effect. A backyard shelter can be built without seeking a building permit. A notification is sufficient.

Polish law has also expanded to include the concept of a *backyard ad hoc shelter*. This is "a freestanding protective structure of non-hermetic construction, with a certain category of resistance, with a construction area of up to 35 m², designed to protect the occupants of a residential building" [17].

A regulation on collective protection facilities, including shelters, is in the final stages of preparation at the Ministry of Internal Affairs and Administration. The regulation specifies, among other things, the technical conditions of such facilities and the rules for their design and construction. According to the assumptions, shelters and hideouts should provide protection for 50% of the country's population [18].

The publication "Ad hoc shelters for civil protection and civil defense tasks" presents examples of ad hoc shelter solutions that can be considered in planning civil protection tasks. This is a folding shelter of the lightweight type. Elements of the shelter's structure are made of polyester-glass laminate with increased strength. The shelter is folded by hand with the help of joints permanently attached to the jointed elements. The size of the folding elements allows them to be transported without violating the road gauge and with maximum filling of the transport platform space. The time for assembling a 5m long concealment support structure with the forces of four people is about 1 hour. A general view of the construction of the discussed concealment is shown in Fig. 6 [19].



Fig. 6. Light type folding shelter.

The width of the concealment in the floor plane is 1,80m. The basic composite segment is 1 meter long. It is possible to combine segments into modules of any length.

The cover structure shown in Fig. 6 is already a certain solution of ad hoc concealment, which can be successively strengthened if possible.

A diagram of another hiding solution is shown in Fig. 7. The possibility of simultaneous use of new technologies with typical handbook materials is taken into account. The height of the H_0 backfill is selected according to the parameters of the assumed gross factors [19].

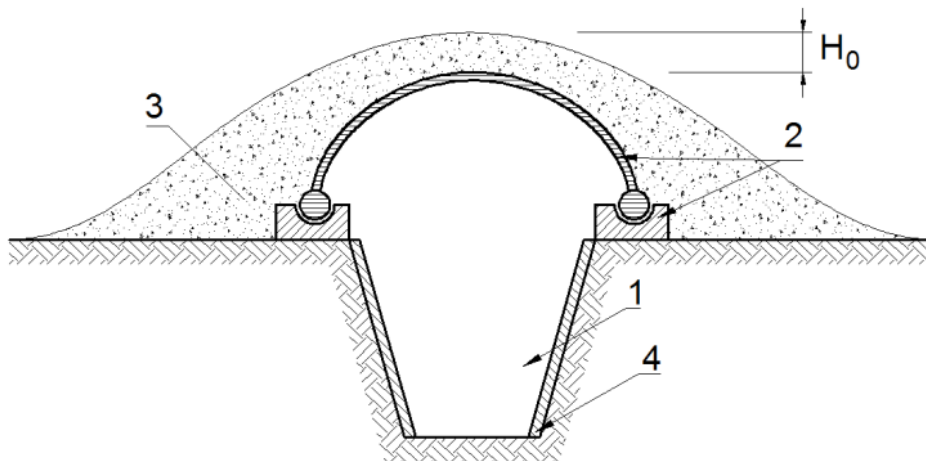


Fig.7. Example of concealment solution, 1-trench or shooting trench, 2-laminate cover elements, 3-soil backfill, H_0 -minimum thickness of backfill, 4-slope cover of excavation with handy materials or laminates.

The probable extent of the debris pile and its height are estimated mainly on the basis of studies and observations from periods of past armed conflicts. Information in this regard can be found in the literature [20]. Debris pile heights H_g of frame and multi-story buildings can be expressed by the relationship:

$$H_g \geq 0,25H_b$$

where: H_b is the height of the building.

On the other hand, the extent of collapse L_g can be estimated according to the relation:

$$L_g \geq 0,5H_b + 3 [m] [19].$$

During the so-called "Cold War" period, the U.S. Department of Defense issued a 32-page booklet titled "The Family Fallout Shelter." The manual contains detailed instructions for the construction of an underground or above-

ground shelter (in a step-by-step version), technical drawings and a cost estimate. The publication was and still is very popular in the US and is still available on the Internet [21].

On the Internet sites one can find many suggestions regarding so-called shelters and backyard hiding places. Examples are shown in Fig. 8 - 11.

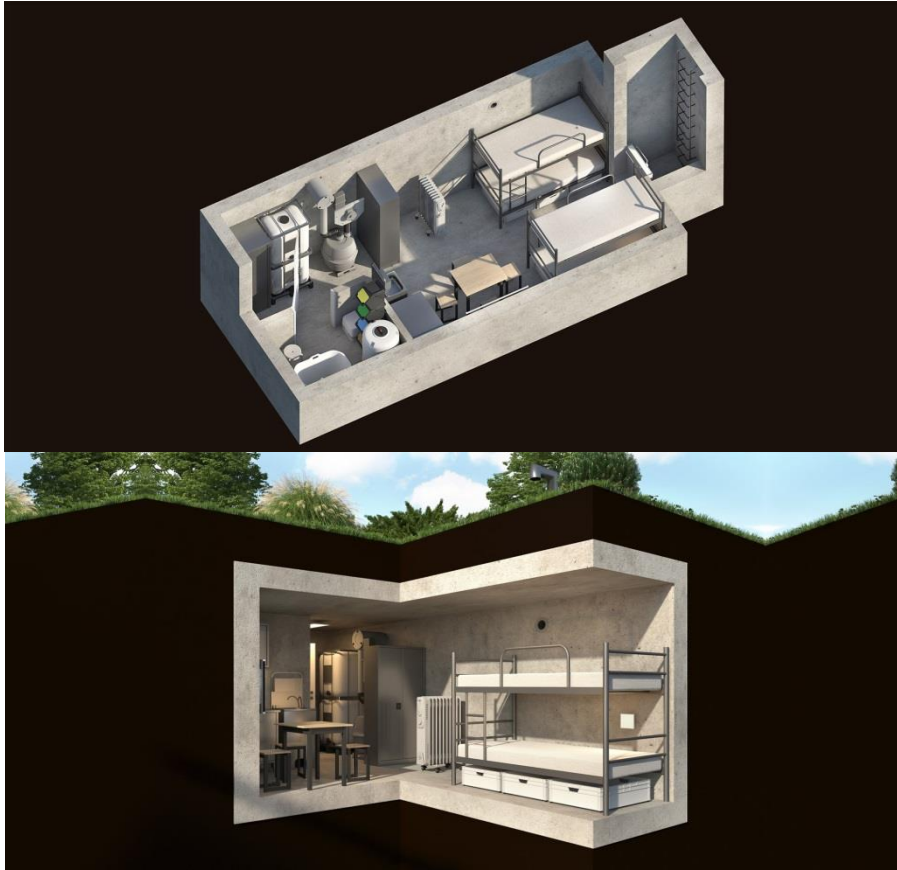


Fig. 8. Diagram of a family home shelter [22].

According to the manufacturer, the hide is an autonomous shelter for a family of four for as long as 30 days. The facility has an airtight entrance door, an emergency exit located outside the facility, a filter-ventilation system, a water supply (600 dm^3), a waste tank with the possibility of discharge to the sewage system, a backup source of electricity, kitchen and social facilities for 4 people [22].



Fig. 9. Diagram of a family shelter in the basement or cellar of a building - the bidder did not provide parameters [23,24].



Fig. 10. Emergency exit [24].



Fig. 11. Family backyard shelter
(a) hiding scheme, (b) a demonstration home shelter that buries from 2 m to 6 m underground, (c) an eclectic (12V) and hand-powered filtration system, (d) a portable sanitation unit powered by a hand or electric pump [25].

5 Summary

Civil protection is a very difficult and very costly process. Many years of neglect cannot be fixed in a short period of time, but it cannot be left without systemic solutions. The State Fire Service has done a tremendous amount of work creating a database of facilities. Unfortunately, probably without classification criteria. "Places of temporary shelter (MDS)," can fulfill the role of shelter from extreme weather events, such as windstorms, orcans, tornadoes, broken trees, but it may not be enough to protect against detaching and falling elements of the building structure, cluttering and cutting off the escape route when part of the building collapses.

The issue of the Warsaw subway remains. According to Warsaw's local government officials, a joint with the State Fire Service, an inventory of subway facilities has been made, which shows that the capital has 7 million sq. m. of space that can serve as hiding places for the population [26] - Fig. 12.

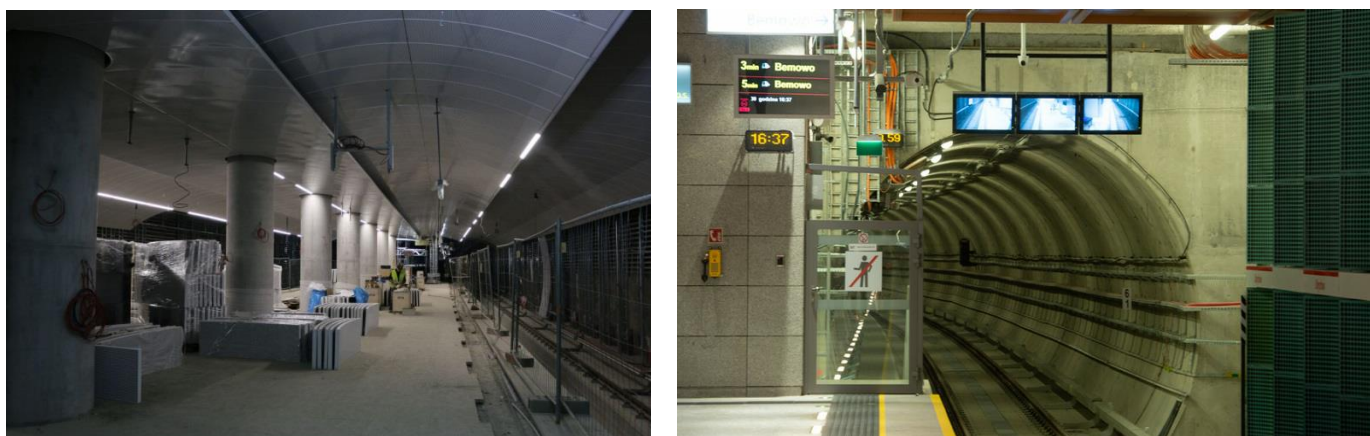


Fig. 12. Warsaw metro [27].

In Ukraine's cities, the metro serves as the primary place of concealment for the population during air attacks and artillery shelling.



Fig. 13. Kiev residents in the metro as part of the collective protection of the population during the bombing of the city [28,29].

According to information obtained on the Internet, subway stations from Kabaty to Wierzbno were adapted to serve as shelters. They had resistant, leak-proof, power-operated bulkheads in the entrance corridors and route tunnels. The stations were to be equipped with outside air filtration systems, in case of air contamination. During construction, due to very high costs, equipping further stations with these devices was abandoned [30].

It seems that an inter-ministerial team of professionals consisting of specialists in special construction, contamination protection and emergency response should be formed to develop guidelines for field administration units responsible for civil protection. Until the 1990s, such a team operated within the Ministry of Defense.

The www.strazpozarna.maps.arcgis.com application should identify hiding places based on criteria developed by a team of experts with simultaneous information on where people can find the actual hiding place, e.g. information in the RCB application. In the facilities should be delineated and properly marked evacuation routes (according to the requirements of PN-EN ISO 7010:2012 evacuation signs), fixed grilles should be replaced with opening ones, electricity, gas and water switches behind the building.

Following the solutions of the so-called "home shelters", there is a very strange trend that air purification systems are imported. There are good solutions in the country, but it is impossible for citizens and individuals who do not have a license for the manufacture and circulation of explosives, weapons, ammunition, and products and technology for military or police use (Law of June 13, 2019 on the performance of business activities in the manufacture and circulation of explosives, weapons, ammunition, and products and technology for military or police use, Journal of Laws. 2019 item 1214 as amended). Filtering equipment and purification elements should be exempted from this law.

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