

SITUATION IN SHELTERING THE POPULATION IN PRAGUE AND COMPARISON WITH SHELTERING SITUATION WITHIN THE WHOLE CZECH REPUBLIC

Jan PIVOVARNIK
jan.pivovarnik@ioolb.izscr.cz

Abstract

Providing shelters for its citizens is one of the primary ways of protecting population of the Czech Republic in crisis situations. It can be characterized as a use of civil protection shelters and other suitable places, which due to their constructional or any other additional modifications are adaptable to the population protection.

The article aims to analyse conditions of shelters mostly in permanent civil protection shelters in the capital city of Prague and briefly compares the situation with the rest of the country.

The analysis is based on the data the author obtained from various legal entities, which collect all available information concerning the shelters. Those entities have a statutory obligation to keep such records and to inspect the civil protection constructions and buildings related to the requirements of civil protection.

Key words

Sheltering Population, Permanent Civil Protection Shelters, Protective Systems of Underground Transport Structures, Improvised Shelter, Emergency Sheltering.

1 INTRODUCTION

Protection of population means an effort to perform civil protection tasks, particularly warning, evacuation, emergency shelter, and other measures ensuring protection of human lives, health and properties [1].

"Civil defence" is the fulfilment of some or all of the following humanitarian tasks designed to protect the civilian population against emergencies, to help the population to eliminate immediate effects of hostilities or disasters, and to create the necessary conditions for its survival. Those tasks include:

- (a) Early warning system;
- (b) Evacuation;
- (c) Provision of shelters ... [2].

It is apparent from the both above quotations that providing emergency shelters is one of the primary ways of protecting the population in crisis situations, in the events of emergencies related to the leakage of dangerous substances, and during radiation accidents.

Provision of shelters for citizens can be characterized as a use of civil protection shelters and other appropriate spaces, which due to their constructional or any other additional modifications are suitable for the population protection. Following facilities are suitable for the mentioned purpose: permanent shelters (PS) of civil defence, protective systems of underground transport structures (PSUTS), improvised shelters (IS), and natural protective features of underground or above-ground buildings [3]. We call the latter case an emergency sheltering.

The permanent shelters of civil protection (hereinafter referred to as permanent shelters) are buildings of a permanent character, which are built in an investment way at

peacetime mainly as double-purpose buildings. Most of the permanent shelters in the Czech Republic are shelters that were built from the 1950s to 1980s.

The category of permanent shelters includes:

- Permanent Pressure-Non-resistant Shelters (PPNS);
- Permanent Pressure-Non-resistant Shelters Reinforced (PPNS-R);
- Permanent Pressure-Resistant Shelters (PPRS) [4].

The protective systems of underground transport structures consists of the Metro Protection System (MPS) and the Protection System of Strahov Tunnel (OSST).

An improvised shelter is a pre-selected or technically and structurally predefined, optimally suited space in a suitable part of an apartment, family house, or operational and production facility that will be actuated by either personal or legal entities for their protection and for the protection of their employees from the effects of crises situations using their own material and financial resources. Modification of the selected space into an improvised shelter would take place before or immediately after the occurrence of an emergency.

In emergency shelters the population uses natural protective properties of buildings in combination with the use of means of individual protection or with means of improvised protection of individuals.

Emergency sheltering is performed as a part of collective protection measures. The Terminology Dictionary defines collective protection as a set of organizational and material measures aimed at protecting groups of people from the consequences of emergencies and crisis situations. In particular, it provides evacuation from life-threatening or affected areas, or a shelter in improvised or permanent shelters of civil protection [5].

2 METHODS USED

In particular, a method of quantitative research was used to deal with the sheltering issue. The method is objective and it was chosen due its possibility of relatively fast, accurate and straightforward data collection and a rapid analysis without interfering variables.

The method has been used to collect data from legal entities, who are responsible for collecting data on sheltering the population, and who have a statutory duty to keep records and to carry out inspections of civil protection buildings and structures falling within the civil protection requirements [1]. Permanent shelters of civil protection and other constructions used to shelter the population, fall specifically into the category of civil protection buildings and structures mentioned above, which pertain to civil protection requirements. Evaluation of obtained data and findings and the conclusions were made using explanatory, empirical and interpretative methods and procedures.

3 RESULTS AND DISCUSSION

3.1 Sheltering the population of the Capital City of Prague

Within the territory of the Capital City of Prague, the so-called protective infrastructure is formed by permanent shelters, which are intended for:

- permanent no pressure-resistant shelters to protect sheltered people from the effects of light and heat radiation, against the effects of penetrating radiation and radioactive contamination,

- with regards to the permanent pressure resistant shelters they are also intended for protection against the anticipated effects of pressure wave after nuclear explosion, against the effects of poisonous substances and warfare biological (bacteriological) agents.

Use of permanent shelters for sheltering the population at peacetime is not considered in the Decree of the Ministry of the Interior No. 380/2002 Coll. [6]. Their full usage is planned only during an Alert State or a State of War. When the Alert State is declared, improvised and permanent shelters will be made ready.

Sheltering the population of the capital city of Prague would be provided in improvised and permanent shelters located mostly under the houses, industrial buildings, schools and health facilities. The Metro Protection System plays a vital role among the permanent shelters, both because of its capacity and complexity of use.

Permanent shelters are structurally and technologically prepared for immediate use. In contrast, improvised shelters must generally be modified, prepared to be sealed, and retrofitted prior to their use to shelter the population.

Sheltering the population of Prague is in accordance with the Act No. 239/2000 Coll., on the Integrated Rescue System and on Amendments to Certain Acts, responsibility of the Capital City Authority and Town District Authorities, which also keep records of sheltering places, and can impose obligations to relevant persons.

Measures to shelter the population of the Capital city of Prague are implemented by the Crisis Management Department of the "Chief Executive Office of Prague City Hall" in cooperation with the Fire Rescue Service of the Capital City of Prague. Implementation of the Shelter Plan, which is a part of a Contingency Plan of the Capital City of Prague, is prepared and elaborated by the Town District Authorities together with the public-benefit organization "Management of Services of the Capital City of Prague" in their plans concerning sheltering of the population. The individual district authorities of the capital city of Prague form the executive body for implementing the Shelter Plan of the Capital City of Prague.

Responsibility for creating permanent shelters and improvised shelters lies with the Mayors of district municipalities, legal persons, school heads, entrepreneurs who own permanent shelters and spaces designated to form improvised shelters in the Shelter Plan. The Sheltering is then organized by the State Administration, local governments, legal persons, business and physical persons. Equipping of permanent shelters with chairs, benches and other furniture and material is carried out as a part of creating the shelter.

Material obtained from local sources is registered by the City Authorities of the Capital City of Prague. The Register is a part of the Shelter Plan of the capital city of Prague.

In order to manage the construction of permanent and improvised shelters, work schedules are drawn up. Their actual construction will be carried out under the guidance of a professional worker by so-called Shelter Co-operatives and the population living in the vicinity of the shelter. However, the use of suitable buildings and manufacturing entities is also envisaged.

3.1.1 The current state of Prague's shelters

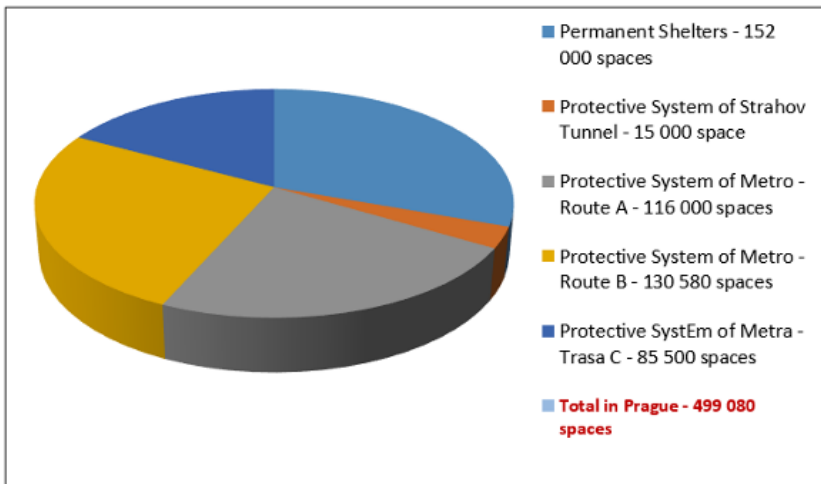
The current state of sheltering is apparent from the following tables and graphs. The Crisis Management Department of the "Office of the Director" of Prague City Hall currently operates 768 permanent shelters with a total shelter capacity of about 152,000 persons. 295 permanent shelters are owned by the City of Prague. These are permanent shelters located underneath of residential buildings entrusted to city districts, standalone or within school facilities. The remaining permanent shelters are owned by other legal entities (businesses, housing co-operatives, community owners, etc.).

Underground transport structures are also utilized as permanent shelters. Those include the so-called Metro Protective System (MPS) with a shelter capacity of 332 thousand people and a Strahov Tunnel Protection System (STPS) with a shelter capacity of 15 thousand people. In permanent shelters, about 40% of the Prague citizens can be sheltered. According to the sheltering capacity of the permanent shelters, it is clear that it would be necessary to arrange improvised shelters for about 60% of the Prague citizens.

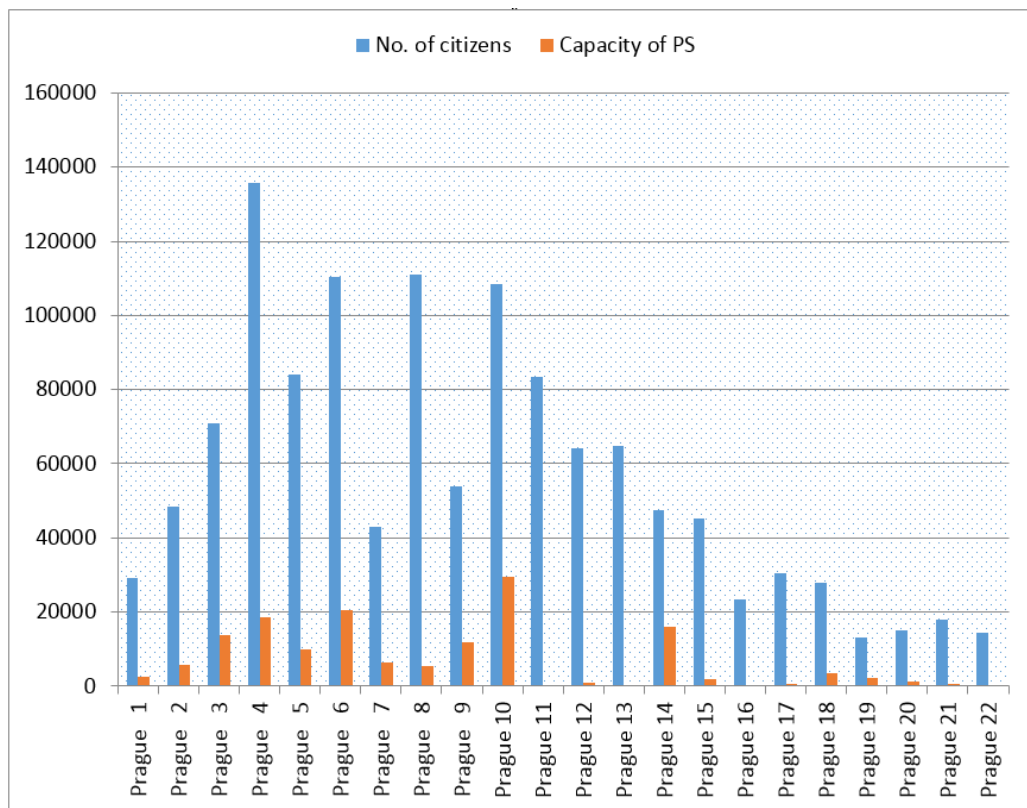
To identify objects for improvised sheltering, a list of decommissioned permanent shelters was use.

*Table 1
Overview of sheltering in the capital city of Prague*

Category of sheltered persons	Sheltering Capacity		Number of permanent shelters
	Permanent Shelters	MPS and STPS	
Population	86 639	347 080	438
Educational facilities	17 614	-	91
Other facilities	47 747	-	239
Total	152 000	347 080	768



*Graph 1
Sheltering Capacity within the capital city of Prague*

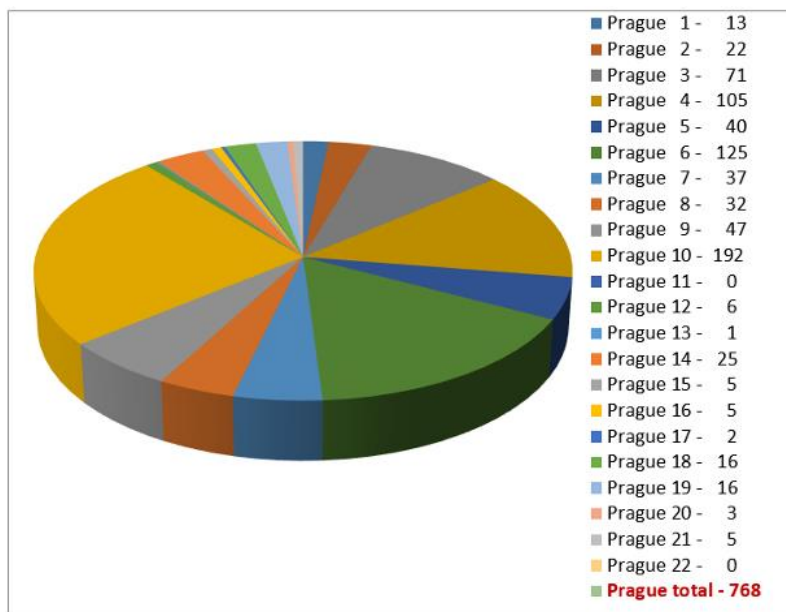


*Graph 2
Sheltering of citizens of the capital city of Prague in permanent shelters
(without the Metro Protection System and the Strahov Tunnel Protection System)*

Table 2
Provision of Shelters for the citizens of the capital city of Prague

Town district	No. of citizens [7]	No. of PS	Capacity of PS	Capacity of PSUTC	% Sheltering
Prague 1	29 223	13	2 460		8,42
Prague 2	48 586	22	5 790		11,92
Prague 3	71 023	71	13 765		19,38
Prague 4	135 699	105	18 728		13,80
Prague 5	84 183	40	9 876		11,73
Prague 6	110 278	125	20 385		18,48
Prague 7	42 909	37	6 455		15,4
Prague 8	111 030	32	5 285		4,76
Prague 9	53 981	47	11 720		21,71
Prague 10	108 477	192	29 523		27,22
Prague 11	83 564	0	0		0
Prague 12	64 148	6	1 040		1,62
Prague 13	64 678	1	300		0,46
Prague 14	47 585	25	16 038		33,70
Prague 15	45 342	5	1 900		4,19
Prague 16	23 425	5	410		1,75
Prague 17	30 494	2	700		2,30
Prague 18	27 788	16	3 520		12,67
Prague 19	13 177	16	2 150		16,32
Prague 20	15 140	3	1 350		8,92
Prague 21	17 964	5	605		3,37
Prague 22	14 507	0	0		0
Total	1 243 201	768	152 000	347 080	40,1 (12,2*)

Sheltering only in the PS without the (PSUTC)



*Graph 3
Number of permanent shelters in individual city districts of the capital city of Prague*

The list of permanent shelters on the territory of the capital city of Prague is published per each town district on the Prague web portal [7] and the geographic portal of the City of Prague in the security application (maps/on-line/security shelters) [8].

3.1.2 Discharging Prague shelters from the Shelter’s Evidence

By removing a permanent shelter from the evidence, the shelter is not decommissioned but only removed from the list of permanent shelters. Its actual decommissioning occurs only when the owner asks the building authority to agree to a change of the building’s usage [9].

A special type of decommissioning of the shelter represents its removal from the evidence due to the newly planned construction. Even in this case, however, the building authority is required to issue a permission. In addition, as a part of the construction removal procedure, the owner elaborates and submits to the building authority a documentation of demolition works together with the documentation of a disposal of the buildings.

The decommissioning process takes place in such a way that the owner of the building will officially ask the Fire Rescue Service of the City of Prague in writing to remove the particular shelter from the evidence record. It shall state the reasons for which the shelter should be excluded. At the same time, it provides a detailed description of the state of the permanent shelter and its technological parts. Subsequently, the Fire Rescue Service of the Capital City of Prague shall draw up a protocol on the exclusion of the permanent shelter from the register and submit it to the Department of Crisis Management, Department "Office of the Director " of the City of Prague City Hall. If necessary, a local investigation would be called to verify the facts reported by the building owner. The Director of the Fire Rescue Service of the Capital City of Prague decides on the exclusion of the permanent shelter.

According to the records of the General Directorate of the Fire Rescue Service of the Czech Republic (GD FRS CR), 387 permanent shelters were decommissioned in Prague during the last period.

3.1.3 Maintenance of the Prague shelters

Maintenance of the shelters is managed in accordance with the relevant technical standards and available financial resources. Regular maintenance consistent with mandatory skills revisions of technological facilities of permanent shelters (e.g. filtering-ventilation once every 5 years, wiring or replacement of power sources 1x every 2 years) is a part of maintenance of permanent shelters [10].

Administration, technical service, maintenance, repairs, periodical revisions, rental and operation of permanent shelters in the capital of Prague are provided by:

- The Crisis Management Department of the "Chief Executive Office of Prague City Hall" - manages about 70 permanent shelters situated within school facilities,
- The Management of Services of the Capital City of Prague - manages 225 permanent shelters, which were entrusted to it by the Capital City of Prague in the Founding Charter or on a contractual basis with individual city districts of the City of Prague.

Table 3
Costs of maintenance, repairs of the permanent shelters in Prague

Total cost	Period		
	2013	2014	2015
Prague Town Council	1 257 623,00 CZK	546 800,00 CZK	1 100 800,00 CZK
Management of Services of Prague	2 292 382,00 CZK	4 699 884,00 CZK	1 400 000,00 CZK

The Ministry of Finance of the Czech Republic annually contributes CZK 45 million to the maintenance of underground transport structures, i.e. the Metro Protection System and the Strahov Tunnel Protection System [11].

3.2 Sheltering the Citizens of the Czech Republic

Sheltering of the Czech Citizens is provided according to the same principles as in the Capital City of Prague, with the responsibility for sheltering the citizens lying mainly with the regional authorities and municipalities. In accordance with the Act No. 239/2000 Coll., on Integrated Rescue System and on Amendments to Certain Acts, Regional Authorities keep records and perform inspections of civil protection structures and structures affected by civil protection requirements in their Regions. This task of the regional authorities is carried out by the Fire Rescue Service of the respective region.

Similarly, the aforementioned Act establishes obligation to municipalities to shelter their citizens. The Act appoints the municipal authorities to ensure municipal emergency preparedness and to participate in the implementation of rescue and recovery works and in the protection of the population. Municipal authorities have a statutory duty to provide shelters to the citizens in case of an imminent danger. Municipal authorities also keep records and perform

inspections of civil protection buildings and structures affected by civil protection requirements within their municipality.

Legal entities, entrepreneurs, and natural persons are obliged under the Act "...providing they are the owners of civil protection constructions or civil protection buildings to take care of the use of such property and all related activities in order to avoid changing the status of the building in relation to its use and to enable it to be used for civil protection purposes and for the Fire Rescue Service to be able to access it, inspect it, maintain it and repair it".

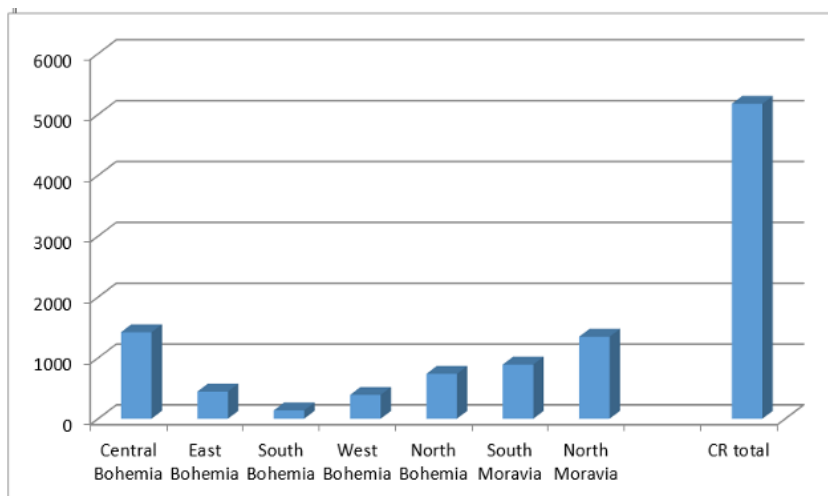
"In the event of an incident in those buildings during production, handling of hazardous chemicals [12] and their transport or handling (hereinafter referred to as "an accident"), the natural or legal person who is the owner, administrator or user of the listed facilities, buildings, substances or waste, is obliged to "warn, evacuate or provide shelter for their employees ". [1]

The principles of the procedure for provision of shelters and the manner and extent of collective protection of the population by sheltering are carried out within the Czech Republic in accordance with the Decree of the Ministry of Interior No. 380/2002 Coll. 'On the preparation and implementation of the tasks of protection of the population.' [6]

Between 1996 and 1998, the inventory of permanent shelters of civil protection was carried out throughout the territory of the Czech Republic in accordance with the Ministry of Defense Instruction [13]. It was carried out by all district offices and municipalities.

The aim of the inventory was to compare the records of permanent shelters with actual number of them and to determine the technical and functional capability of permanent shelters [14].

Some inventory results are shown in the following chart and table.



Graph 4

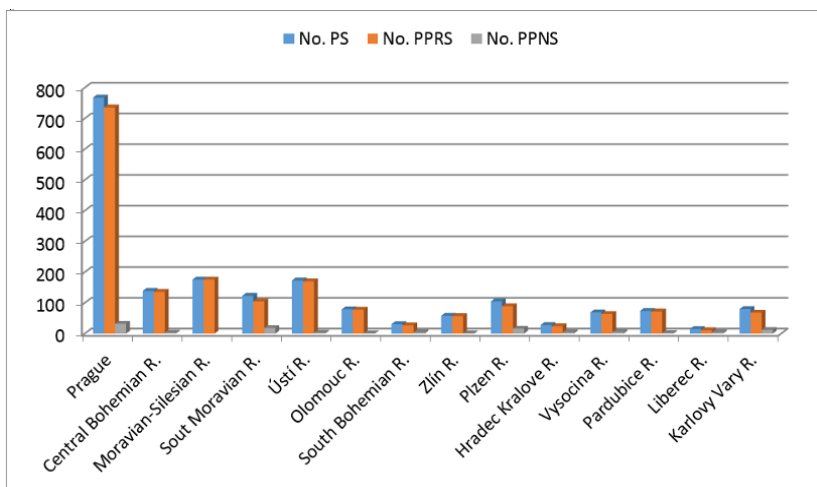
Number of permanent shelters in individual regions of the Czech Republic in 1998 (according to the old subdivision of the Czech Republic)

*Table 4
Number of permanent shelters in individual regions of the Czech Republic in 1998
(according to the old subdivision of the Czech Republic)*

Region	Central	East	South	West	North	Southern Moravian	Northern Moravian	CR total
No. of permanent shelters	1 422	447	138	392	738	891	1 348	5 376

The current state of an ability to shelter the population in the Czech Republic is evident from the following tables and graphs.

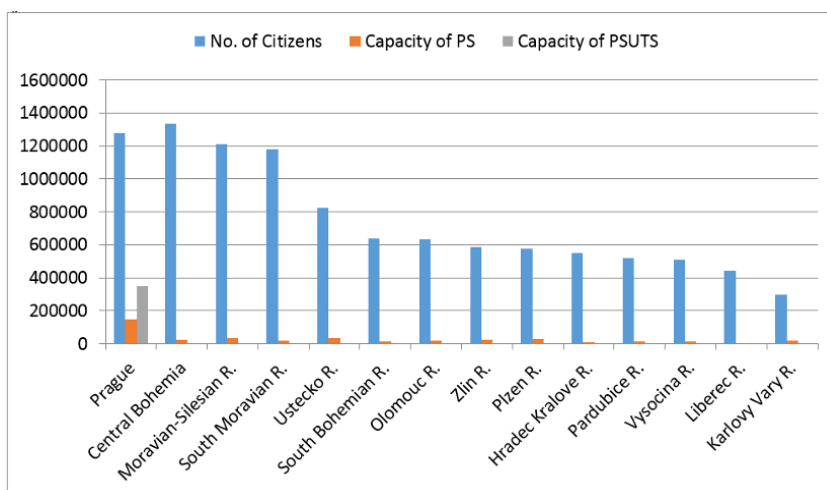
In the Czech Republic, the General Directorate of the Fire and Rescue Protection currently manages 1918 permanent shelters with a total capacity of 402 607 shelter spaces. Permanent shelters provide spaces for approximately 3.8% of the population of the Czech Republic. When using protective systems of underground transport structures (PSUTS), the total capacity increases to 749,607 spaces, and sheltering ability increases to 7.1% of the population.



*Graph 5
Number of permanent shelters in various regions of the Czech Republic*

*Table 5
Number of permanent shelters in various regions of the Czech Republic*

Region	Prague	CB	MS	SM	UST	OL	CB	ZL	PL	KrH	VYS	PA	LI	KV	CR
No. of PPRS	736	136	176	105	170	78	27	57	89	24	64	72	11	68	1813
No. of PPNS	32	3		18	3	1	4	1	16	4	5	2	4	12	105
No. of PS	768	139	176	123	173	79	31	58	105	28	69	74	15	80	1918



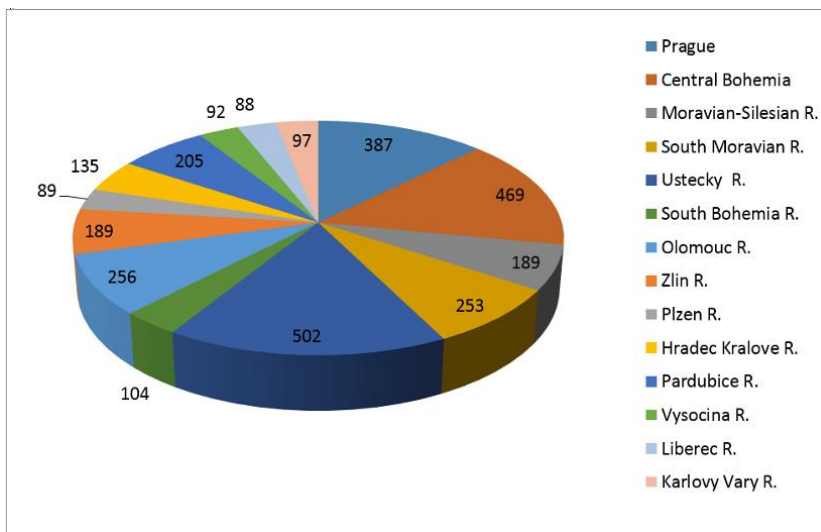
*Graph 6
Sheltering of citizens in various regions of the Czech Republic*

*Table 6
Sheltering of citizens in various regions of the Czech Republic*

Region	No. of citizens [15]	Capacity of PS	Capacity OSPDS	% sheltering provided
Prague	1 243 000	150 607	347 000	38,9
Central Bohemia R.	1 336 000	26 000	0	1,95
Moravian-Silesian R.	1 211 000	35 000	0	2,8
South Moravia R.	1 178 000	20 000	0	1,7
Usti nad Labem R.	822 000	35 000	0	4,2
South Bohemia R.	639 000	12 000	0	1,8
Olomouc R.	634 000	20 000	0	3,1
Zlin R.	584 000	22 000	0	3,8
Plzen R.	578 000	27 000	0	4,7
Hradec Hralove R	551 000	7 000	0	1,3
Pardubice R.	517 000	14 000	0	2,7
Vysocina R.	509 000	13 000	0	2,6
Liberec R.	440 000	3 000	0	0,6
Karlovy Vary R.	297 000	18 000	0	6,1
Total (only in PS)	10 539 000	402 607	347 000	7,1 (3,8)

Comparing the number of permanent shelters in 1998 (after the inventory - 5376 permanent shelters) with the current state (1918 permanent shelters), we find that between 1998 and the present period, a total of 3458 permanent shelters were decommissioned, i.e. about 64%

of permanent shelters . By decommissioning the mentioned number of permanent shelters, the total capacity of permanent shelters decreased by more than 500,000 sheltering spaces.



Graph 7
No. of abolished permanent shelters in various regions of the Czech Republic

Table 7
No. of abolished permanent shelters in various regions of the Czech Republic

Region	Prague	CB	MS	SM	UST	OL	CB	ZL	PL	KrH	VYS	PA	LI	KV	CR
No. of PPRS	736	136	176	105	170	78	27	57	89	24	64	72	11	68	1813
No. of PPNS	32	3		18	3	1	4	1	16	4	5	2	4	12	105
No. of PS	768	139	176	123	173	79	31	58	105	28	69	74	15	80	1918

Note: The CR regions in the Tables No. 5, 6, 7 and in graphs 5, 6, 7 are ranked in an ascending order according to the number of citizens in various regions of the Czech Republic, according to the data of the Czech Statistical Office [15].

4 CONCLUSION

Permanent shelters were built mainly between the 50s and 80s of the last century, they are outdated, their nature of protection is no longer compatible with current strategies and ways of conducting wars, or with high-efficiency and intelligence of weapon systems. Their use is highly controversial even during emergency events related to a leak of hazardous materials.

In terms of the security and costs related to their maintenance it is an inappropriate use of the state funds. The vision was approved by the Government of the Czech Republic, which was reflected in the individual concepts of population protection and security strategy.

Permanent shelters are no longer constructed; existing permanent shelters serve for peaceful use of these objects. Construction and maintenance of permanent shelters are no longer financially supported by the state except for financing permanent shelters within some university hospitals and financing share of maintenance of underground transport structures with protective systems such as Metro and automobile tunnel under the Strahov Stadium.

It should be noted that existing capacity of the permanent shelters in any case does not cover the need for sheltering of the Czech Republic population. Overall, the permanent shelters in the Czech Republic are gradually being decommissioned from the records of the sheltering fund. For improvised and emergency sheltering are currently mainly used natural protective properties of buildings.

Abbreviations

CR	Czech Republic
GD FRS CR	General Directorate of the Fire Rescue Service of the Czech Republic
IS	Improvised Shelter
PS	Permanent Shelters
PSUTS	Protective Systems of Underground Transport Structures
PPNS	Permanent Pressure-Non-resistant Shelters
PPRS	Permanent Pressure-Resistant Shelters
PSUTS	Protective Systems of Underground Transport Structures
MPS	Metro Protection System
OSST	Protection System of Strahov Tunnel

This article was created within the project VI20152020009.

Literature

- [1] Zákon č. 239/2000 Sb., o integrovaném záchranném systému a o změně některých zákonů.
- [2] Dodatkový protokol k Ženevským úmluvám z 12. srpna 1949 publikovaný sdělením federálního ministerstva zahraničních věcí č. 168/1991 Sb.
- [3] HYLÁK, Č. a J. PIVOVARNÍK. Individuální a kolektivní ochrana obyvatelstva ČR Praha: MV – GŘ HZS ČR, 2016. ISBN 978-80-87544-18-1.
- [4] PACINDA, Š. a J. PIVOVARNÍK. Kolektivní ochrana obyvatelstva. Praha: MV – GŘ HZS ČR, 2010. ISBN 978-80-86640-67-9.
- [5] Terminologický slovník pojmů z oblasti krizového řízení, ochrany obyvatelstva, environmentální bezpečnosti a plánování obrany státu. Praha: MV, 2016.
- [6] Vyhláška Ministerstva vnitra č. 380/2002 Sb., k přípravě a provádění úkolů ochrany obyvatelstva.
- [7] Údaje hlavního města Praha dostupné na: <http://www.praha.eu> (O městě / Život v Praze / Bezpečnost / Krizové řízení / Informace o úkrytí).
- [8] Geografický portál hlavního města Prahy dostupný na: <http://www.geoportalpraha.cz> v aplikaci bezpečnost (mapy / on-line / bezpečnost / úkryty).
- [9] § 126 zákona č. 183/2006 Sb., o územním plánování a stavebním řádu (Stavební zákon).

-
- [10] ČSN 73 9050 – Údržba stálých úkrytů. Praha: Český normalizační institut, 2014.
 - [11] Usnesení vlády č. 21 ze dne 9. 1. 2002.
 - [12] Zákon č. 157/1998 Sb., o chemických látkách a chemických přípravcích a o změně některých dalších zákonů.
 - [13] Instrukce Ministerstva obrany ze dne 4. prosince 1995, č. j. 9112/1 o provedení inventarizace stálých úkrytů civilní ochrany okresními úřady.
 - [14] PROUZA, R. Objasnění příčin nejčastějších závad zjištěných při kontrolách úkrytů a návrh na preventivní opatření. Lázně Bohdaneč, 2003.
 - [15] Údaje Českého statistického úřadu dostupné na: <http://www.czso.cz>.