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Fallout Shelters in Zagreb After the End of World War II

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In the memory of Ruth Verde Zein (1955–2025)

ABSTRACT: The article is based on a revised and expanded version of the presentation entitled »Fallout Shelters in Zagreb After the End of World War II«, given at the 71st Annual International Conference of the Society of Architectural Historians, held 18–22 April 2018 in St. Paul, Minnesota. The fallout shelters built on the territory of the City of Zagreb have largely remained outside the scope of architectural historiography. Nevertheless, the city's Civil Protection organization recently cited the existence of over 900 shelter facilities under its authority. The research and analysis presented herein covers the period in which the fallout shelters were built, who conceived them, who designed and built them, under whose technical and political influence they appeared, who financed them, and, finally, whether they are necessary or obsolete in present times. The construction of air-raid shelters began in 1932 and flourished in the period before World War II. The air-raid shelters (officially *Protuavionska zaštita*, lit. Anti-Aircraft Defense) conceived in the 1948–1971 period were an integral part of the Civil Protection Forces. After the suppression of the Prague Spring in 1968, Yugoslav president Tito introduced the doctrine of self-defense and ordered the construction of fallout shelters, which was carried out in the 1974–1991 period. The article concludes with five key points. Politically, the entire process of shelter construction, including fallout shelters, was hugely dependent on the political changes in the former monarchical, and later socialist Yugoslavia. After the late 1960s, fallout shelters became one of the instruments of the militarization of Yugoslav society in the 1970s and retained this status until the collapse of the Federation. Economically, the construction of fallout shelters was a huge burden to the socialist economy, despite the availability of cheap labor and the Yugoslav debt-driven self-management-based economic system. Hyperinflation in the 1980s eroded the nominal funds that had been collected as a »shelter tax«. Technologically, the reinforced-concrete shelter construction was in line with contemporaneous global developments. While the construction of the structures themselves did not present any problems, the control process was inadequate due to parallel power structures. The question of aesthetics was not even raised, as the shelters were conceptualized solely for protecting the population. Due to the project's military nature, the visible parts of the shelters were designed to be as inconspicuous as possible, while the interiors were executed in the simplest possible manner. Regarding their fate, the shelters proved useful during the air-raids in the 1991–1995 period, but afterwards they

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gradually fell into neglect. Nevertheless, the current administrations are attempting to organize their use in the event of possible natural or human-made disasters, particularly in light of the worsening geopolitical situation at the time of this article's presentation and publication.

Keywords: Fallout shelters; fortifications; military architecture; Zagreb; Croatia; Yugoslavia; 1932–2015

1. Introduction

The fallout shelters built on the territory of the City of Zagreb have somehow eluded the scope of architectural historiography.[1] Nevertheless, the municipal Civil Defense Organization recently cited the existence of 975 shelter facilities under its authority (Polšak Palatinuš 2012: 1). The people who lived and/or studied in Zagreb during the last two decades of the former Yugoslav Federation vividly remember the construction of these structures and their subsequent use in air-raid protection on the eve of Croatian independence in 1991. Consequently, one might wonder when exactly the fallout shelters were built, who conceived them, who designed and built them, and under whose technical and/or political influence, how they were financed and, ultimately, are they necessary or obsolete in the present time.[2] A substantial number of air-raid shelters built in the late 1930s was accidentally discovered during research on the urban fabric conducted in the interwar period. The first traces of the organization of civil protection in the Kingdom of Yugoslavia date back to 1932, when the world was crumbling due to the economic crisis, while the scope of the ensuing mass conflict seemed unrealistic, if imaginable. It was discovered that fallout shelter construction in the closing decades of the Cold War could hardly have been imaginable without the knowledge of shelter construction before WWII. Further, the construction of shelters did not stop in the period after the end of the Cold War until 2000; it was still recommended in the first decade of the new millennium and confirmed after the Fukushima disaster in 2011. Nevertheless, the directives governing the organization, planning, construction and maintenance of shelters were repealed in 2015 (An. 2022: 1). Therefore, the chronological arc extends from the first official document on the air-raid shelters (1932) to the repeal of the relevant legislation (2015). Consequently, the material is chronologically set, with implications discussed further in the conclusion. This article will eventually show that the tradition of

[1] The author wants to thank the editor-in-chief of the *Croatian Technical Encyclopedia,* Dr Zdenko Jecić, for proposing to publish the article in *Studia Lexicographica*, and the two anonymous readers who improved the manuscript and made the final article more enjoyable to read.

[2] The article is based on a revised and expanded version of the presentation entitled »Fallout Shelters in Zagreb After the End of World War II«, given at the 71st Annual International Conference of the Society of Architectural Historians, held 18–22 April 2018 in St. Paul, Minnesota. It was a part of the thematic session PS 47 »Cold War Architecture«, co-chaired by the late Ruth Verde Zein, Mackenzie Presbyterian University, Brazil, and Hugo L. Mondragón, Pontificia Universidad Católica de Chile (An. 2018, 367–373), whom the author wishes to thank for inviting him as a speaker.

shelter building in Zagreb is still kept, although with minor chronological disruptions, and may be useful as an example in further considerations of the history of shelter building on the territory of former Yugoslavia. Finally, the research, analysis, discussion and conclusions emphasize the political events in the period between the one described in the presentation and the time of writing of this article.

2. Methodology

During the research carried out between 1998 and 2002 on apartment houses in Zagreb built between 1928 and 1945, a certain number of basement spaces, intended to serve as the houses' air-raid shelters, was discovered and duly recorded without further data mining. A significant number of air-raid shelters was also discovered while researching collective housing blocks in Zagreb built between 1945 and 1955, itself carried out in the period from February to June 2017. These findings funneled the research based on the 5Ws (Bešker 2009: 49) of air-raid/fallout shelters. For the definitions of terms regarding shelter typology, relevant Yugoslav and Croatian encyclopedias were consulted (An. 1981a: 409; 1981b: 409; 1981c: 561; 2007: 799–800; 2013: 1; Erić 1966: 744–749; Žagar 1992: 127–130). Thorough research of the material concerning civil defense matters, kept at the State Archives in Zagreb, was conducted between April and December 2017, except the data mining regarding each particular air-raid/fallout shelter, which could be the subject of a separate research project.[3] The primary goal of the research was to compile a collection of legislative documentation and supporting professional literature contained in the archival collection, regarding the Department of Civil Defense (DAZG/SAZ: HR-DAZG-10 GPZ Odsjek za civilnu zaštitu, Sign: 9; An. 1933: 1; An. 1935: 1; Bakal 1972: 1; 1973a: 1; 1973b: 1; Bubnov et al. 1972: 1). Lacking evidence was obtained by mining Internet sources in 2017, whether by collecting articles and documents obtainable as .pdf files or by reading those that were not obtainable in this format in the National and University Library in Zagreb. The accumulated data in the form of legislation, official documentation, blueprints of the methodologically selected examples of air-raid/fallout shelters, and contemporary articles and books constitutes the chronological narrative on the subject. Between 1932 and 1945, these structures were known as the »air-raid shelters«, between 1948 and 1971 as »anti-aircraft defense shelters« and finally, in the period from 1971 to 1991 and from 2000 to 2015 as »fallout shelters«. Unfortunately, regarding the military nature of fallout shelters, some data could not be mined, especially related to the exact financial circumstances of the whole enterprise.[4]

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[3] The author would like to thank the State Archives in Zagreb, especially their former head, Dr Živana Heđbeli, who kindly provided every kind of help in researching the topic.

[4] An exact financial analysis could be made by juxtaposing all the financial data, including budgetary reports from relevant administrative units, enterprises (especially construction companies)

3. Air-raid protection in the period from 1932 to 1945

In 1932, the Royal Yugoslav Army issued the »Directive concerning air-raids and protection against them«, as a purely bureaucratic measure. It prescribed the construction of an air-raid shelter for every newly built public building, and the establishment of a »Air-Raid Protection Committee« in every city and region. Regarding the city of Zagreb, the »City of Zagreb Municipal Air-Raid Protection Committee« was established on 6 July 1933, headed by the incumbent Army Commander of the City of Zagreb holding the rank of General (An. 1933: 1). The most professionally qualified members of the Committee were architects, especially the renowned Croatian Modernists Vladimir Antolić, Gjuro Ancel, Stjepan Hribar, Ivan Zemljak, Antun Ulrich and Zvonimir Kavurić, followed by structural and chemical engineers, all of them employed by the Zagreb Municipality as civil servants. Other important professionals or scientists were occasionally asked to provide their opinion, including the future Nobel Prize winner Vladimir Prelog in 1935. In autumn 1934, Ancel designed an air-raid shelter for the new streetcar/tram depot in Trešnjevka, which was completed in 1935, as the first of its kind (**Figure 1a-b**).

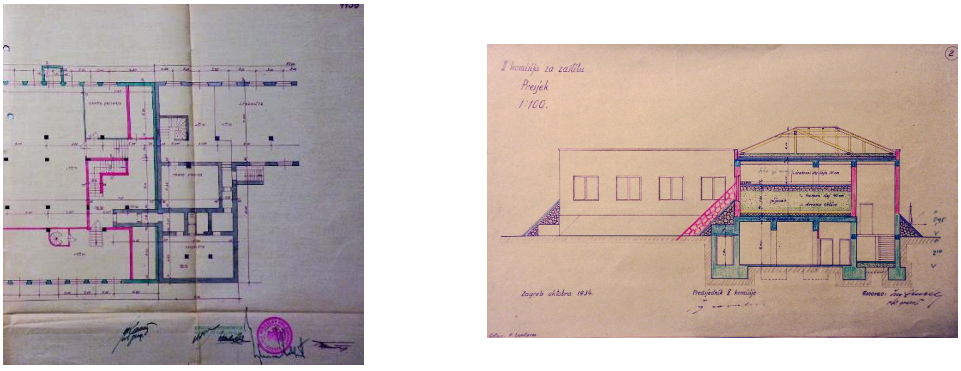

Figure 1a-b. The project for the air-raid shelter (SKLONIŠTE) in the cellar of the office building of the Zagreb Electric Tram, 105 Ozaljska St, 1934 – 1935, ground plan, section / **Slika 1a-b.** Projekt za sklonište od zračnih napada u podrumu poslovne zgrade Zagrebačkog električnog tramvaja, Ozaljska ulica 105, 1934–35., tlocrt, presjek

Consecutively, the Committee began implementing the Civil Defense Agenda in a scientific manner, by preparing to visit similar facilities abroad, in Austria, Czechoslovakia, Poland, the United Kingdom, and the Third Reich. A small delega-

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or armed forces (the Yugoslav People's Army on the federal level, or the Territorial Defense/Department of the Interior of the People's Republic of Croatia, later the Socialist Republic of Croatia), adjusting it to the continuous, periodically even ballooning inflation of the Yugoslav currency, the dinar, in the period from 1948 to 1991, and weighting it with respect to selected reserve currencies, such as the euro or the US dollar. Such a task obviously exceeds the scope and the purpose of this article.

tion visited Graz in the winter of 1935 and was taken aback by the unsatisfactory air-raid shelters there. On 29 July 1935, the British Consulate in Zagreb informed the Committee »that the local authorities in the UK have not yet arranged the system of protecting the population from air-raids, so the sending of a study commission would be pointless«[5] (An. 1935: 1). That same year, the Polish General Counsel suggested a visit to the Air Raid Defense drill in Toruń. The Reichluftsfahrtministerium in Berlin kindly gave its permission for a six-day study visit to all important facilities and manufacturers. The majority of the fifth day was dedicated to contemporary German air-raid shelters. The delegation was slightly disappointed with the air-raid shelters in both Poland and Czechoslovakia, but highly satisfied with the air-raid shelters in Germany. The modern complex of the School for Civil Protection, with the Chemical Laboratory for Poison Investigation, designed by Antolić, was partially completed in 1938, while the envisaged Trial Air-Raid Shelter was unfinished in April 1941. Further, the Committee evaluated the new General Regulation Plan prepared by Antolić & Ulrich from the air-raid defense point of view and found the modernity of Le Corbusier-like stripped blocks in the newly regulated areas to be an effective factor in planning against air-raid damages. Several members proposed excavating tunnel shelters as dual-purpose facilities, to be used both for the protection of the inhabitants of the old parts of the city (the Upper Town & the Lower Town) and as car traffic tunnels in peacetime. The most urgent task was that of convincing the higher authorities to amend the legislation governing the obligatory construction of air-raid shelters in the basement of every private three-or-more story apartment building (**Figure 2**). The problem was financing, because the landlords were not keen on funding something completely out of the scope of collecting rent from their tenants. The legislation was finally amended in the autumn of 1939, under the influence of information drawn from studying the air-raids during the Poland campaign, and stayed in force until the dissolution of the City Council in May 1945. By the outbreak of WWII in Zagreb, about 120 air-raid shelters were either completed or under construction in private buildings, as were 20 shelters in public buildings. Finally, ten articles on air-raid shelters emerged in professional literature in the 1935 to 1941 period (Anžlovar 1936: 182–183; Bakrač 1940: 109–115; Hahn 1937: 177–181; Klimeš 1937: 181–184; Nović 1935: 321–323; Steinmann 1936a: 10–12; 1936b: 35–39; 1939, 33–37; Težak 1940: 109–115; Ugrenović 1940: 54–56).

[5] Original text in Croatian: »[... upućen sam od mog Ministarstva Vanjskih Posala, po saslušanju Ministarstva Unutrašnjih Djela, da Vam saopćim,] da lokalne vlasti u Velikoj Britaniji još nijesu uredile sistem obrane civilnog pučanstva od zračnih napadaja pa prema tome nebi imalo svrhe poslati jednu komisiju u Englesku radi studija takovog uredjaja.«

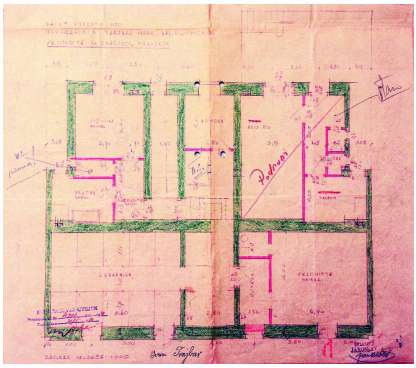


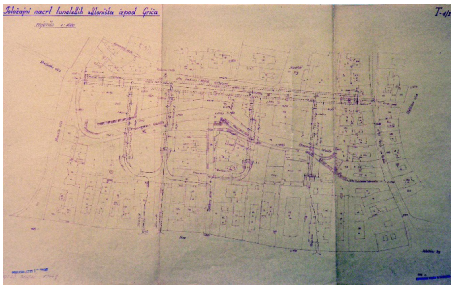
Figure 2. The air-raid shelter (SKLONIŠTE) in the cellar of a typical Zagreb apartment house, 32 Grada Mainza St, 1939–1940, ground plan / **Slika 2.** Sklonište od zračnih napada u podrumu prosječne zagrebačke ugrađene najamne stambene zgrade u Ulici Grada Mainza 32, 1939–40., tlocrt

The Committee was dissolved soon after the dissolution of the Kingdom of Yugoslavia, and its duties were relegated to other city administrative bodies. So far, there has been no documentary evidence of shelters constructed by the Germans for their embassy residence or their embassy offices. Due to the importance of Zagreb as a German railway node, the authorities started to prepare for intensive air-raids. Conscription to repair air-raid damage began, all the existing air-raid shelters were prepared for use, and more provisional shelters were built, especially in the parts of the city with light-structure housing. In the old parts of the town, dozens of cellars were temporarily repurposed into air-raid shelters, by strengthening their Prussian vaults with heavy wooden support beams. In the summer of 1943, at the initiative of Mayor Werner, the digging of the dual-purpose motor traffic tunnel and shelter between Radićeva and Mesnička St began. Because of the deteriorating economic situation, only the two L-shaped tunnels on each side were near completion when the works were halted in the autumn of 1944 (**Figure 3a**).

4. The anti-aircraft defense Shelters in the period from 1948 to 1971

With the restitution of the Yugoslav government in May 1945, almost all of the technical staff remained at their positions, now renamed to »technical advisor« by members of the ruling party. The policy of shelter construction was decided in Belgrade as a chain of consequences of foreign political decisions and developments. Unfortunately, the multi-story residential buildings built in the period from 1946 to 1952 do not contain basement shelters, due to the overall cancellation of applicable legislation in 1946 (Kahle 2021: 1158). The Tito–Stalin split forced Yugoslavia to align with the western allies, enabled the purchase of airplanes like the Thunderbolt and Sabre, demanded the constitution of »anti-aircraft defense« in 1948

(An. 1948: 1805–1806) and the amendments to the secret Directive of the Federal Ministry of Interior from September 1951, which prescribed the construction of tunnel shelters under the Upper Town, in the completed section of the Grič tunnel with an enlarged cutaway gallery for citizens' protection (today a tourist attraction), and restarted the construction of air-raid shelters in the newly built social housing blocks. To the north, the Kožarska tunnel shelter was cut off from 1951 to 1955, as served as the command post of the municipal or state Anti-Aircraft Defense HQ, with entrances removed from the main tunnel axis, possibly for fallout protection, and equipped with gunnery barbettes on both exits (**Figure 3a-b**).



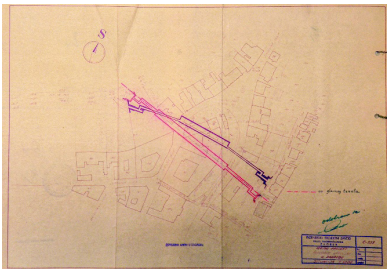


Figure 3a-b. The tunnel-like air-raid shelters below Zagreb's Upper Town (GORNJI GRAD), general plans, a) between Radićeva and Mesnička St, built 1941–1944 and 1948–1951, b) between Tkalčićeva and Dubravkin Put St, built 1951–1955 / **Slika 3a-b.** Tunelska skloništa od zračnih napadaja ispod zagrebačkoga Gornjega grada, tlocrti, a) između Radićeve i Mesničke ulice, građeno u razdoblju 1941–44. i 1948–51., b) između Tkalčićeve ulice i Dubravkina puta, građeno u razdoblju 1951–55.

After Khrushchev became the new leader of the USSR, Tito made another about-face and started to realign with the Warsaw Pact. From 1961, Soviet MiG-21s started replacing American airplanes as the primary fighter force. Although Yugoslavia had been one of the founding members of the Non-Aligned Movement, the Yugoslav People's Army under Tito and his deputy General Ivan Gošnjak adopted the policy of »natural alliance with socialist armies« and otherwise held strategic alliances only with Italy and Greece. When the Warsaw Pact occupied Czechoslovakia in 1968 under the policy of »restrained sovereignty« of Khrushchev's successor Brezhnev, Tito uneasily dismissed Gošnjak and appointed General Nikola Ljubičić the new federal defense minister (Bjelajac 2010: 241), and introduced the concept of »territorial defense forces«, probably to appease the Croatian party leadership (Marijan 2009: 661). Although the Yugoslav military encyclopedias from the 1960s or 1970s stated that, according to the experience from 1945, air-raid shelters provided certain protection proportionally from the center of the explosion (Erić 1966: 647), the General Staff became obsessed with nuclear attacks, starting with the Cuban Crisis in 1962 and amplified with the Czechoslovak crisis in 1968. Consequently, the

construction of nuclear or fallout shelters was introduced via amendments to legislation in 1969 and 1970 (Kahle 2021: 1167).

5. The design and construction of fallout shelters in the period from 1971 to 1991

The Zagreb City Council amended its shelter legislation in 1970 and started to harmonize the just-adopted General Regulation Plan of 1971 with fallout shelter planning. The plan envisaged three dual-purpose road traffic tunnels, which would circumscribe the Upper Town from the east, the north, and the west, and have an alternative wartime use as fallout shelters. Unfortunately, the tunnels were never built.[6] In 1972–73, the City ordered a study of the impacts of a nuclear device explosion in the Zagreb area from renowned institutes in Yugoslavia (Bakal 1972: 1; 1973a: 1; 1973b: 1). The study presented various scenarios of nuclear impact and consequently proposed quotas for fallout shelters and their capacity. The City Institute for Urban Planning adopted older regulation plans for shelter-building and started integrating nuclear protection into all future regulation plans.

Figure 4. The Revised Detailed Urban Plan for Volovčica, [fallout] shelters (SKLONIŠTA), layout, 1972 / **Slika 4.** Detaljni urbanistički plan Volovčica, revizija, [atomska] skloništa, plan rasporeda, 1972.

In 1976, the Federal Ministry of Defense issued new regulations on the design and construction of shelters, diversifying them by strength of protection (standard

[6] The authors of the General Regulation Plan of 1971 adopted the idea of a chain of three underground tunnels for the road traffic below Šalata, Kaptol, Nova Ves, the Upper Town-Grič, and Tuškanac. The arch-like street from Držićeva Ave was to go underground below Meštrović's Pavilion and Šalata [approx. 1.5 km], wherefrom it would cross Ribnjak St, continue below Kaptol and Grič [approx. 0.5 km], and finally go below Tuškanac and Kačićeva St [approx 1.4 km] to the proposed Šarengradska Ave. Along with their publicly stated purpose of relieving congestion in the city center, the three projected tunnels were to serve the hidden purpose of a system of public fallout shelters for the city center's population.

protection shelters, intensified protection shelters, and light shelters), placement (surface shelters, partially buried shelters, underground shelters, and tunnel shelters), manner of use (standard shelters vs. dual purpose shelters), and capacity (small, large—up to 300 people—and compound, i.e. two to three times more than 300). Courses for shelter designers and structural engineers started to emerge, as well as companion handbooks and articles in professional structural engineering journals (Karadžić 1980: 24; Zagorec 1979: 219–224; Zagorec i Sorić 1977: 267–270; Žagar 1979: 29; Žagar, Zdunić i Baljkas 1977: 15–18). A rock band from Pula named Nuclear Shelter (Croatian: *Atomsko sklonište*) performed songs containing catastrophic and anti-war lyrics and toured across Yugoslavia. The first Yugoslav nuclear powerplant with American technology from Westinghouse was completed in 1981 in Krško, present-day Slovenia, at the distance of only 25 miles WNW from the center of Zagreb. A year before that, the movie *The China Syndrome* was playing throughout Yugoslavia and probably caused the relocation of the building site of the planned second nuclear power plant »Prevlaka« from the distance of 18 miles ESE from Zagreb to another, more distant location. The initial fallout shelter structures were constructed without sufficient experience, structural design, and production control. Since the groundwater levels in Zagreb are high, the construction of underground shelters was expensive for Yugoslav society. Consequently, most underground shelters were constructed as basements of prominent government, cultural, public, and office administration buildings. Other public or residential fallout shelters were built as half-buried structures, whether detached and covered with soil near kindergartens, schools, community centers, or markets, or built as basements of social housing blocks or as dual-purpose parking lots near them. A small group of professionals began proposing that all shelters be built as dual-purpose facilities. A pioneer of computer usage in structural calculation and a professor at the School of Civil Engineering at the University of Zagreb, Zvonimir Žagar, defended his doctoral thesis on the design and construction of dual-purpose fallout shelters (Žagar 1984: 1). He advocated for the design and construction of single-family houses as fallout shelter structures. One of the sources he used was the book *Nuclear Shelters, a Guide to Design* by Richard Ormerod, published in 1983 (Ormerod 1983: 1).

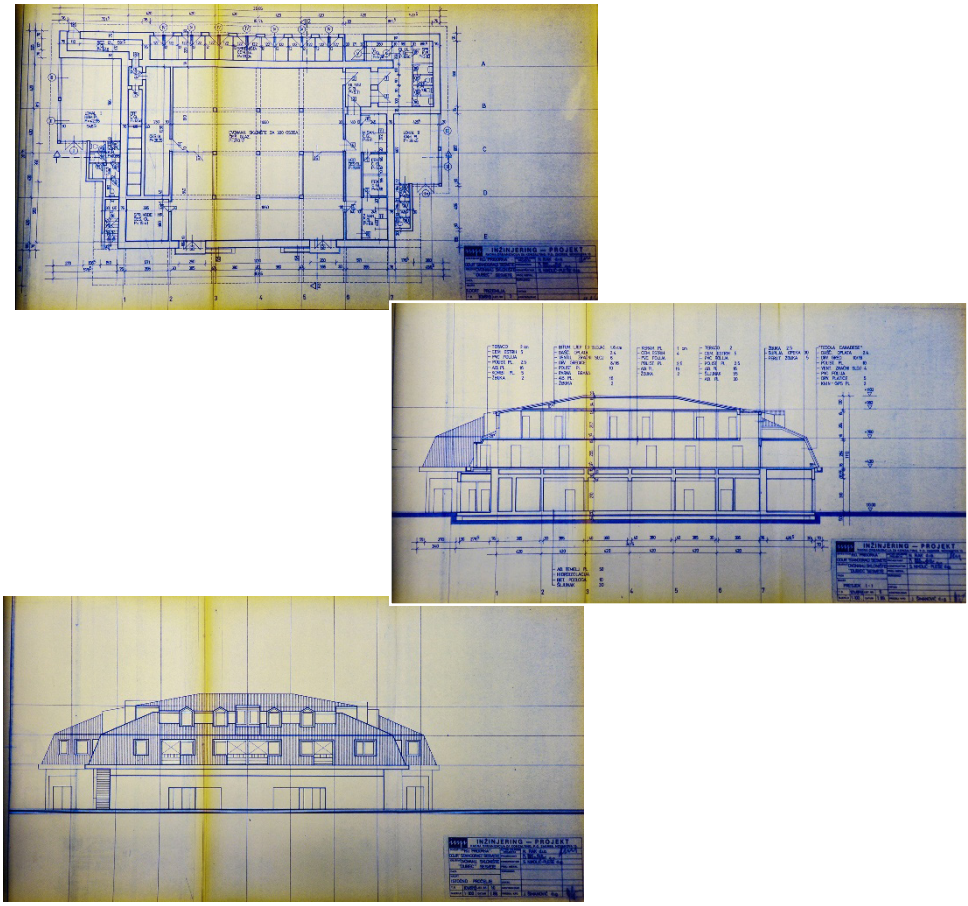


Figure 5a-c. The design of the bifunctional [fallout] shelter »Dubec«, unbuilt, 1989, ground plan, longitudinal section, façade / **Slika 5a-c.** Projekt dvonamjenskog atomskog skloništa »Dubec«, neizvedeno, 1989., tlocrt, uzdužni presjek, pročelje

Due to high groundwater levels, a dual-purpose surface fallout shelter, convertible to its wartime purpose in a day or so, was designed in the 1980s. The building was to be constructed with double HVAC facilities, one for peacetime use and another for wartime use. Similar to the German submarine shelter in Brest in occupied France during WWII, the shelter itself was designed as a thick reinforced-concrete container with another less armored concrete plate above, carrying an additional two stories for peacetime use. In case of a nuclear attack, the construction and debris placed on top would fall on the roof, thus making a suitable protective layer for the shelter. The architectural design could be changed from the vernacular to a postmodern or modern one. One could speculate if this concept would have prevailed in shelter design had Yugoslavia somehow avoided dissolution.

6. From 1991 onwards

Croatia declared independence from Yugoslavia on 8 October 1991, in the basement fallout shelter of the INA headquarters building in Šubićeva St. Other public and residential shelters were widely used for protection during air-raids by the Yugoslav Air Force in 1991–1992, and again in 1995, against rocket attacks from the occupied territory. Later in the 1990s the fallout shelters slowly fell into oblivion, although some of them served as warehouses for do-it-yourself Croatian entrepreneurs, or as storage facilities for the belongings of those who were evicted from their closured homes in the new millennium, following the commercialization of shelter facilities in 2001, after the general obligation to build them had been suspended in 2000. After a minor accident in the Krško nuclear power plant in June 2008 and, more recently, the Fukushima disaster of 2011, the city administration began forming a new Civil Defense Organization, headed by Dr Pavle Kalinić, by making evacuation plans in the case of great natural or human-caused disasters. The idea of turning the existing fallout shelters into general-purpose ones is under broad consideration. Furthermore, in the early 2010s, the requirement of building fallout shelters in the basements of kindergartens, schools, and office and public buildings was expanded to apply to every important architectural competition, but the corresponding legislation on fallout shelters was abolished in 2015.

7. Discussion and conclusions

The presented material shows the history of shelter building in the City of Zagreb in the Cold War era initially as »anti-aircraft defense« shelter construction, and transforming into the exclusive construction of nuclear fallout shelters, although this transformation did not occur »in a straight line«, but rather, as a meandering, with occasional stops and restarts. This history is a worthy part of the architectural history of the City of Zagreb, a significant part of the architectural history of the socialist Yugoslav state, and, finally, an interesting chapter of Cold War architectural history, considering that the construction of these fallout shelters was inspired by contemporary American (Monteyne 2011: 1), Swiss, Swedish, and British experiences, i.e. it conceptually belonged to Western society, not to the Eastern Bloc. Therefore, one can make arguments along five of the following major lines.

Politics. The overall shelter construction, including that of fallout shelters, hugely depended on the political changes in the first two and a half decades of the existence of socialist Yugoslavia and its late president. After a turning point in the late 1960s, fallout shelters became one of the embodiments of the militarization of Yugoslav society in the 1970s and persisted as such until the collapse of the federation.

Economy. The construction of military facilities, initially shelters for the political elite,[7] then of important underground air-force bases[8] and shelters for naval vessels,[9] and finally of fallout shelters, was a huge burden on the socialist economy. The required durability of construction was achieved with the extensive use of a relatively cheap workforce, the increased ratio of concrete in structures, and the relative scarcity of the shell compared to the structure and the air filters, despite the debt-driven economy of the Yugoslav self-management-based economic system.[10] It is worth pointing out that the nominal funds collected as a »shelter tax« were eroded by hyperinflation in the 1980s.

Technology. The design of reinforced-concrete structures in Yugoslavia was aligned with Swiss legislation from 1935 until 1946, when the new regulations were amended (Kahle 2021: 1160–1161). The subsequent, improved regulations regarding reinforced concrete from 1971 and 1987 were not fully compliant with the western world, although construction was somewhat in line with the contemporaneous developments in the world. The fallout shelter structures were not a problem to build, but the process of control was inadequate due to the parallel power structures, although the party ultimately decided on every major issue.

Aesthetic. This matter was not even considered, i.e. the shelters were constructed with the function of protecting the population in mind. Due to the military nature of the project, the visible parts of these structures were designed to be as inconspicuous as possible, either by being buried in the ground or incorporated in the buildings as their substantial, basement parts. The interiors were made as sparse as possible, to save money. Fallout shelters in the form of stand-alone houses were equally sparsely designed and equipped, if built at all.

Fate. The shelters proved useful against the air-raids in 1991–1995, at least from the psychological point of view. The population felt that they would be safe from whatever attacks the Yugoslav air force could organize. After 1995, the shelters gradually fell into oblivion, but the current administration is trying to organize their use in potential natural or human-caused catastrophes, such as the Fukushima disaster in 2011. Additionally, the current geopolitical situation necessitates the design and con-

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[7] Including the shelters for Tito and the political elite in the Bosnian mountains commissioned in the early 1950s.

[8] Such as the former, now abandoned, Željava air-force base near Bihać at the present-day Bosnian-Croatian border, designed to withstand a nuclear attack.

[9] E.g. maritime shelters for missile boats on the island of Lastovo, which was closed for foreign citizens until 1990s.

[10] With the money invested into fallout shelters in the whole country, the Yugoslav Federation probably might have built both the Brotherhood and Unity Motorway and the Adriatic Tourist Motorway, instead of the actually built highways.

struction of fallout shelters, including the proper maintenance and reconstruction/renewal of the ones analyzed in this article. In conclusion, the author humbly proposes the adoption of the Swiss Confederation's concept of fallout shelters (Mariani 2009: 1; Fahy 2016: 1).

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ATOMSKA SKLONIŠTA U ZAGREBU NAKON ZAVRŠETKA DRUGOG SVJETSKOG RATA

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SAŽETAK: Ovaj članak temelji se na revidiranoj i proširenoj prezentaciji pod naslovom »Atomska skloništa u Zagrebu nakon završetka Drugog svjetskog rata« u sklopu »71. godišnje međunarodne konferencije Društva povjesničara arhitekture« održane od 18. do 22. travnja 2018. u St. Paulu, MN, SAD. Atomska skloništa izgrađena na području Grada Zagreba izmicala su dosegu arhitektonske historiografije. Ipak, Gradska organizacija civilne zaštite nedavno je istaknula broj od više od devetsto skloništa pod svojom upravom. Istraživanje i analiza bavili su se razdobljem izgradnje atomskih skloništa, tko je osmislio njihovo postojanje, tko ih je projektirao i izgradio, pod čijim tehničkim i političkim utjecajem su nastala, tko ih je financirao i konačno jesu li potrebna ili zastarjela u sadašnjem vremenu. Izgradnja zračnih zaklona započela je 1932. godine i procvjetala je prije Drugog svjetskog rata. Skloništa za obranu od zrakoplova (Protuavionska zaštita) nastala su u razdoblju od 1948. do 1971. godine sa Snagama civilne zaštite. Nakon gušenja Praškog proljeća 1968., jugoslavenski predsjednik Tito uveo je doktrinu samoobrane i naredio izgradnju atomskih skloništa, što je i ostvareno u razdoblju od 1974. do 1991. godine. Članak završava s pet glavnih točaka. Politički, cjelokupna izgradnja skloništa, uključujući i atomska skloništa, bila je uvelike ovisna o političkim promjenama u bivšoj kraljevskoj, a poslije i u socijalističkoj Jugoslaviji. Nakon kasnih 1960-ih, atomska skloništa postala su jedno od sredstava militarizacije jugoslavenskog društva 1970-ih i kao takva su ostala i do raspada Federacije. Ekonomski, izgradnja atomskih skloništa bila je ogroman teret za socijalističko gospodarstvo, unatoč jeftinoj radnoj snazi i ekonomiji jugoslavenskog samoupravnog društva vođenoj dugovima. Hiperinflacija 1980-ih pojela je nominalna sredstva prikupljena kao doprinos na skloništa. Tehnološki, izgradnja skloništa od armiranog betona bila je u skladu s trenutnim razvojem u svijetu. Izgradnja konstrukcija nije bila problem, ali je proces kontrole bio neadekvatan zbog paralelnih struktura moći. Pitanja o estetici nisu se ni postavljala, jer su skloništa konceptualizirana s funkcijom zaštite stanovništva. Zbog vojne prirode projekta, vidljivi dijelovi skloništa zamišljeni su da budu što skriveniji, dok su interijeri materijalizirani što je moguće skromnije. Što se tiče njihove sudbine, skloništa su se pokazala korisnima protiv zračnih napada 1991. – 1995., no nakon 1995. postupno su pala u zaborav, iako sadašnje uprave pokušavaju organizirati njihovu upotrebu u slučaju mogućih prirodnih ili ljudskim djelovanjem uzrokovanih katastrofa, posebno nakon pogoršanja političkih događaja u vremenu između prezentacije i objave članka.

Ključne riječi: atomska skloništa; utvrde; vojna arhitektura; Zagreb; Hrvatska; Jugoslavija; 1932–2015.