ROMANIAN MILITARY THINKING

A HISTORICAL PERSPECTIVE ON ROMANIA'S MILITARY INFRASTRUCTURE: THE EVOLUTION OF CONSTRUCTION REGULATIONS AND PROSPECTS FOR UPDATING

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The article presents the evolution of the military infrastructure in Romania from the 19th century to the present, focusing on the transformations in military construction regulations and the organization of design and construction activities.

With the establishment of the standing armed forces, the technical norms for the construction of buildings and the principles for the barracks layout were defined and architects developed standard projects to speed up construction and minimize costs. The regulations have been adapted over time, following the evolution of the armed forces and military technologies. In the context of the significant increase in the Ministry of National Defence real estate investments in recent years, in order to align with the best international practices, updating the technical infrastructure norms with specifications regarding all types of spaces in the barracks has become timely and necessary.

This study is based on the analysis of military regulations and specialized literature to investigate the evolution of the military infrastructure in Romania, thereby contributing to a better understanding of the current context. In conclusion, the article proposes an action plan for updating the technical norms, as well as a list of objectives regarding the content of these norms.

Keywords: military infrastructure; barracks; history of military construction; military regulations; military facilities;

INTRODUCTION

The 19th century, marking an era of profound social, cultural, and economic transformations, witnessed the emergence of modern military architecture. Various European countries adopted similar plans, materials and technologies, resulting in a form of military architecture globalization. Starting in 1850, military structures with very similar architecture emerged across Europe. (Gatti & Cacciaguerra, 2014).

The development of military infrastructure in Romania gained momentum with the establishment and expansion of the standing armed forces, leading to the construction of buildings designed to accommodate troops, military hospitals, and subsequently, depots and factories for manufacturing war materials. To establish and carry out the necessary infrastructure works, technical departments were set up within the Ministry of War. Shortly after, by experimenting with different solutions and conducting research trips abroad, the norms for the buildings design and the principles for the barracks layout were established. Based on them, military architects began to standardize designs to accelerate the construction process and minimize costs. The construction of military infrastructure continued without interruptions and the living conditions were improved through the development of new architectural plans. The first standardized barracks were based on a plan with a central courtyard. However, the need to increase the capacity and the problems arising from the juxtaposition of incompatible functions led to the abandonment of that model in favour of arranging large central spaces surrounded by pavilions dedicated to a single function. The standardization of dimensions, configuration, and constructive solution allowed, in a relatively short time, the rapid completion of a large number of buildings, leading to the formation of a complex and diversified system of military works at the national level.

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The principles established for the configuration of barracks and for the military construction management have remained valid. However, they have been adapted over time to align with the evolution of the armed forces structure, the military technologies and the changes in construction regulations. Examining the changes in the regulatory framework for barracks infrastructure in Romania, from the initial stages to the adoption of the *interoperability* concept, following the accession to NATO and the EU, I consider it necessary for the infrastructure norms to be reviewed and supplemented in order to improve both functional and economic standards in military construction.

After 1840, the increase in the number of military units led to a new development phase. During that period, it was decided to build large barracks in garrison towns, inspired by models from abroad. The projects and studies for the necessary military constructions were carried out by foreign engineers and architects employed in the Engineers' Section (Secțiunea Inginerilor) within the Ministry of the Interior.

THE BEGINNINGS: 1829 – 1877

Following the provisions of the Treaty of Adrianople in 1829, the Romanian national army was established, having a fixed organization and location, prompting the need for appropriate infrastructure development (Corneanu, 2018). Barrack construction began in 1831, immediately after the implementation of the *Organic Regulation (Regulament Organic*). As this process was lengthy, the *Organic Regulation* allowed for the use of temporary buildings and established the principle of billeting troops with residents. During that period, the conception of military constructions was influenced by experts from the Tsarist army, an influence that would continue until the withdrawal of the Russian troops from Romanian territories. Representative for that era is the Oota Barracks in Craiova, developed in 1832 by the Russian General Kiseleff (Herjeu, 1902, p. 197).

After 1840, the increase in the number of military units led to a new development phase. During that period, it was decided to build large barracks in garrison towns, inspired by models from abroad. The projects and studies for the necessary military constructions were carried out by foreign engineers and architects employed in the *Engineers' Section (Secțiunea Inginerilor) within the Ministry of the Interior*. The first barracks were experimental, combining in a single building all the functions necessary for housing, feeding, training and administering the troops. Shortly thereafter, it was proven that type of barracks, referred to at the time as centralized, *"was not suitable for the country's climate, military organization, or the living habits and customs of our soldiers"* (Ib., p. 200). Representative examples from that period include the former Malmaison barracks on Calea Plevnei, the only barracks in the Romanian Armed Forces configured as a closed quadrangle, or the main building of the barracks on Dealul Copoului in Iași.

After the Unification of the Romanian Principalities, in the process of the army reorganization, the foundational elements of the Romanian engineering branch were established. In 1859, the *Army Engineering Service (Serviciul de Geniu al Armatei)* was born, embedded in the *General Staff Corps (Corpul de Stat Major General)*, in charge of *"transitory and permanent fortification works; all works related to the construction and maintenance of military or public buildings in general, such as: barracks, guard posts, stables, hospitals, prisons and others; construction and installation of movable and permanent bridges; management of public works that are executed with the help of the army"* (Ib., p. 204; High Ordinance no. 83 of 12 November 1859, art. 7, letters C, D and F), and in 1860 the *Technical Council of the Engineering Corps (Consiliul Tehnic al Geniului)* was established, tasked with *"reviewing any project or estimate"* (Ib., p. 205; Order of the Day, 25 May 1860, issued to the Army).

In 1863, the ***Barrack Regulation (Regulamentul Casarmelor)*** was introduced, the first regulation of this kind, inspired by the French one, which contained provisions regarding the maintenance, furnishing and guarding of barracks. Regarding the organization and conformation of the barracks, article 7 of the regulation outlined the types of buildings, while chapter IV established the principles for organizing and sizing spaces. In addition, according to the regulation, construction projects were carried out by engineering officers and the execution of works could be carried out either by military forces or through contracting. The principles of that regulation have been preserved to this day, being constantly improved and adapted according to legislative changes. Thus, in 1870, the new ***Regulation on Barrack Service (Regulament asupra serviciului casarmării)*** was approved, a reduced version of then-current French regulation, which further detailed the composition and sizing of spaces in barracks, as well as their furnishing.

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During that period, the development of permanent infrastructure continued, with the construction of barracks, hospitals and military depots. Regarding the design of military buildings, following the studies undertaken in England to improve barrack conditions, the barrack type with multi-purpose buildings was abandoned and a new system was adopted, in which each building was dedicated to a single function. Based on those principles, following the study of the European barracks, Major Z. Gheorghiu developed a troop pavilion project that was implemented for the first time in 1875 at the Engineer Battalion Barracks in Bucharest. The design was later adapted for the Artillery Barracks in Roman and other barracks, leading to a standardization of the building. That process was not carried out in a rigid manner but allowed the continuous improvement of the construction solutions.

Based on the analysis of the different systems applied in the country and abroad, the principles for the construction of new barracks were revised to include the subdivision of the barracks' mass into smaller buildings; grouping buildings by services and separating the living quarters from other functions; consolidating administrative and training services within one building; establishing a separate infirmary pavilion; creating a dedicated pavilion for storing the troop's war equipment etc.

CONSOLIDATION: 1878 – 1918

After the War of Independence, the volume and complexity of the works increased rapidly, prompting, in 1881, the establishment of the *Engineering Central Service (Serviciul Central al Geniului)*, subordinate to the minister, tasked with the study of major military building projects and standard designs, as well as the review of projects proposed by regional services. The service was led by Major Z. Gheorghiu and promoted the use of the decentralized principle and standardized projects. In 1886, the *Engineering Central Service* was a disbanded and the *Engineering Directorate (Direcția Geniului*) was established within the Ministry of War, which would henceforth carry out the projects and studies for barracks and military constructions. The technical staff from the Central Service was transferred to the Directorate, where it would form the *Engineering Technical Service (Serviciul Tehnic al Geniului)*, led by Captain A. Pavlo.

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In 1894, a new ***Engineering Technical Service Regulation (Regulament privind Serviciul Casarmamentului)*** was implemented (High Decree no. 1820, 29 April 1894, in *Monitorul Oastei*/Army Gazette no. 39, 28 June 1894), which updated the existing regulations according to the orders issued in the meantime with specifications related to the construction and administration of the fortifications, establishing, at the same time, a separate fund for the purchase of furniture. As a result of the numerous legislative changes that occurred in the meantime, it was revised two years later (High Decree no. 682, 7 February 1896, published in *Monitorul Oastei* no. 22, 4 March 1896), to include: the provisions of the Minister published as instructions, the types and nomenclature of the army furniture, the duties of the fortifications engineering services, the regulation of testing laboratories, the introduction of a chapter on officers' housing and the additional duties of commanders regarding barracks. In 1908, a new ***Regulation on the Barrack Service (Regulament asupra serviciului cazarmării)*** was approved (High Decree no. 745, 1 May 1908, in *Monitorul Oastei* no. 69 and no. 30, 3 June 1908), which made modifications particularly in the field of barracks administration, redistributing responsibility to regional structures. Afterwards, the investments in construction declined, with focus shifting towards improving combat techniques and increasing combat troop numbers.

During the First World War, most of the barracks remained in enemy-occupied territory. The existing barracks within the territory of Romania, reduced to the area of Moldova, insufficient for the Romanian and allied (tsarist) troops, were complemented by temporary camps. Under those conditions, the *Temporary Barrack Directorate (Direcția Baracamente)* was established within the Engineering Directorate, thus separating the temporary constructions from the rest of the military constructions.

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EXPANSION: 1918 – 1947

After the end of the war, when the troops of the Romanian armed forces were deployed throughout the country, the military construction activity focused on the necessary works for the rehabilitation of the old barracks and for their expansion by building new pavilions. Under those conditions, the activity of design, construction and military domains was separated from the activity of the *Engineering*, through the establishment, on 18 June 1920, of the *12th Domain and Barrack Directorate (Direcția a XII-a Domenii și Cazarmament*), renamed, in 1929, the *Military Domain and Barrack Directorate (Direcția domeniilor militare și cazarmamentului*) and, in 1939, the *Military Construction and Domain Directorate (Direcția construcțiilor și domeniilor militare*).

The activity of restoring the barracks began with a comprehensive inventory process. All the barracks, buildings and lands used by the armed forces were published in the *Military Construction and Domain Yearbook* (*Anuarul construcțiilor și domeniilor militare*), published in 1921, and in a second edition from 1925, entitled the *Military Construction and Domain Indicator (Indicatorul construcțiilor și domeniilor militare)*.

In order to guide the modernization and expansion of the infrastructure, in 1921, the ***Regulation of military constructions and domains (Regulamentul construcțiilor și domeniilor militare)*** was approved, a regulation that remained in force for the next 30 years. According to art. 19 of the Regulation, the Military Construction and Domain Directorate managed the album of standardized constructions and the file with the related plans of those constructions, as well as the album of the armed forces standard furniture.

During that period, an extensive military infrastructure development programme was executed to meet the needs of the armed forces, which were undergoing a phase of modern reconstruction. Thus, in a span of only 20 years, all the old barracks were modernized and a substantial number of new barracks were built. There were created warehouses for ammunition and combat equipment, factories and arsenals for the production of war materials, airfields for military aviation and military aviation schools, barracks for tank units, for air station regiments, for anti-aircraft artillery regiments and for the regiments that had to fight

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in the fortifications in the west of the country, as well as for the units deployed in Bessarabia, Bucovina and the Quadrilateral. Numerous military clubs were also established. In their vast majority, the projects were ensured by the Directorate's specialists. Only for some representative buildings, the projects were carried out by architects from the civilian sector, such as the case of the Military Academy, designed by the architect Duiliu Marcu.

During the Second World War, the construction of pavilions and barracks continued, investments in permanent constructions doubling in the three and a half years of the war compared to what had been built in the 20 years of the interwar period (Bărbulescu et al., 1996). During that period, the activity of building the military infrastructure was influenced by the need to prioritize the provision of barracks for the commands and troops of the German Military Mission (until August 1944) and later for the Soviet troops stationed on the territory of our country. Because of the inability to establish post-war military deployment locations, the period was characterized by the use of temporary constructions, cheaper and faster to build. In addition, the Construction and Military Domain Directorate built camps of pit houses. Permanent constructions were erected only on stable sites regardless of the circumstances, involving the completion of some already started works and the creation of training centres.

THE TRANSFORMATION: 1947-1989

After the end of the War, some of the barracks and installations were either destroyed in the war or damaged in the withdrawal of the fascist armed forces from Romania. In addition, the *Peace Treaty between Romania and the Allied and Associated Powers*, signed in 1947 (Monitorul Oficial/Official Gazette no. 199, 30 August 1947), allowed the USSR to keep a large number of units of all branches on the territory of our country, Thus, the Soviet armed forces occupied some of the best barracks, airfields, warehouses, buildings for military personnel. As a result, the Romanian military units were relocated to areas devoid of barracks, necessitating the construction of new facilities and the repair and modernization of the existing infrastructure in the initial years after the war.

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In 1958, following the decision of the Soviet leader, Nikita Sergheevici Khrushchev, to withdraw the Soviet forces from Romania, a large number of barracks were vacated and transferred to the civil administration. In the 1960s, the main concern was the modernization of the existing infrastructure. Focusing on the optimization of material consumption, emphasis was placed on the vertical development of pavilions and the reduction of barracks into smaller perimeters. The systematization of those barracks was based on the principles of functional zoning, partitioning distinct zones for: the guard zone, the socio-cultural buildings zone, the facilities zone, the depot zone, and the technical and parking zone. The modest constructions were replaced with P+2 pavilions made of masonry and reinforced concrete that included modern facilities and provided higher interior comfort (Tîrzioru, Pădureanu, 1995, p. 262).

The occupation of Czechoslovakia by the Warsaw Pact troops in 1968 led to enhancing the armed forces combat capabilities. As a result, additional investments were made to supplement existing accommodation spaces and to build new barracks for command units and newly established units. The constructions made during that period were very diverse, standing out both for the level of thermal insulation and waterproofing provided, as well as for the increased attention paid to the external appearance of the facades.

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Under the conditions of the centralized and planned economy, the activities of the Military Construction and Domain Directorate were carried out according to the national regulations applicable to all similar institutions in the national economy, namely the obligation to obtain the approval of the Council of Ministers for projects greater than 50 million lei and the submission of proposals for the annual and f ive-year work plan. The military constructions were continuously aligned with the laws in force in the national economy through orders approving regulations and instructions regarding the military infrastructure. Thus, in 1952, the Military Domain Regulations were replaced with regulations dealing separately with: administration and operation of barracks, fire prevention etc. Also beginning that year, standardized design was regulated as a standard in military architecture. For each project, a preliminary design consisting of the site plan and the standardized project was prepared and subjected for approval in the Ministry of the Armed Forces and, subsequently, sent for endorsement to the *State Planning Council (Consiliul de Stat al Planificării*). When the standardized project could not be used, the plans of a new project and a facade were attached. Based on the design order, the technical project and estimate were made. Moreover, with the adoption of the Armed Forces Reorganization Law in 1947, which also established the responsibilities of the Military Construction and Domain Directorate, among the responsibilities of 1st Bureau of the 1st Service – Studies and Projects, we find as an activity the study and record keeping of the standardized buildings and furniture (Bărbulescu et al., p. 45). In 1972, following the legislation that restructured the design activity throughout the country, the *Military Construction Design Centre (Centrul de Proiectări Construcții Militare*[1]*)* was established. Within its organizational structure, Workshop 4 was responsible for the standardized designs, an activity that would be taken over by the other 3 workshops. Also in 1972, following the adoption of *Law no. 14 regarding the organization of the national defence of the Socialist Republic of Romania (Legea nr. 14 privind organizarea apărării naționale a Republicii Socialiste România)*, the infrastructure regulations, named Cz, were revised and supplemented. Thus, *Cz. 21 Technical norms for accommodation (Cz. 21 Norme tehnice de cazare)*, approved by General Order of the Minister of National Defence no. O.G. 4/1975, remained valid until 2008. In the '80s, as part of the national policy regarding construction[2] investments, a new catalogue was approved, with 37 standardized projects specific to the military field, which replaced the 130 existing projects, in order to reduce investment costs by approximately 20%.

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[1] In 1950 the Design Department within the Military Construction and Domain Directorate was transformed into the Design Section and, in 1951, the Design Directorate was established as the central body of the Ministry of the Armed Forces. In 1955, the Design Directorate became the *Military Institute of Studies and Design (Institutul Militar de Studii și Proiectare)*, which would operate until 1958, when it was replaced with the *Design Section of the Construction and Troop Accommodation Directorate (Secția de Proiectare din cadrul Direcției Construcții și Cazarea Trupelor*). When the Directorate was reorganized in 1971, the Design Section became an independent body, subordinate to the Minister, called the *Military Design Sector (Sectorul Militar de Proiectare)*. (A.N.).

[2] *Decree no. 418/1980 on the standardization of constructions, technologies, as well as materials and elements for construction and installations (Decretul nr. 418/1980 privind tipizarea construcțiilor, tehnologiilor, precum și a materialelor și elementelor pentru construcții și instalații)* is the latest legal provision in a series of regulations and recommendations regarding standardization and prefabrication, replacing architecture with *"standardised design"*. (A.N.).

A major change during that period concerned the execution of construction works. If, until 1946, most of the construction works were carried out by contracting private companies, starting in 1947, for small-scale works as well as capital and current repairs that could not be carried out by the beneficiary units, construction detachments were established at the territorial bodies for constructions and domains. Those works were the most common in the barracks occupied by the Romanian armed forces. For the investments needed for the barracks of the Soviet armed forces, the construction works were carried out by contracting state-owned enterprises in the field of construction, plumbing, electrical etc. Starting in 1950, when a large number of investments in barracks and housing were initiated, 16 construction battalions were established, dispersed throughout the country. In 1952, the Military Construction Enterprises were established, organized by battalions, on the territorial principle, which took over the tasks and leadership of the construction battalions in the particular area. Frequent reorganizations led to the emergence of the Military Construction Sectors.

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REFORM: 1990-2015

The political, economic and military transformations that took place after 1989 were also felt in the military field. Based on the provisions of annual Framework Plans regarding the armed forces reorganization changes occurred in military doctrine, in the command structures and in the forces organization.

Regarding the military construction activity, starting in 1990, measures were taken to stop the engagement of military structures in the national economy and to reduce the personnel through the disbandment of some units, as well as their transformation or resizing. Thus, the Construction Sectors were disbanded, the Territorial Administration Centres were established, and the functions within the Design Centre were reduced. If, until 1990, around 16,000 people worked in the armed forces in the field of military construction, their number was reduced to only 150 people, military and civilian, in the period 2010-2015 (Bartoș, 2021). Currently, the Domain and Infrastructure Directorate, whose name dates back to 1999,

and the current organization, with some changes, to 2008, has under its command six Domain and Infrastructure Centres, with headquarters in Bucharest, Craiova, Sibiu, Focșani, Iași and Constanța, a Centre for studies and design of military constructions and a Centre for intervention in emergency situations.

Especially after 1973, the armed forces did not receive the necessary funds for the maintenance and repair of barracks, so that in the early 1990s most barracks were in a state of disrepair, and after 1990, the funds for capital investment and repairs in the armed forces diminished. Military construction activity continued with the completion of the major objectives started before 1989, but the number of new investments was reduced. Because of the lack in funds, some barracks were made entirely from prefabricated wooden temporary pavilions. The interventions on the existing infrastructure, most of the works carried out during that period, were aimed at consolidating the buildings and modernizing them by improving accommodation conditions and introducing data networks. (Bărbulescu et al., 1996).

Until the year 2000, a series of legislative acts were developed that coordinated the armed forces reform process. Based on the objectives established by the *National Security Strategy of Romania* (2001) and the *Military Strategy of Romania* (2000), the infrastructure was resized, modernized and facilities were created for the conduct of multinational military actions.

During that period, new works were also carried out to provide command, accommodation and training facilities for the newly established units in the counties of Satu Mare, Bihor, Arad, Harghita and Covasna, as well as the infrastructure of the anti-aircraft surveillance system in the locations of Cluj, Craiova, Constanța, Timișoara and Suceava (Direcția domenii și infrastructuri, 2010, p. 12). Concurrently, the disbanding of some units and the abandonment of compulsory military service (2007) had major implications on the existing infrastructure, so that in the period 1995-2006, a number of 149 barracks from all over the country were transferred to civilian use (Petrișor, 2011, p. 93).

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Following Romania's accession to NATO (2004) and the EU (2007), in 2008 the regulations specific to the military construction activity were revised. *Cz-21/75 Technical Norms for Accommodation* was replaced with *Order M45/2008 for the approval of the Technical Norms for Domain and Infrastructure* and *Cz-81/74 Instructions regarding the administration, use and maintenance of the accommodation fund of the Ministry of National Defence* and *Cz-1/94 Regulation of accommodation activity* were replaced with *Order M91/2008 and with the Regulation of Real Estate in the Ministry of National Defence*. The prescriptions for infrastructure management, reflecting the orientation towards the Alliance defence strategy and the increasing importance of deployable forces, include new concepts related to the mobility and adaptability of facilities. However, the infrastructure standards contain less information regarding the dimensioning and functional organization of buildings, limited to specifications regarding the organization of office spaces. Consequently, the responsibility for interoperative compliance and facilities requirements was transferred to the beneficiary structure.

For the implementation of agreements between Romania and the USA, the works intended for the US troops stationed at the Mihail Kogăniceanu base were completed and the Babadag, Smârdan and Câmpia Turzii training ranges were rehabilitated. In 2013, the main construction works at the Missile Defence Facility in Deveselu were inaugurated.

During that period, the first works were carried out for the development of infrastructure in partnership, based on international agreements and alliances. For the implementation of agreements between Romania and the USA, the works intended for the US troops stationed at the Mihail Kogăniceanu base were completed and the Babadag, Smârdan and Câmpia Turzii training ranges were rehabilitated. In 2013, the main construction works at the Missile Defence Facility in Deveselu were inaugurated. Also, by 2005, the first NATO Security Investment Program (NSIP)- funded objective was completed and new investments were initiated for the military units deployed in Fetești and Otopeni (Direcția domenii și infrastructuri, 2010).

INTEROPERABILITY: 2016-2023

In order to strengthen Romania's status within international alliances, our country initiated an extensive investment programme in the modernization and expansion of the military infrastructure. The investments, based on the regulations of the Ministry of National Defence and NATO standards, underline our country's commitment to interoperability and effective integration into allied structures. The orientation towards interoperability is reflected in the infrastructure's capacity to support joint operations, ensuring seamless cooperation and increased operational efficiency.

Among the Ministry of National Defence objectives are the provision of adequate administrative and training spaces for the newly established commands, such as: the Joint Forces Command, the Special Operations Forces Command, the Cyber Defence Command, the Multinational Division SE Bucharest and the Multinational Brigade SE Craiova; and the infrastructure development for procurement programmes such as: Patriot/HSAM, Piranha, HIMARS/Larom and Spike systems. These investments represent an important step in strengthening Romania's defensive capacity and aligning it with advanced military technologies. Additionally, the Ministry of National Defence focuses on the modernization and expansion of the infrastructure of the air bases at Borcea, Mihail Kogălniceanu, Câmpia Turzii and Otopeni. This involves not only the improvement of existing facilities, but also the construction of new structures. Another aspect is the collaboration based on partnerships for the development of common locations such as Cincu, Mihail Kogălniceanu, Deveselu and Câmpia Turzii. These investments not only strengthen Romania's ties with its allies, but also facilitate the exchange of expertise and resources, vital for maintaining a high standard of training and operational readiness. (Icleanu, 2023).

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Since 2016, investments have seen a significant increase, and in order to meet the new objectives, the staff of the Military Construction Studies and Projects Centre has been increased. In 2022, the sixth Centre for Domain and Infrastructure (CDI 6) was established in Constanța. To ensure an adequate infrastructure, compatible with that of the strategic partner and NATO partners, CDI 6 aims to fulfil the role of host nation in the implementation of national/regional initiatives to ensure a tailored forward presence of NATO allied forces in the

southern part of the eastern flank, in the Black Sea area (Nedelcu, 2022). Also in that year, the head of the Domain and Infrastructure Directorate issued directives that updated the regulations related to infrastructure and real estate, namely *Disposition no. DDI-12 of 13 June 2022, approving the Technical Norms for Domain and Infrastructure*, and *Disposition no. DDI-13 of 17 June 2022, approving the Real Estate Regulation in the Ministry of National Defence*.

The increase in Romania's defence budget to 2.53% of GDP for the year 2023 represented a key factor for financing the modernization of the military infrastructure, underlining the national commitment to security and the fulfilment of international obligations. Considering the resource constraints of the past, which now lead to an urgent need for the development and modernization of the barracks infrastructure, the budget increase allows the implementation of a comprehensive programme of modernizing and developing the military infrastructure. In this context, I appreciate that it becomes pertinent to develop an effective strategy for the rapid construction of a large number of buildings, alongside a review of infrastructure norms, to ensure interoperability with the standards of international alliances.

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CONCLUSIONS

The analysis of the evolution of barracks infrastructure in Romania highlights several important trends in the development of military infrastructure, such as:

Standardization of constructions through regulations: The technical norms for infrastructure emphasize an orientation towards standardization and efficiency. It entails not only simplifying the construction process but also ensuring uniformity in quality and design, thereby ensuring coherence in military infrastructures at the national level.

Standardized design: The use of standardized projects and their recommendation for certain situations by regulation bring significant benefits in terms of time and cost efficiency. By applying predefined designs, the planning and execution process is considerably simplified, allowing a faster and more economical completion of works. This method also ensures consistent quality of constructions due to the application of uniform standards across all projects.

Speed and adaptability: The development of technology in the field of construction has led to the adoption of new typologies of prefabricated and mobile constructions. It provides increased flexibility and efficiency in the deployment of military infrastructure. Moreover, projects can be designed to allow adaptations and modifications to meet the specifics of different locations or changes in operational requirements.

Interoperability: The evolution of infrastructure regulations, aligned with the national defence strategy, focuses on interoperability and coordination with the standards of partners and allies. The adaptation of infrastructure norms and procedures to the requirements and protocols established at the international level becomes a key element in improving the response and collaboration capacity of the Romanian armed forces.

These aspects underline Romania's efforts to modernize and adapt the military infrastructure to contemporary requirements, emphasizing the importance of standardization in the context of interoperability between military structures.

In the context of increasing investments in infrastructure in order to improve efficiency, I consider it is opportune to review and supplement the technical norms regarding infrastructure, which are currently limited to aspects related to the sizing and furnishing of offices. In this regard, these regulations could be extended with specific details to all types of spaces within the barracks, thus ensuring a more comprehensive and effective approach. It is important that these updates to the regulations should be made in a consultative manner, involving experts from different fields and taking into account recent technological and operational developments. Additionally, alignment with the standards used by our partners and allies by coordinating with their regulations is also necessary. It not only ensures that the infrastructure and managing procedures are compatible and can be easily integrated in case of joint operations or exercises, but also that best practices and innovations in the field are shared. Such cooperation can lead to increased efficiency and overall effectiveness within military alliances.

Upon a careful analysis of the evolution of norms for military infrastructure, it becomes evident that some principles, although

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still applicable in practice, are not reflected in the current norms. Reintroducing these elements – including the principles of functional zoning and detailed *room-by-room* specifications – would contribute significantly to increasing the quality of military infrastructure.

Elements that can be regulated and included in the technical norms are:

❖ **The functional zoning of barracks**: Regulation should establish guidelines for the spatial organization of barracks, optimizing operational efficiency, safety and well-being of personnel, taking into account accessibility, security requirements and the integration of various functions.

❖ **Typologies of military constructions**: Classification of different types of military buildings in a well-defined system helps to better organize resources and plan constructions efficiently. Tracking investments for the same building type can be an effective strategy for estimating reference prices. In addition, the standardized classification of military buildings ensures a consistent level of quality and safety. It also helps ensure compliance with national and international regulations, as well as construction and safety standards.

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❖ **Specifications for pavilions on the *room-by-room* principle**: This approach provides a balance between flexibility and standardization in the design of interior spaces. The spaces are designed to allow for easy modifications and extensions, thus dynamically adapting to changing and evolving needs. At the same time, maintaining a certain standardization in design ensures coherence and efficiency in the use of spaces, facilitating the reconfiguration of the infrastructure with minimal effort and resources. This combination of adaptability and design uniformity effectively responds to changing needs without sacrificing operational efficiency.

❖ **Constructive typologies for buildings**: Regulation must clearly differentiate between temporary, mobile, adaptable and semi-permanent constructions, providing examples for each category and detailing recommendations for their use and prescriptions for construction management throughout the lifecycle.

These elements will provide a solid framework for the development of the military infrastructure, ensuring the fulfilment of current needs and adaptability to future challenges. However, for an effective update

of the technical norms for infrastructure, a detailed analysis of the relevant documents is crucial. It should include:

- **Abrogated infrastructure regulations** in order to establish the elements that should be revised, supplemented and reintroduced in the current regulatory framework;
- Identification of all **normative acts that include regulations regarding the spatial and functional conformity of barracks to ensure the integration of this regulation in the national legislation framework and specific normative acts**. In addition to the documents developed by the structures of the Domain and Infrastructure Directorate, such specifications can also be found in the orders of the Minister of National Defence, as well as the regulations regarding: the storage of technical materials or the military equipment park, the provision of physical protection or the provision of voice-data networks;
- Identification of **NATO and US Department of Defence standards and best practice examples**.

This comprehensive approach will ensure that the Romanian armed forces infrastructure regulations are complete, topical, and in line with international standards.

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