Constructive Principles of the Italian System Used To build the bastioned fortification of Oradea Fortress

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Abstract: This paper presents a constructive concept of the Italian system of fortification and demonstrates that the fortification of the Fortress Oradea is belonging to this principle. The Italian system appears in the same time with the Renaissance. This is the very first modern bastioned fortification which is using the sharp salient-angle (the feather model). Renaissance`s Principles arrived in Transylvania also with the Italian architects and engineers brought here by Caterina de Medici. This paper presents a detailed analyse of the Oradea fortress, and contain a demonstration and explanation of the constructive concept which was used.

Key-Words: - Military Architecture Theory, Fortifications, bastioned fortress, rampart, bastion, artillery, fortification, Renaissance, artillery.

1 Introduction

The construction of the star shape fortress Oradea starts around 1540 and is was made according with the Italian System trace, drafted by Pietro Cataneo which were later used by Italian military architects who worked in Oradea (fig.1)

The architects chose a pentagonal shape pattern with 5 bastions, adapted for artillery, on each corner. The project was assigned to the Italian architect Domenico di Bologna who has visited the court of Gheorghe Martinuzzi. Other Italian architects such as Ottavio Baldigara, Domenico dei Ridolfini da Camerino, Simone Genga, Achille Tarducci da Carinaldo, Giovan Marco Isolano da Bologna, Maurizio Veneiro or Giacomo Resti got involved in this huge project for building this fortress.

The fortress was erected in 2 large stages: the 1st stage was between 1518-1550 under the leadership of Gabriel Bethlen and Rackoczi family; the 2nd stage was between 1569-1598 under the leadership of Ioan Sigismund of Bathory and of Bathory family. The fortress is surrounded by a very large ditch between 60 and 80 meters wide and 6 meters deep, supplied with warm water from Peta river that did not freeze in winter.
2 Material and method.

Constructive principles of the Italian system

The bastion had the shape of the feather with a salient angle, the flanks formed a salient angle generally of 60°, being ended and protected by orillons. The orillons were linked with the curtain wall through the lateral flanks of the bastion that, connecting the bastion to the curtain side, were further strengthened by a wall endowed with a platform and a parapet, for a better lateral flanking of the curtain wall. A parallel fire was thus established.

By placing a cavalier or a lunette on the bastion, the fortified element became even harder to conquer, and very resistant to enemy fire. Cataneo’s concept that was used at Oradea is explained in figure 4. Figure’s 4 legend: g-glacis, W-re-entering places of arms, a-orillon, b-ravelin, c-cavalier.

In order to understand this concept from fig.4, we will analyse thoroughly all the elements of the fortress of Oradea and we will compare them with the theoretical pattern.

The defensive structure of the Oradea fortress is analysed in figure 5. One can notice that the fortification consist of 2 fortified pentagonal precincts (fig.5 upper right)- the red pentagon that represents the castle and bastion precinct represented in yellow. The defence ditch surrounds the fortress on all sides of the starred perimeter and it is represented in blue. In fig.5-left corner, the fortress ditch is represented in red and the old glacis which does not exist anymore, is represented in yellow. Thus, one can notice the way in which the urban structure got too close to the fortress entering even the protection area. The fortification had 2 interior concentric yards, the 1st being the castle yard-represented in yellow in fig.5 (3rd figure on the column), while the 2nd was the bastioned fortification yard which included the first one as well, represented in green (last figure in the column). In fig.6 is presented the study of the fortress today-stage, and an epoch stamp (16th century). Notice in fig.7,8,9 the way the system works. In those figures is analysed the different types of fire.

Fig 2-bastion without a cavalier.

Fig 3-bastion without a cavalier.

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Fig. 5. Analytic study of the component elements of Oradea Fortress.

Fig. 6. Present study of the Oradea Fortress and its representation in an epoch stamp.

Fig. 7. Carrying out the cross fire and flanking fire from the lateral flanks and bastions.

Fig. 8. Carrying out the cross fire from the lateral flanks of the bastion in combination with the cross-fire of the first precinct towers.
Fig. 9. The demonstration of the Italian geometrical pattern over the fortress ground-plane (the composition axis are represented in red and O1,O2,O3 are the centres of the geometrical plan of the fortress)

Fig. 10. The demonstration of the Italian geometrical trace of the bastion 5 with explanation of the drawing method and the component elements: AB,AC-bastion flanks, CD,BF-bastion orillons, DE,FG-side flanks.

Figure 9 points out the concept of ideal pentagonal fortification, the 3 geometrical centres being collinear and equally apart from one another. This manner in which a bastion was built (it has an identical pattern for all 5 bastions), is represented in fig.10. The cannons could be placed in two ways:- 1 one the bastion platform, firing from the the parapet, or 2- inside the bastion, but only in lateral flanks, in order to create a flanking-fire for the curtain, and the rest of the bastion was filled with earth. The main strong point of this type of fortification is to give up passive defence and adopt the active defence. The advantages of the Italian system are: usage of cross-fire, the adoption of the starred plan and the salient angle-sharp shape of the bastion which removes the dead angle of the medieval bastion in circular plan (fig.11).

Fig. 11. The demonstration of the dead-angle elimination in the Italian trace.

3 Problem Solution
Reshaping the protection area is utterly necessary for the rescue of the monument. A simple restoration is not enough, if a method required for the revival and urban inclusion of the fortress can not be found. It is also important to acknowledge the value of the monument since it is the only one of this type in Romania, and the only example of Renaissance military architecture of Italian type in Romania. (there was another square bastioned fortification built on the Italian system al Alba Iulia, but in the 18th century was part-demolish and included inside the modern Vauban-type fortification of Alba-Iulia- Carolina Fortress).
4 Conclusion:
In order to restore the citadel’s old look, and to bring it to an acceptable shape, it is necessary to bring life inside it. You can’t bring life inside if it is not restored properly. Knowing the past, helps you knowing to restore the present and preserve it for the future. This case in particular is the single one in Romania, so it is necessary to save the monument asap. A quick, fast and professional intervention is required.

This paper explains the building method of Oradea Fortress and why it does belong to the Italian School, and it demonstrates the concept and analyses the reconversion and resquing possibilities of this monument; this act can only be made after a good knowledge of the monument past and the way in which it was built.

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References:


[17] CESARE BRANDI- Teoria Restaurarii
[20] LENDY (Captain) Treatise on Fortification London 1862
[22] VITRUVIUS The Ten Books of Architecture
[23] MACHIAVELLI- Dialogues on the Art of War 1573
[24] The Codex of Francesco Laparelli MS 1566
[26] FRANCESCO DI GIORGIO Trattati di Architettura, Ingegneria e Arte Militare
[27] LANTERI GIACOMO Due dialoghi Venice 1557
[28] CORNEWYLE ROBERT The Maner of Fortification Of Cities, Townes, Castelles and other Places MS 1559
[29] MAGGI GIORLAMO & CASTRIOTTO JACOMO Della fortificatione della citta Venice 1564
[30] LUPICINI ANTONIO Architettura Militare...Florence 1582
[31] RUSCELLI GIORLAMO Perecetti della militia moderna tanto per mare quanto per terra Venice 1583
[32] BUSCA GABRIELLE Della espugnatione et difesa della fortezze Turin 1585
[33] IVIE PAUL. The practise of Fortification London 1589
[34] DE MAECHI FRANCESCO Architettura Militare die Capitano F de M...Brescia 1599
[35] STEVIN SIMON- Of Besieging Towns and Fortresses 1608-1615
[36] SARDI PIETRO Corona imperiale dell’architettura militare Venice 1618
[37] FLORIANI PEITRO PAOLO Difesa et offesa delle piazzee macerata 1638
[38] VAUBAN SEBATIEN- Manuel of Siege and Fortification
[39] SAXE MAURICE (Field MARSHAL)- Reveries or, memoirs concerning the art of war by Maurice Count de Saxe Marshal-General of the armies of France 1776, French-Edinburgh
[40] PASLEY C.W. A course of elementary Fortification, including rules, deducted from experiment for determining the strength of revetments; treated on the principle of peculiar perspicuity 1851 London
[41] YULE HENRY (LIEUT) Fortification for Officers of the Army and students of Military History, London 1851.
[42] DUEKER ALBRECHT- Etliche underricht zu befestigung der stett schloss und Flecken Nurenberg 1527
[43] COEHORN MENNO VAN- Nieuwe Vestingbouw op een natte of lage Horisont Welke op driedieleij manieren getoont word in ’t Fortificeren der binnengrote van der Fransche Royale seshoek. London 1705