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# FORTIFICATIONS, DEFENCE SYSTEMS, STRUCTURES AND FEATURES IN THE PAST

## FORTIFIKACIJE, OBRAMBENI SUSTAVI I STRUKTURE U PROŠLOSTI



Zagreb, 2019.

# FORTIFICATIONS, DEFENCE SYSTEMS, STRUCTURES AND FEATURES IN THE PAST

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## FOREWORD

This edition brings the conference papers from the 4<sup>th</sup> International Conference on Mediaeval Archaeology organised by the Institute of Archaeology in Zagreb in 2017. It is a result of efforts of the medievalists of the Institute of Archaeology to establish continued international gathering of the academic community in Zagreb in order to discuss current archaeological topics on mediaeval archeology. Each year the topic of the conference covers the specific issues of mediaeval archeology, and the conference proceedings are published in the edition *Zbornik Instituta za arheologiju / Serta Instituti Archaeologici* (ZIA). Proceedings of the 1<sup>st</sup> Conference *Groblja i pogrebni običaji u srednjem i ranom novom vijeku na prostoru sjeverne Hrvatske (Cemeteries and funeral customs in mediaeval and early modern period in the northern Croatia)*, held in 2014, have been published in ZIA, Vol. 4 in 2016. Proceedings of the 2<sup>nd</sup> Conference *Srednjovjekovna naselja u svjetlu arheoloških izvora (Mediaeval settlements in the light of archaeological sources)*, held in 2015, have been published in ZIA, Vol. 6 in 2017, and Proceedings of the 3<sup>rd</sup> Conference *Sacralization of Landscapes and sacred places*, held in 2017, have been published in ZIA, Vol. 10 in 2018.

The 4<sup>th</sup> International Scientific Conference on Mediaeval Archaeology **Fortifications, defence systems, structures and features in the past**, organized by the **Institute of Archaeology** in cooperation with **the Croatian Institute of History**, took place from the 7<sup>th</sup> till the 9<sup>th</sup> of June 2017 in Zagreb. Our wish was to encourage the researchers to present, through this topic, their knowledge on technical solutions of certain defensive elements of different fortifications, different manifestations and changes in the organization of defensive structures and systems over time, with regard to the causes of those changes and identification of possible patterns of defence systems, structures and features in a certain area, region or in a certain archaeological or historical period.

Although based on knowledge yielded mostly by the archaeological research, the topics of the Conference exceeded the basic framework of the archaeological discipline, and the it has been conceived as a multidisciplinary encounter of different ideas, approaches, methods, results and interpretations. Furthermore, the topics of the Conference have been open to wider archaeological and historical periods, not only the Middle Ages. We were interested in how different developmental processes took place before the Middle Ages (Prehistory, Roman Period), which inevitably affected the human life in the Middle Ages, and how different phenomena of the Mediaeval Time influenced the human life in the Modern Period as well.

The Conference has gathered large number of experts and professionals from different countries, who have presented their research, discussed the topic and exchanged their knowledge. As many as 107 participants took part in the conference, coming from Croatia, Hungary, Czech Republic, Italy, Slovenia, Serbia, Romania, Bosnia and Herzegovina, Poland, Russia, Slovakia, Turkey, Denmark, Germany, Macedonia and Austria. All in all, they contributed a total of 74 presentations by lectures and 14 posters. Within the Conference programme museum exhibition *Mediaeval Fortification Architecture* by the authors Ratko Ivanušec and Zorislav Horvat was opened at the Archaeological Museum in Zagreb, while at the Croatian Institute of History the photo-exhibition by Darko Antolković entitled *Encounters with Fortifications* has been presented. Conference participants have jointly visited the permanent exhibition of the Zagreb City Museum, and an expert excursion to Medvedgrad Castle has also been organized.

Since the aim of the scientific conference was to perceive the given topic in an interdisciplinary and multidisciplinary manner, we are pleased that in this book, besides the papers dealing with mediaeval fortifications, we have the opportunity to publish papers that study the defence systems in the preceding and following periods (Prehistory, Antiquity, Modern Period) and that archaeological studies are complemented by the studies of historians, art historians and architects as well.

Here we publish 37 reviewed presentations which were adapted into papers by their authors. By publishing the Proceedings in English, we have tried to provide to the authors the widest visibility in the international scientific community.

I would like to thank once again all the participants of the Conference for excellent cooperation, as well as to the institutions and individuals that helped make it a great success. I also thank the colleagues from the Institute of Archaeology for their help in the organization of the conference and the publication of these proceedings. We are also grateful to the Croatian Institute of History for their support in the organization of the Conference, as well as to the Archaeological Museum in Zagreb and the Zagreb City Museum for the accompanying programmes of the Conference. Acknowledgements go also to the reviewers and the members of the Editorial board of the volume. The publication of the proceedings would not be possible without the financial support of the Croatian Ministry of Science and Education.

We sincerely hope that the conference papers gathered in this publication are going to inspire archaeologists and colleagues from various scientific disciplines in their further research of the fortifications and different defence systems, structures and features dating from the Middle Ages as well as from other archaeological and historical periods.

Tatjana Tkalčec



## THE LONG TERM – THE EXAMPLE OF DALMATIAN VENETIAN FORTRESSES

*The article deals with the fact that some fortifications retain their function for many centuries. The question is how this role could be kept despite the incredible development of weapons in that long period. Obviously certain positions permanently remained of strategic interest, and fortification engineering strived to make them defensively effective by adaptation of the standard forms. Author analyses this phenomenon on Dalmatian fortresses of Knin and Klis, which were governed by the Venetian Republic for a significant part of their history. After the withdrawal of the Turks in the Morean war the fortress of Knin was modernised, thus becoming a first-range Venetian fortress. In addition to the adapted bastion structures, in these Venetian fortresses elements inherited from the Middle Ages (falsabragha/faussebraye, tenaglia/tenaille) can be found, now used in modern and original ways. Apart from the two elevated fortresses (Knin, Klis), there is the example of Drniš, where on the local plateau a bastion belt was erected in addition to an existing older fortress. Finally, the case of the detached fort of S. Giovanni in Šibenik is mentioned, as an example of difficulties in controlling an unfavourably configured site.*

*Key words: Venetian Republic, Middle Ages, bastion fortification, Knin, Klis, Šibenik, Jančić*

In this paper we will focus on Dalmatian fortresses in the period of Venetian rule, particularly during the modern age, i.e. in the 17<sup>th</sup> and 18<sup>th</sup> centuries.<sup>1</sup> During the earlier period most of these fortresses were controlled by the Turks, so that after their liberation Venice faced the need and the problem of their upgrading and modernisation. As they were located in the particularly sensitive hinterland area, their position and future destiny were considered insecure. We are referring to the period during which the last three Venetian-Turkish wars occurred: the War of Candia (1645–1669), the Morean (1684–1699) and the Second Morean War (1714–1718).

We might start with the interesting question as to how certain positions could retain their defensive function over many centuries, despite the incredible development of attack technology, i.e. weaponry, over that period. The best example is the Klis (Clissa) fortress, which is believed to originate at least from the 9<sup>th</sup> century, and preserved some kind of military role until World War II. Similarly, there is the Knin fortress, whose millennial duration also began in the early Middle Ages. Both fortresses might have assumed their fortification role even in Roman times.

In the course of such a long period of time, which included the transition from cold weapons to firearms, the fortresses obviously had to undergo appropriate building adjustments. It has to be concluded that the locations of these forts – in terms of their ability to control a certain strategically important position – were a persistent reason for their being constantly maintained throughout all those centuries. In the example of Klis, this position is a passage between the Dalmatian hinterland and the Salona area, still crossed by some important roads today (Fig. 1), while Knin is located on the banks of the Krka river and in the vicinity of the former Triplex Confinium, where the borders of the Venetian, Habsburg and Ottoman states used to meet.<sup>2</sup>

1 This work has been fully supported by Croatian Science Foundation under the project IP-2016-06-5776.

2 As a curiosity, let us mention the note by Maximilian de Traux, a military engineer in Austrian service, who wrote in 1805 that Knin controlled the most important position in Dalmatia: M. de Traux, *Festungen Dalmatiens und Albaniens nebst vorliegenden Inseln, und Beschreibung*, manuscript, National Library of Serbia, Belgrade, 28.

It should be noted that in certain periods both fortresses were estimated as ready for abandonment or demolition, the possibility of their modernisation and further purpose not being evident. After the first conquest of Knin in 1648, the Venetian proveditore generale Foscolo thought that it should be abandoned because Venice would not be able to maintain and supply a fortress so far away from the sea. Schulenburg, the commander in chief of the Venetian army in the 18<sup>th</sup> century, shared this opinion.<sup>3</sup> And as far as Klis was concerned, there was a disagreement about whether the fortification should be maintained and perhaps even strengthened. At the time of its conquest, also during the War of Candia, the Venetians could not have been sure that Klis would stay permanently liberated from the Turkish rule. Foscolo wanted to keep and renew it, and thus significant interventions were made by engineer Magli.<sup>4</sup> There were opinions that the fortress would not be able to respond to its task in new circumstances, which is why it was to be demolished and abandoned (Novak 1972: 112, 113; 1977: 25; Piplović 1994–1995: 70). In addition, there was the idea of pulling down the lower zones (enclosures), and keeping only the top position (Novak 1972: 136).<sup>5</sup> But of course the final decision belonged to the Senate, which, led by its strategic considerations, continued constructing and modernising those fortresses.

It was mentioned that special attention would be paid to the Venetian period, during which interventions from the repertoire of bastion fortification were carried out. As the fortresses existed for centuries earlier, Venice was adding to the existing medieval or Turkish structures. It is precisely this relationship that is instructive, because it will be shown that in these places the bastion and the medieval types of defence had many common features.



Fig. 1 Klis (Clissa) (photo by: A. Žmegač)

In Klis, and Knin as well, one can notice that the most precious position on top of the hill or the ridge was used, previously occupied by medieval buildings and towers. Now they were removed and replaced by cannon positions. This means that the highest point that dominated the area was still the most desirable defence position. The position was the same, but the defence method involved a major difference: in the Middle Ages it was vertical defence, a defence against the enemy located at the base of the wall. Even in the modern age this kind of defence was employed if the attacker managed to penetrate into the lower zones of the fortress, although remote cannon defence was primarily used. Of course, as the same arms were or could be used by the enemy,<sup>6</sup> an important part of attack or defence was conducted with heavy

3 Croatian State Archives, Zagreb, Cartographic collection, K VII i 3, 11r.

4 Archivio di Stato di Venezia (from now on: ASVe), Senato, Dispacci, Rettori, Dalmazia, 53.

5 For example, engineer Benaglio proposes demolition, with the exception of the "ultima ritirata"; Biblioteca del Museo Correr, Venice (from now on: BMCVe), Morosini-Grimani, ms. 540/VI (21. X. 1654).

6 Caused by poor planning or organisation, the Turkish army often lacked heavy cannons and thus returned without seizing an adversary fortress.

weaponry at a distance.

At the time of bastion construction the aim was to achieve a proper defence belt, with appropriate angles, calculated bastion sizes and their distances, but at elevated fortifications like Klis and Knin such ideas had to be completely abandoned and adapted to the available space and configuration of the terrain. In Klis particularly there is a lack of space in the top zone, so that smaller buildings of an adjusted shape were constructed (Fig. 2). Of course, they generally belonged to the bastion-building conception, but as they did not have the form of a proper bastion, Venetian sources called them “posto”, positions for accommodating cannons. There was no additional space in the peak zone, so that the fortresses could have been enlarged only at the lower levels. It was possible to have some kind of cannon position there, but these zones were primarily used to accommodate auxiliary buildings, as well as additional defended gates in order to make the attackers’ progress more difficult. These lower levels, “terraces”, were often underbuilt and then filled up with earth to create a desired horizontal surface;<sup>7</sup> this is a distinctive solution in comparison with the Middle Ages, since it was previously not common to expand space in such an artificial way. However, it is the extension of the access road, its curvy course and the addition of gates that fully correspond to the earlier medieval defence measures.

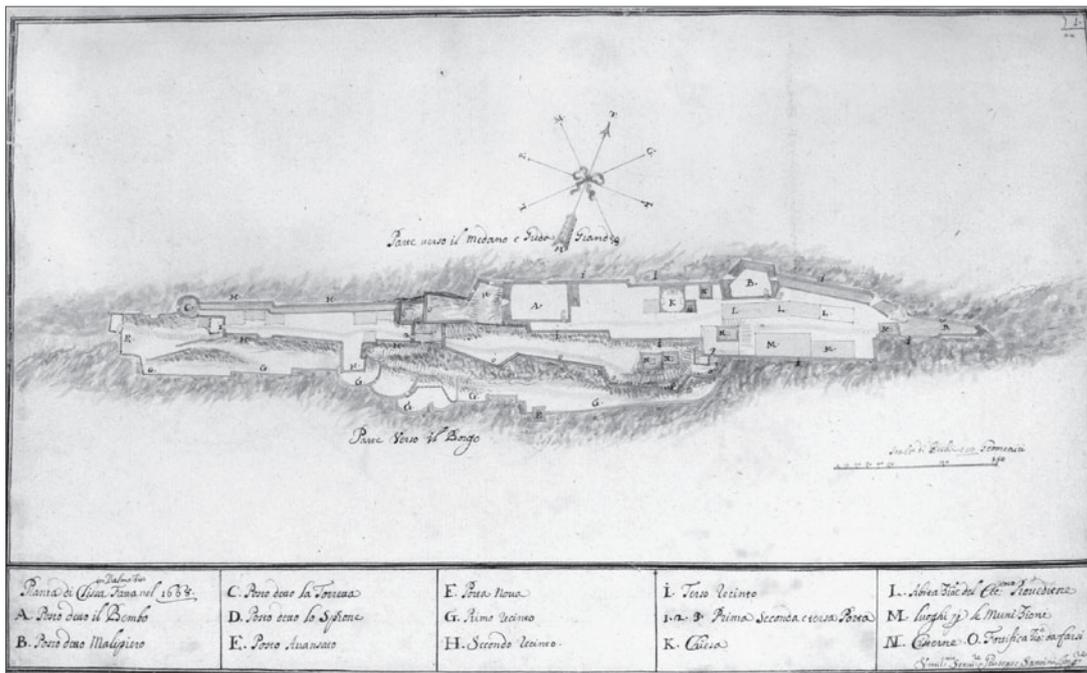


Fig. 2 G. Santini, Klis, 1668 (City Museum, Split)

Further interesting relations between bastion and medieval structures can be seen in Knin. At the time of its final liberation (1688), there was a project of a broad bastioned enclosure which would include the settlement at the foot of the hill.<sup>8</sup> It had been planned as quite a regular fortification with large bastions, but it remained just a project. However, it was decided to reinforce the older fortress at the Spas hill. This was confirmed by an anonymous description from 1708, which stated what had been done until then, but it still remained “d’antica struttura” and “molto debole e difettosa”.<sup>9</sup> After that engineer Jančić visited Knin and prepared a modernisation project for the fortress. It is certain that the Venetian Senate was acquainted with this project in 1710, when Knin was considered one of the most important Venetian fortresses.<sup>10</sup> This information is particularly valuable because it testifies that an originally medieval hilltop fortification could gain such, obviously strategic, significance through bastion adaptation. Jančić’s description of Knin<sup>11</sup> is exhaustive, proving how thoroughly the engineer analysed the relief of the hill and the existing constructions in order to identify the sites that required intervention. As space was limited on the Knin fortress as well, he described the existing structures as “ristretto”, “breve” or “angusto”,<sup>12</sup> indicating that there was not enough room for optimal bastion fortifications.

7 This is well depicted by the Eraut cross section of Klis (1682): Biblioteca Nazionale Marciana, Venice (from now on: BNMVe), ms. it. IV 28 (5093), 51r.

8 BNMVe, ms. it. VII 94 (10051), 10; the author was engineer O. Alberghetti.

9 Of an ancient structure; very weak and faulty; Österreichisches Staatsarchiv – Kriegsarchiv, Vienna, Cartographic collection (from now on: KA), K VII i 2F.

10 ASVe, Senato, Deliberazioni, Rettori. Rettori, Filze, 165.

11 Fondazione Querini Stampalia, Venice, ms. 154; the same text in BMCVe, Donà dalle Rose, ms. 475, I.

12 Narrow, short.



Fig. 3 Knin, Jančić's bastion belt (photo by: A. Žmegač)

Jančić suggested interventions primarily on two sites: at a point where ascent was possible, and on the castle at the northern end of the fortress. In the first case he designed a restricted bastion belt, where he introduced the so-called *falsabraghe*, or outer ramparts (Fig. 3). These low walls formed an additional protection and obstruct the attackers' access to the main rampart. Interestingly, Jančić's description shows that he had already found *falsabraghe* in some places in Knin, which reminds us that they were in fact an older fortification solution. They existed in a similar form in the Middle Ages, but here they were used in the context of the new structure. *Falsabraghe* were widely applied in bastion construction, and in other Jančić's works as well, but they were usually used as part of lowland fortifications; here he presented an interesting solution by using them on steep ground.

Looking at the ground plan of Jančić's new arrangement, it can be noticed that the *falsabraghe* are not following a straight, but a broken line. Basically, this is the principle of the so-called *tenaglia* (pliers), a solution

to confront the enemy with two symmetrical wings designed to enclose the attackers. There are different forms in which the *tenaglia* appears in modern age: in a simple shape like this, or as a typical *tenaglia* made up of two semibastions and a short curtain wall. But the *tenaglia* is another motif that originated in the Middle Ages, when the walls in such a sensitive place used to be set at right angles to each other in order to enable attacking the enemy soldiers in front of the walls as efficiently as possible. The *tenaglia*, therefore, appeared in various forms; in the case of Knin it dynamised the otherwise simple additional rampart, the *falsabragha* (Fig. 4). We could argue that the Knin example is a *falsabragha* in form of a *tenaglia*, but in his notes Jančić does quite the opposite and calls it a *tenaglia* in the form of a *falsabragha*.<sup>13</sup>

In any case, the new defensive belt, now with two bastions and two *falsabraghe*, meant a significant modernisation of the defence in that section. This can be confirmed in engineer Rossini's report from 1755, where he refers to it as "quel moderno recinto".<sup>14</sup>

The importance of the two medieval, now modernised and bastioned, fortifications can be discerned from Schulenburg's records on the defence of Dalmatia. Discussing Central Dalmatia, he concluded that there were only two directions for the enemy to enter the area<sup>15</sup> and reach the coastal towns: one was the Knin-Drniš-Šibenik route and the other the direction Sinj-Klis-Split. Because of such strategic considerations the Senate eventually came to the conclusion that it was not just important to maintain these fortresses, but to strengthen them considerably as well.

Attention should also be drawn to Drniš. This borough between Šibenik and Knin had its older fortification, and acquired a new one after it was seized by Venice on the eve of the Morean War. But the Venetian Republic focused on Knin, while the Drniš fortress remained modest in size and significance. Still, its interest lies in the relation of the bastion structure to the older nucleus. At the end of the plateau above the river Čikola there was a medieval-Turkish fortification with a dominant cylindrical tower and a set of auxiliary buildings around it. On the access side a belt consisting of a central bastion and two semibastions was concentrically added to the older complex. This belt crossed and defended the entire plateau and significantly increased the fortress space (Fig. 5). Unlike the cases of Klis and Knin, where medieval structures almost totally disappeared and were replaced by modern ones, here the old fort was retained and, in fact, became the core of the

13 "Tenaglie in forma di false braghe"; this is an explanation in the corresponding ground plan: BMCVe, XLIVb 504.

14 That modern enclosure; KA, Inl. C III Knin 1, 10v.

15 Schulenburg, of course, was referring to a huge Turkish army that would prepare for the siege of the towns, and therefore would carry cannons.



Fig. 4 Knin, bastion Pisani and falsabragha (photo by: A. Žmegač)

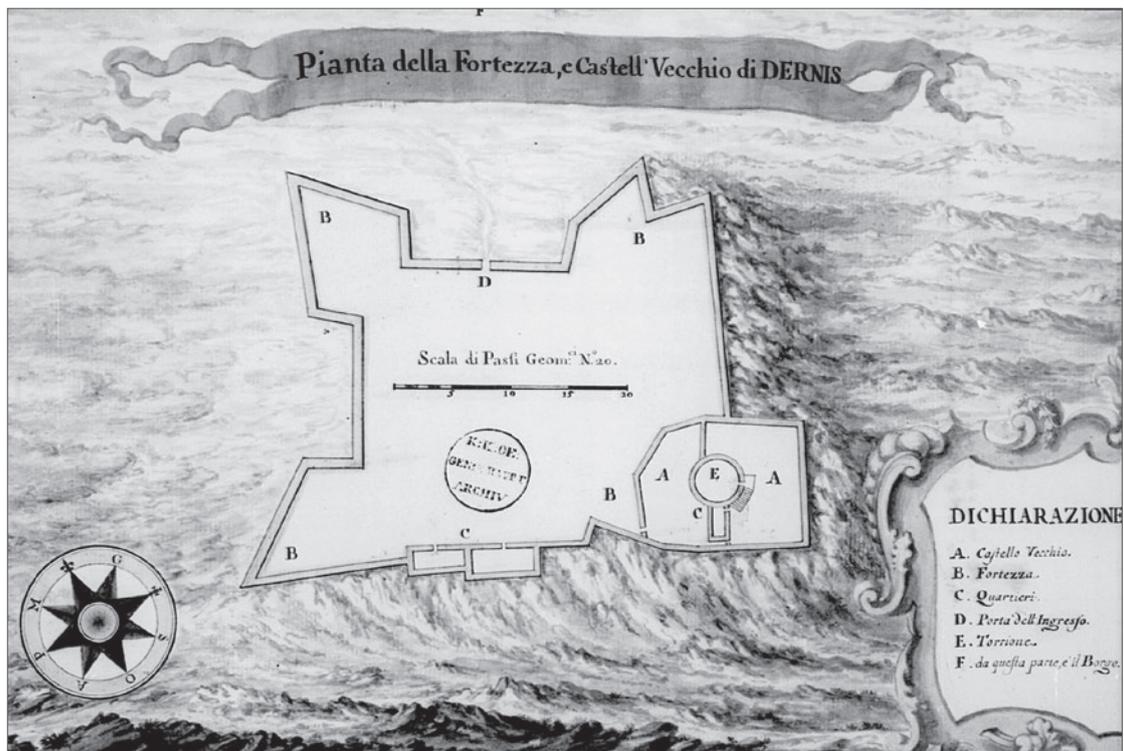


Fig. 5 G. Juster, Drniš, 1708 (Kriegsarchiv, Vienna)

new fortress. This is probably due to the fact that the location was a plateau, so the old fort did not occupy a particularly prominent position; otherwise it would surely have been replaced by some kind of bastion structure. In the Drniš case the defence was largely taken over by the new bastion belt, while the older core seems to have had some kind of auxiliary function in the fortress. Some of the historic records show that this core was neglected (Tosato 2014: 155),<sup>16</sup> but had not been demolished, and its buildings, even the tower, could still be used.

The recently undertaken excavations in the Drniš fortress have brought to light elements of the bastion belt; before that there were no traces of this structure above the earth. Archaeological research has also been carried out in recent years in the Šibenik (Sebenico) fort of S. Giovanni. This is a detached fort erected on the hill above the city, as it was noticed already in the 16<sup>th</sup> century that enemies could easily attack the city from that position (Fig. 6). The fort was finally erected at the beginning of the War of Candia in 1646. It is perhaps the most complex fortification in this area, as it had undergone several development stages in a very short period of time and was frequently expanded. It was modified and added to with such speed because of the immediate Turkish danger, which actually led to two sieges. Those fateful sieges took place in the first two years of the fort's existence, in 1646 and 1647. Numerous historical sources, both written and visual, exist about the fort at that time, but precisely because of their multitude, and because they recorded different facts regarding the state of the fort, their credibility was questionable. In other words, it could not be definitely established whether the elements recorded there had been really built, or whether they were just descriptions of proposed actions or even unreliable drawings with much arbitrary content. But eventually it was verified that all the sources were unusually credible, recording the frequent changes on the fort, some of which were later substantiated by archaeological research. For example, the existence of the first core according to Leni's project from 1646<sup>17</sup> was clearly confirmed by the disclosure of the tip of its northern semibastion.



Fig. 6 Šibenik with the hill of S. Giovanni (right) (photo by: A. Žmegač)

Thus the small original core existed, erected in just 58 days, and the works continued. There were also the repairs after the heavy siege of 1647, traces of which are still visible today, as well as the mentioned additions and the expansion of the fort. The works lasted until the 1660s. Bearing in mind the dramatic nature of the events at the time, which gave the inhabitants of Šibenik little time to carry out defensive measures and interventions, and the current technology of construction, this endeavour has to be considered an impressive feat.

The greatest difficulty in securing the elevation of S. Giovanni was presented by its unfavourable shape. It was not sufficient to occupy the location overlooking the town, because the plateau continued to the north, and a view opened over the northern valley only from its other end. This was recorded in current documents at the time, but was also substantiated by authors such as Divnić and Del Campo (Difnik 1986: 99; Bertoša 2003: 62). Not securing the northern end of the plateau would have meant no control over the valley, where the enemy could find shelter, just like behind the numerous rocks in the area, mentioned in historic sources and still visible today. This is why almost immediately a small fort was built at the northern end of the plateau and connected to the described core. It included a *tenaglia* facing the enemy at its end, which

16 For example, Binard's / Juster's drawing shows the roofless and ruinous tower. On the Treviso survey from 1756 there is the ruinous old fort, but the bastion belt is already marked by the same condition.

17 ASVe, Senato, Dispacci, Rettori, Dalmazia, 51, inset to the report of 29. X. 1646.

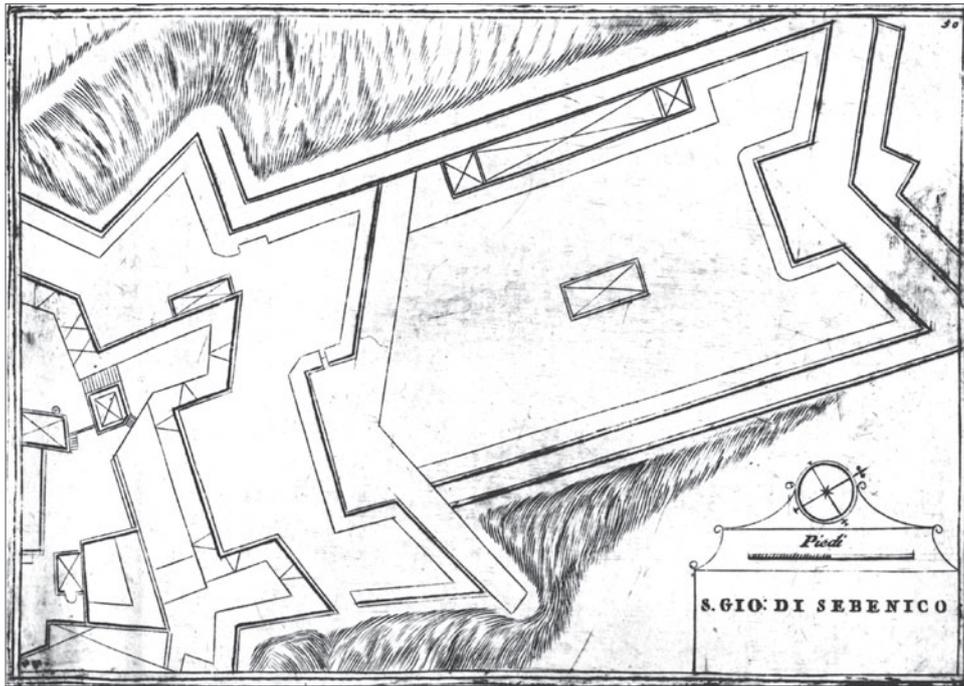


Fig. 7 V. M. Coronelli, S. Giovanni in Šibenik, print, 1688

has been preserved to the present day. It is precisely because of that long and characteristic body that the whole fort got to be popularly known as Tanaja.<sup>18</sup>

Difficulties, therefore, resulted from the vast space, both poorly controllable and rocky. Basically, there was no need for extensive construction projects, as this was an additional and separate fortification, detached from the town; there was neither much time nor sufficient other necessary resources. Such complex situations in which it is difficult to reconcile contrary demands, but action has to be taken and decisions reached, were quite common during the erection of fortifications. Let us mention an analogous case in this regard. The capital of Morea (Peloponnese) at the time of the Venetian Republic, Napoli di Romania, also had its own fortifications, but was threatened from the Palamida hill high above the town. For years between the first and second Morean Wars, Venice had been hesitant about the construction of a fort on that site, as it was considered that the mildly rounded and spacious elevation was almost impossible to secure. But since it was clear that this position was a threat to the city and that the attackers – both Turks and Venetians – had been using it to conquer the town, finally the construction started. The project was prepared by Jančić, who had previously, as mentioned, worked in Knin. His solution was to erect a detached fortress composed of separate bodies that controlled and supported each other. This represented a certain rationalisation intended to solve the problem posed by that vast and unfavourably configured space and put it under control. Therefore, both Palamida and the Šibenik fort S. Giovanni are good examples to demonstrate what kind of difficulties arose when there was too much space to be controlled on elevated positions, as opposed to Klis or Knin, in whose upper parts space was deficient.

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<sup>18</sup> As can be seen from the historic ground plans, among which the most famous is the one by Coronelli (Fig. 7), at a certain period of time the fort contained three tenaglie, one in front of the other, all facing the side where the enemy was expected.

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