

Defensive Modernization & Evolution of the Forms in the Urban Structures of Tehran (Naser al-Din Shah Era)

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Abstract

The Naserid era changes in Tehran are visible both within the architecture and in the urban aspects, this includes basic developments and evolutions. Modernity and modernization are turning points for a radical revision of the design of the city. After the nineteenth century, and because of the desire of the Nasir al-Din Shah to leave the magnificent modern city (Dar al-Khalafah Naseri), most of the changes are similar to those of the French city. And most innovations happened in Naserid Tehran as the Construction of Tūpkhāneh square, creating new streets, building a defense wall, and employing Austrian and French teachers, which are developments related to this order. With the inspiration of European teachers and planners in designing the city, the style of Vauban architecture was influenced by local and indigenous styles. Modernism has a lot of influences on local styles. By comparing the effects of the new style in Tehran and beyond its boundaries, one can consider the effects of the styles and patterns of the native architecture of the occupied territories. This paper aims to study the adaptive pattern of city development; squares, streets, and other important urban changes inside the borders of Tehran, and to understand the effects of non-local on national landscape influences on the morphological features of the city of Tehran.

Keywords

Modernization and Urban Changes, Naser al-Din Shah, Vauban Style, Defense Wall, Dār al-Funūn Deeds.

Introduction

During the thirteenth century and the governance of the Qajar dynasty, modern structural changes would be observed in Tehran. Thirteen-century Tehran coincided with the apex of nineteenth-century evolutions and the European industrial revolution. Naserid¹ era interferences in Tehran stem its pattern from the physical and spatial changes created in 19th century European cities (Pakzad, 2014). The presence of French and Austrian delegations in the instructor team of the country and attendance of advocates/fans of modernity and European improvement inside or outside the court had created an appropriate vehicle for discussing how to apply the above changes, Changes which could give the Iranian cities a new and modern insight. In the second half of the 1860s, not only changes in Tehran increased but also the rate of foreign influence in different strata of the society and different walks of life would become tangible.

The formation of a centralized Qajar government in 1786 coincided with a new epoch of global history; an epoch that started with the French revolutions of 1789. Old capitalist revolutions find and conquer their genuine place i.e. the city. The formation of Qajar coincided with an era that caused all social, cultural, political, and the old texture of European manufacturing to collapse and form a new world order (Habibi, 1994). In Habibi's interpretation of Modernity, it is a case and theorem which happened in Europe, but as soon as a social current occurs, this current no longer remains in its land and expands to other lands (Habibi, 2020).

In confirming the role that the city played in epitomizing *modernity*, one could rely on de Certeau's theory that *The city is both the main origin of modernity and its champion as well*. Taking advantage of the above approach, an investigation of this epiphany and its presence in the physical appearance of Tehran shall be presented below (de Certeau, 1984).

This survey aims to investigate the changes developed in Tehran under the impact of modernity by the order of Naser al-Din Shah. Noting the development and expansion of *modernity* in Europe of this era, Naser al-Din Shah's focus on European communities led to Iranians' familiarity with the culture and civilization of the West, i.e. the west is mostly the source of inspiration for following and taking patterns for changes. From the second half of the nineteenth century, hundreds of Europeans rushed to Iran in the form of politicians, consultants, orientalist, merchants, religious missionaries, military Attaches, diplomats, tourists, expeditions, researchers, and expatriates.

1. Factors Creating Evolution in Naserid Metropolis

Agency of Naser al-Din Shah at the Apex of Qajar Government

The experience of the formation of a contemporary city in Iran started from the Naseri period (1230-1240 AH). In Tehran and Tabriz, the first models can be found with the expansion of the gates of Tehran and the removal of ditches, and then the gradual appearance of new institutions and civilizational institutions, the appearance of the urban square, the emergence of buildings with new materials and technologies, and many other developments. Until the early years of Reza Shah Pahlavi's era, we are witnessing a new kind of urban planning with a combination of our previous historical experiences, according to Habibi, Tūpkhāneh Square is a combination of Isfahan Naghsh Jahan Square and new achievements of urban Modernism (Fazeli, 2021).

The evolution of Tehran by the order of Naser al-Din Shah has been the turning point and official commencement of the evolution of *modernity* in Iran. The era of entering *modernity* could be counted to begin in 1858. The genuine change which occurred in the above-mentioned design has been the effect of a decision taken by Naser al-Din Shah to ruin the old walls surrounding the city to create more space for the new design. From the time of trench digging and the clay wall around Tehran by the order of Shah Tahmaseb in the mid-tenth century until its destruction at the beginning of the Pahlavi dynasty, this step was a salient action influencing the development of the Tehran metropolis (Curzon, 1983).

¹ The period of Naser al-Din Shah Qajar empire who was the first Modern Persian monarch who formally visited Europe.

The influence of this step-in old localities of Tehran was actually the appearance of a modern city along with a distinguished/elite social-political group and the creation of an eye-catching economic base.

His Majesty granted the agency of the affair to his excellency Mostofi ol-mamalek Mirza Eesa the Vizier of Dar al-Khalafah. On Sunday eleventh of Shaban, the task was ordered to be commenced and his majesty shah of shahs took a silver pic in his auspicious hands and due to the blessings attached to it picked a small hole in the land and his highness the regent and the hire kingship followed suit and later on the workers started digging the trench. The circumference of the city would approximately increase to three miles and a half. Along the trench, twelve gates are supposed to be erected. From this day on Tehran became known as *Naserid Dar al-Khalafah* (Etemad al-Saltaneh & Hassan ebn-Ali, 1985).

Abdollah Mostowfi writes; *Moshirodoleh's intention of taking the Shah to Farang is Shah's familiarization with material and spiritual progressions in Europe developed due to the influence of legislative governments in the countries therein. So that the shah could actually observe these things himself and others could not make him regretful of the tasks he had decided to carry out, perceives the trend of progression and the style of governance in foreign countries, and learns how they administer their countries. So, when he returns back to Iran, the shah emphasizes the salience of the affairs useful for the virtue and good of the commoners.*

In order to secure the metropolis, a military camp was established outside Tehran's government gate. In this command, Shah would expound to his soldiers the care to be taken for the welfare of soldiers and officers based on last year's progressions as a result of his foreign trip to Europe for the betterment of new and progressive military forces such as arms and ammunition, trainer, etc. (Mostofi, 1965).

2. Agency of Dār al-Funūn' Experts in Shaping Urban Development

The first civil development was started by Amir Kabir, in the first days of Nasser al-Din-shah's kingship. Amir Kabir's steps and reforms to modernize Iran would start with the establishment of *Dār al-Funūn* in 1852 in which European crafts were to be taught, which became the origin of salient intellectual developments in Iran. In fact, the school could be explained as a vehicle for the expansion of European science in the second half of the nineteenth-century CE in Iran.

Amir Kabir traveled to Russia on two official trips and stayed there for several months each time. He already visited arms manufacturing factories, observatories, educational, and scientific centers of Moscow, Petersburg, and Tbilisi. In addition, he spent four years as head of the Iranian delegation to *Erzurum* in Ottoman Empire when Ottoman Emperor was busy implementing the first modernity reforms. Amir would also study European resources and was somehow updated in terms of European information. He would order the administration to subscribe to foreign press from England, France, Russia, Austria Ottoman, and India (Adamyat, 1976).

Polak as the influential person in Dār al-Funūn, on the competence of Amir Kabir, said: When in 1850 the prime minister, Mirza Taqi Khan Atabak known as Amir Nezam decided to open a military school based on European specimen in Tehran, without past bitter experiences and publics' intense hatred for foreign influence, he was quite sure that he wouldn't achieve his goal without gaining the assistance of European Educational forces (Pollack, 1990).

3. Design and Supervision of Urban Development of Tehran

Dar al-Funun college was established in 1231 (1852) to train army and public service personnel. Teachers at this college were generally recruited from France to counter Russian and British influence. The flagship of the Qajar reforms was Dar al-Funun. With the training of this institution teachers and their books; Iranians started a new vision of their past as well as the history of the world mainly from the perspective of Westerners (Abrahamian, 2008).

This college in this time period played an important role in the production and transfer of knowledge required by the government and also the rationalization of governmental procedures. It must be noted that *Dār al-Funūn* instructors have played a major role in designing the development map of Tehran. In architecture, engineering, and urban planning, there were instructors such as Křziř, Polak, and engineers like Gastiger and Buhler who were at the service of the court and there were others who were affiliates of the European East-India Company. They all had essential roles in the introduction and attraction of innovators (Dowlat Ellieh Iran, 1909).

Alexander Buhler, an engineering officer educated at Paris Poly Technique came to Iran in 1846. He would instruct engineering and construction of fortifications. He had been gradually known to shah and administrators as a competent engineer. Finally, the design of military towers and castles was assigned to him. The establishment of *Dār al-Funūn* and the deployment of European training forces caused to cover the weaknesses and shortcomings against other world states.

Methodology

Some factors influencing the evolutions in the *Naserid era* will be presented. New educational methods of *Dār al-Funūn* will be explicated to get to the thoughts of designers and experts in this field. The method followed by designers is the European city's pattern known as the *Vauban Style*. Since our subject matter revolves around the effect of the defense requirements of modernism on the evolution of Tehran during the *Naserid era*, hereby the urban components taking shape following these developments will be presented. After familiarization with the above-mentioned elements, similar specimens of this design model in Europe are herewith explicated. Final relative investigation and analysis of research findings shall be compared and complied with as far as possible.

The style of the survey shall be carried out upon a theoretical approach in terms of research methodology and possesses a historical-analytical direction. The study of historical documents and archived photos is the main approach struggling to investigation and interpretation in order to disclose the subject of the research under study; that's why the author chose the analytical form. The information-gathering approach is based on library-research document study while the type of resources referred to are first-hand documents of the reign of Nasser al-Din Shah.

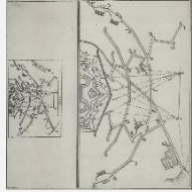
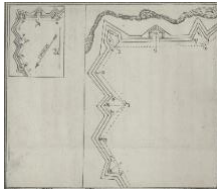
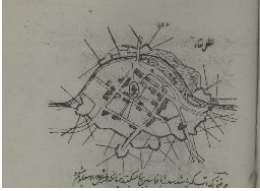
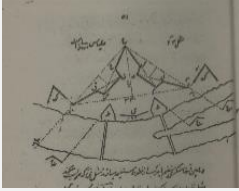
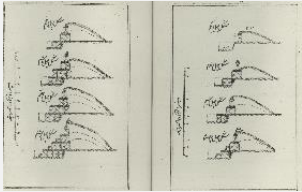
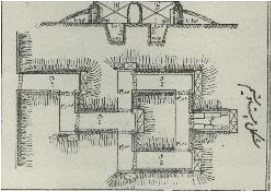
Result and Discussion

Deeds and Documents from *Dār al-Funūn*

Regarding the steps taken for the design of the development of Tehran in the *Naserid era*, plans and documents archived in *Dār al-Funūn* are essential elements, because the instructors of them have been designers of the Tehran development plan. Finding out the thinking backgrounds of instructors could act as a lamp shedding light on the method used as their patterns. By scrutinizing their training courses, it becomes clear that Buhler has played the central role in designing the city plan in his books explicating the method of military design and drafting through *Vauban Style*.

The titles of the books read as follows: Execution of surrounding requirements, the science of seeking refuge and castle construction, and the science of drafting. These above books in French, show that while general Buhler had been aware of *Vauban Principles* in fortification and drawing, he would've used his awareness of the *Vauban system* in instruction (Table 1).

Table 1: Buhler's books on military technology and engineering (Buhler, 1858; 1870; 1876).

		Cartography training
Tunnels and streets to the city's government palace	How to perform Bastion in the city map	
		A Treatise on Building Castles ¹
Bastion and defense agents in the urban fence.	Method of implementing defense equipment around the city belt	
		Deployment of surrounding and its requirements
Digging ditches details and gravel	Digging ditches and executive requirements in the city map	

Vauban's Pragmatic Innovations

Marshal Sébastien Le Prestre de Vauban is one of the individuals who could affect European Art through his great talent. Vauban is a name that comes to mind when there is the speech of seventeenth-century fortifications in Europe. He was one of the creative innovators in the region under Louis the fourteenth. His thoughts affected many aspects of French natural life. During the kingship of Louis, the fourteenth, plans of defense fortifications were prepared and boundaries were indicated as required. These were ideals of the king and his war minister Le Tel-Lier which turned into realization by many architects and engineers under the auspices of Vauban as the most famous of them. In this period the dominance of classic bastion fortifications in the Vauban style could be observed during the kingship of Francoise when the construction of a belt out of trenches and fortresses became necessary (Lepage, 2009).

Summarily, the steps taken by Vauban in urban planning areas and military requirements in the city could be classified as follows. A full explication of these topics is brought in a separate chapter at the end of my thesis².

Belfort

Specifications of Vauban principles in French cities like Belfort are used. A significant city in terms of the effects of the Vauban orders. In 1678, Vauban was set to work improving the town's fortifications, demolishing the old defenses, and extending the town to the river Savoureuse. In the lower part of town, Vauban used his tower bastion design with a detached bastion, or counterguard, in front of it. Neuf-Brisach, just a short drive away, is best known for this design. Unlike some other, more theoretical, designers, Vauban believed that each fort should be adapted to the specific terrain at the location. Here, terracing was useful, but in other, lower fortress sites, he might make use of complex waterworks to create a wet ditch or moat. At Belfort because of the hilly terrain, he made frequent use of traverses to protect against enfilade fire (Table 2).

¹ In the paper *A Treatise on Building Castles* by Alexander Buhler (Paris polytechnic graduated in geography, he studied mathematics and drawing at Dar al-Funun in 1270), the book has been introduced and described by the author.

² Taken from the author's dissertation titled *Investigation of Urban Changes of the City of Tehran in the Naserid period compared with the Principles Developed by Sebastien Le Prestre de Vauban* [dissertation], Heidar, P.; directed by Dr. Hanachi, P., Dr. Haghir, S., & consultation of Dr. Mazaherian, H. (French military engineer in 17th AD, the most enduring aspect of Vauban's legacy was his view of France as a geographical entity).

The citadel was especially strongly protected as it was designed to hold out even if the city fell into the hands of the enemy. The citadel also had the political purpose of helping to control the populace. We will now head to the citadel!

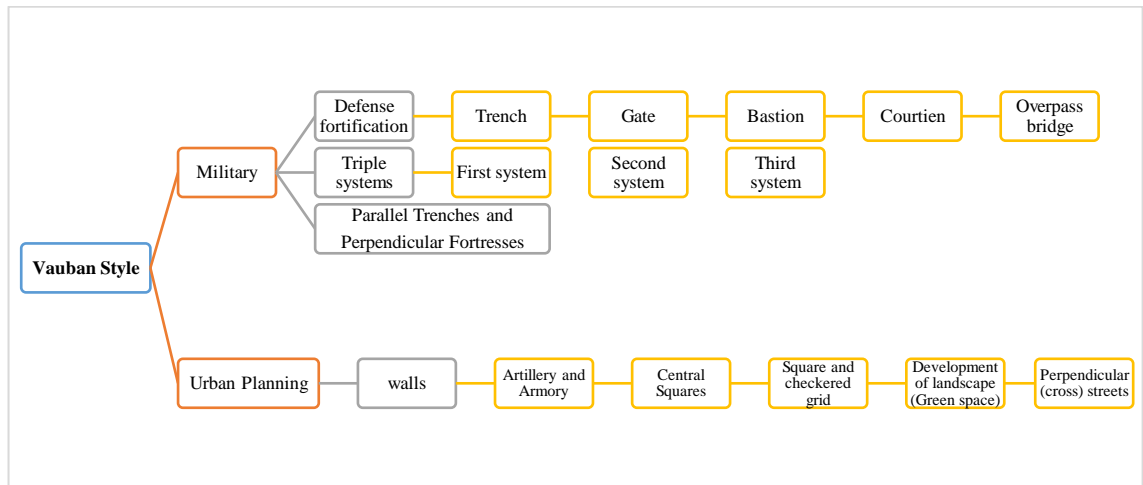


Figure 1: Vauban's proceedings in urbanism and military fields (Categorized by the authors; Griffith, 2006; Lepage, 2009).

Table 2: Renaissance urban developments in city design and fences (Hamill, 2010; <https://en.wikipedia.org/wiki/Belfort>).

<p>The view from a top the citadel where Vauban built a horn work and Haxo made extensive modifications in the 1800s.</p>	<p>This sign shows Vauban's horn work and the later modification.</p>	<p>This is further down the trail at the tip of the horn work.</p>

Renaissance Urban Developments in City Design and Fences

The invention of the ball and the use of ordnance in the destruction of the city of Constantinople by the Ottoman Turks in 1453, is the beginning of a new era in the history of military fences, the idea of creating a horizontal and increasing distance between the city limits and the outer boundary of the fence arose. As a result of this; complicating the extra space of fences, a related set of fortress and wall bulges, huge costs of building new walls, and the imposition of more density on the city (Morris, 1996).

Fences are one of the determining factors of urban form and the formation of existing city fences based on the new provisions of martial engineering was the result of this novel idea like the reconstruction of parts of the city by creating new public spaces and related streets (revitalization), Military strategic requirements such as Palmanova in Italy, Neuf-Brisach as an example of Vauban's work in France (Cours de fortification, Ecole militaire de l'artillerie, 1912).

The fences of the cities that remained from the pre-Renaissance era were re-shaped during the Renaissance according to the new laws of martial engineering. Medieval fencing consisted of one or two ramparts with ditches. From the fifteenth century, various theories were presented in the field of martial engineering. The invention of the ball fundamentally changed the matter. They found out that the destructive force of a bullet was related to the angle at which it hit the target, on this occasion, the fortifications were made very thick and sloping so that the enemy bullets could be bent to cause less damage (Morris, 1996).

In the ideal plans of this period, the central core of the city was often dedicated to urban life and the residence of famous urban people and businessmen. From this center of interaction, alleys had to branch out and connect the city center to other parts of the city and finally to the outskirts of the city (Pakzad, 2010).

Defensive Modernization

As Abrahamian (2008) quotes; in Naserid Tehran, we are witnessing the emergence of defensive modernization. Such effects can be seen in the spatial and physical structure of Tehran. It should be noted that the rate of conformity in which the reproduction of non-native forms is a debate that can be acknowledged that, like other patterns such as Tekyeh Dowlat or Tūpkhāneh square, accepted changes in native transmutation and attempted to symbolize Iranian Modernity and it may be from the point of view of some critics. It has an exhibitiv aspect and criticizes the implementation of its basic concepts (Table 3).

Modernity defines itself with the technological revolution and technology. So, modernity takes a serious look at the technological revolution and the achievements of technology (Habibi, 1994). With this interpretation, we can witness the emergence of modernity in Iran from the Naserid era, the effort to use modern tools, and the advent of technology and its instruments in Iran inspired by Europe; Ammunition, cannons, etc., urban development arising from that fence and defensive streets and barracks and cannon construction and other arrangements.

Table 3: The construction of space and buildings in Tehran Dar al-Khalafah (Categorized by authors; Iran Newspaper, 1877).

City Component	New castle around the city	Angled lines with geometric form
	Twelve new gates	Magnificent and lofty
	New Tūpkhāneh Square	Two floors with six gates
	Sabzeh Square	Around it are two-story shops
	Drill Square	Capacity for Twenty thousand troops during the exercise
	The street and alley that surrounds the citadel like a circle and a belt.	
Defense Element	Atomajor School	The science of geometry and the science of war and related sciences are studied in any type.
	Military clothing warehouse buildings Armory	
	Bastion	
	Military warehouses	
	The place of arsenal rig and ammunition	
	Lengthy streets and alleys	
	Guards and guardhouses	
	Ball warehouse	
	Barracks and artillery	
	Barracks are built around the city	
	City Guards	

What comes to mind on the aim of the construction of these spaces is their military application and defense function (Najafi, 2014). In this interpretation, every application related to military forces and army equipment which assists supply of needs and requirements or realization of their organization as military factors are considered a military application and function. For instance, artillery, armory, drill field, barrack, and artillery warehouse have been considered as the most salient military spaces of the Naserid Dar al-Khalafah each used for the partial supply of military requirements, therefore, all fall under the general title of *Military Spaces* (Figure 2).

Tehran Defense Wall

Walls have a determinant role in urban form. With the construction of new walls, in addition to intra-city evolutions, Naserid Tehran found a new geometric form. Heinrich Karl Brogessh, a famous German researcher, who visited Tehran in 1886, writes: *An order was issued by the Shah for urban development. Old walls and attachments were ruined and in quarter of an hour, ordered military facilities with towers, fortresses, shooting places, and also trenches and relevant bridges were constructed and as it was claimed everything was copied from Paris defense belt. In summary, Tehran old towers gave their place to European style new military fortifications (Brugsch, 1996).*

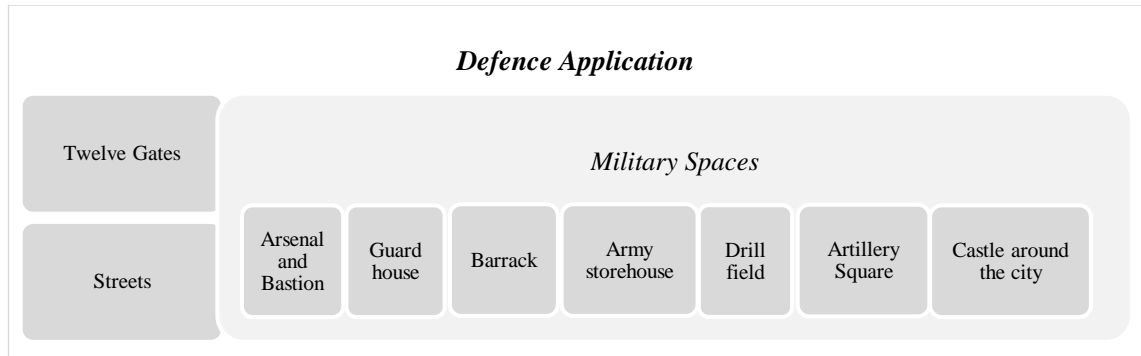


Figure 2: Categories of the city main evolution in Naserid Tehran (by authors; Najmolk, 1892).

Table 4: Renaissance urban developments in city design and fences.

<p>Around the Gomrok gate (Aerial film by Walter Mittelholzer a Swiss aerial photographer who traveled to Iran, 1925)</p>	<p>East side of Tehran (Aerial film by Walter Mittelholzer a Swiss aerial photographer who traveled to Iran, 1925)</p>	<p>Atlas of old Tehran (Shirazian, 2018)</p>

Defense elements used in Vauban fortification is as in the table below which could be seen in Naserid Tehran¹.

Table 4: Defence elements of Vauban fortification used in construction of Tehran walls and trenches (Lepage, 2009).

	Bastione de Front	Bastion	Curtain	Ditch	Gatehouse	Outworks	Covered way and place of Arms	Bridge
Pictures								
Tehran	*	*	*	*	*	----	----	*

Review of Research History

George Curzon, the famous British diplomat, writes about Naserid Tehran in his book *Iran and Iran issue*, which presents a picture of Iran in the second half of the nineteenth century: Twenty years after his reign, he apparently thought that his empire was enclosed in an insufficient area, so suddenly Tehran expanded vast and he tried to destroy its former borders and expand its neighborhoods.

So, he demolished most of the old towers and ramparts and made the ditches smooth and the edge of the surrounding desert into the city, he built a new moat and trench based on the Vauban plan, which was a type of Paris fortification before the war with Germany. But it doesn't describe the details of this city plan.

Professor Gurney, a professor at the University of Oxford, describes the city's reshaping: The original design of the city was based on the *First Vauban system* used in the seventeenth century for the cities of France and Italy. The plan was prepared by General Buhler, a French professor of military science at the Academy of Arts, who completed the work in 1288 AH. He describes the shape and geometry of fences, ditches, and arches based on the narrations of Hotom Schindler, Najm al-Mulk, and Curzon.

Another article entitled *The role of architecture in the emergence of Tehran* written by Jennifer M. Scars from the University of Edinburgh speaks about the new fort with its bastions and moats, the design of which he considers an adaptation of the plan for the fortifications of Paris by Vauban attributed to Buhler.

Centenary of Modernity in Urbanism and Architecture of Iran written by Reza Moghtader (1372 AH) discusses modernity in the early nineteenth century. The learning of new sciences that Abbas Mirza was a pioneer in which, the Dār al-Funūn to apply European methods, which are the source of important intellectual development. New elements of Western civilization in the urban context deal with streets, squares, and modern and industrial factors. It mainly studies the urban developments in the Pahlavi and Reza Shah eras.

Another paper *The first echo of modernity in Iran* by Habibi (1994) in which he has talked about the arrival of modernity and the industrial revolution, the composition and impact of indigenous culture and cultural transmutation/Tehran style, internal and external factors/neighborhood, Street, New Elements in Tūpkhāneh Square.

Another book that describes the developments of Tehran Naseri in this field is *Theory of Modernity in Architecture* (Haghir & Kamelnia, 2019). In the chapter related to *Naserid era and the first developments in architecture and urban planning*, Changes are derived from Vauban, with evidence from Hotom Schindler, Marsh, and George Curzon expressing this phenomenological similarity, and equating it with the *first Vauban system*.

What needs to be investigated and researched is the genesis of the theoretical model there was used for the changes in Tehran Naseri and what role the Dar al-Fonun could have played in these developments and how does the influence of Vauban come from in city planning.

Conclusion

According to research carried out in this section, it can be said that the significant development of Tehran city was observed in Naser al-Din Shah kingship, in the thirteenth century and is coincident with twenty-first years of his governance when Modernism had a lot of influences on local styles. By comparing the effects of new styles in Tehran and beyond its boundaries, one can consider the effects of the styles and patterns of the native architecture of the occupied territories.

The order to execute this plan had been assigned to Mirza Eesa-Vazir and Mostowfi ol-Mamalek. They assigned the project to General Buhler, the instructor of military drafting at Dār al-Funūn' college. Buhler knew Vauban's principle in constructing castles and army drafting. It can be seen that he would instruct Vauban military knowledge and craft.

¹ Taken from author dissertation titled *Comparative Investigation of Naserid Tehran urban changes with Vauban Principles* directed by Dr. Pirouz Hanachi, Dr. Saeed Haghir and adviser with Dr. Hamed Mazaherian.

Vauban was a French military engineer. He had a lot of influence on the landscape of Europe after modernity. In designing Naserid Tehran, Buhler took advantage of his knowledge and awareness, it was observed that they followed a pattern and executed the plans based on Vauban style but each with its cultural and native background, which procedure used in the construction of walls, trenches, military fields, streets, etc.

According to the overview view; building defense form walls (based on Bastion), In the space created by Tehran, the new structure indicates an approach inspired by the perspective of its European creators, these innovations are themselves dependent on the Iranian historical background.

The common features of city development: further the defensive fence form of Renaissance cannon power (Bastion style), inside the urban space, the presence of streets as the framework elements of the city which is the identity of modern cities, formation of numerous and large squares by adapting the new pattern such as the squares of France and Italy, as Lord Curzon statement, all show a pattern from the Baroque background. In conclusion, it can be stated that Tehran in the Naserid era tried to be the manifestation of European cities that are influenced by modernism.

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