



A PRELIMINARY STUDY ON THE USE OF CLASSICAL PROPORTIONS IN OTTOMAN ARCHITECTURE: COLUMN ORDER ANALYSIS IN GOVERNMENT PALACES FROM THE PERIOD OF SULTAN ABDÜLHAMID II

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ABSTRACT

The objective of this manuscript is to prove how Ottoman architecture applied a classicist interpretation by using classical proportions and syntax. Government palaces, which are the best representations of Ottoman 'Empire' architecture in the provinces, were chosen as the objects of study. The method applied in this study was research on the shapes of column orders of the government palaces in Anatolia, which today's architecture has inherited. Then, numerical analyses of the rules and proportions of the columns determined by theoreticians of classical architecture were performed, with proper measurements and calculations made. From the study of the samples, it was concluded that "Ottomanized" versions of column orders, towards the end of the 19th-century, have some similarities with Western classical column orders and proportions.

Keywords: Classical architecture; Ottoman architecture; government palace; proportional analysis; column orders.

INTRODUCTION

One of classical architecture's principal concerns was to attain 'correct', 'good' and 'beautiful' proportions. In this context, the column order, which emerged as the most important tool through which to achieve such proportions, was perhaps the most important subject of classical architectural theories. From the time of Vitruvius to the 19th-century, various theorists investigated this issue and discussed how column orders, which are the basic determinants of ideal classical proportions, should be arranged.

Starting in the early 18th-century, Ottoman architecture had begun to be influenced by European architectural culture, an influence that lasted nearly two hundred years. The first phase of westernization, which lasted until the end of the first quarter of the 19th-century, did not have any effect on the 'fundamental' principles of classical Ottoman architecture. In other words, the main change in the architecture at the time consisted in the adoption of surface ornamentation, whereas general plan for building organization still conformed to traditional Ottoman templates (Batur, 1983: 1046; Kuban, 1954: 136; Arel, 1975: 59). Thanks to their education in the traditional Royal Architecture School *Hassa Mimarlar Ocagi*, which was established by Ottoman reign in the 15th-century and continued to train architects through the master-apprentice system for almost four centuries (Afyoncu, 2001: 1, 61; Cezar, 1971: 6, 59, 60), Ottoman architects at that time made use of ornaments and façade elements from the Baroque, Rococo and classical styles, applying them to their designs in new ways and entirely

reworking them into a specific Ottoman idiom (Kuban, 1954: 156; Cezar, 1971: 6; Arel, 1975: 105).

At the beginning of the *Tanzimat* reform era [1830s], Ottomans focused on the goal of establishing a new, ‘modern’ and ‘westernized’ state. In this atmosphere of change, the Royal Architecture School *Hassa* was eventually suppressed as an institution rooted in the old and traditional administrative mentalities. Thereafter, the Ottoman Empire did not have any school for architecture until the establishment of the School of Fine Arts in 1882 and therefore experienced the problem of training architects (Batur, 1983: 1054; Çelik, 1996: 123). During this period, foreign architects and Ottoman architects who received education abroad played a central role in shaping the architecture under Western influences. Once established, the School of Fine Arts chose Alexandre Vallaury, a Levantine who graduated from the *École des Beaux-Arts*, as its director. Under his direction, the School’s architects were educated in line with the historical, academic classicism of the *Beaux-Arts* tradition, which was common in numerous places throughout the world at the time (Batur, 1983: 1054; Çelik, 1996: 123, 124). As a consequence of the aforementioned conditions, applying classical proportion rules and orders came as no surprise in Ottoman architectural practices.

The increasing influence of the empire style in the 19th-century served as further evidence that the classical architecture tradition found fertile terrain in the Ottoman Empire. In fact, at the end of the 19th-century, the Ottoman Empire, after having looked at Europe as a model in many fields, eventually gave Western classical architecture the role of casting the new face and image of the empire (Yerasimos, 1999: 1-19; Çelik, 1996: 101). During the reign of Sultan Abdülhamid II [1876-1909], a large number of state buildings were built in the classical style, including the government palaces analysed in the present study. In this period, a significant portion of state construction activities was concentrated in the provinces. Moreover, the government palaces in the provinces were the richest and most remarkable, although compared with the official buildings in the capital city, they appeared fairly modest (Figure 1). In addition, the government palaces provide the opportunity for scientific research, given their number and similar design and planning features. Vedat [Tek] Bey, who is the sole known architect of the government palaces [Kastamonu] analysed in the frame of this study and received his architectural education in France at *Beaux-Arts*, had vast knowledge of Western classical architecture (Batur, 2003: 69). Although there are numerous documents in the Ottoman Archive about financial allocations and various permits for government palaces, there is mostly no available information on the original projects and architects who designed the buildings. (Ortaylı, 1984: 3-15). It is anybody’s guess about whether the Ministry of Public Works [*Nafia Nezareti*] prepares government palace projects in conjunction with authorized people in related provinces or whether a freelance architect from the capital city or provincial organization drew the plans, which the central organization then approved. However, it is certain that this process was under the central organization’s control. There is an interesting document in the Ottoman Archive that states that government palaces constructed in the provinces will be in compliance with the dignity and prestige of the state (Ottoman Archive, Group code: I.HUS., File nr: 38, Folder nr: 1312CA093). Furthermore, there are other documents in the Ottoman Archive that state that the projects and estimation books of the government palaces were checked by the ‘central state’.

A total of 34 government palaces have survived in Turkey from the period of Sultan Abdülhamid II. Fourteen of these government palaces [Kastamonu, Ergani, Sinop, Sivas, Kütahya, Kalecik, Çivril, Milas, Safranbolu, Erdek, Ta köprü, Mu la, Mesudiye and Siverek] had entrance arrangements with stone columns and were therefore included in the present study, as they are particularly well suited for column order analysis. Instead of the term ‘classical orders’ that is included in some sources, the paper prefers to use the term ‘column

orders' [*Säulenordnungen* in German, which Erik Forssman (1984) also used]. As only columns, instead of the general structure of the building, were analysed in this paper, they were the most important factor in this respect. Column order analysis of the government palaces was performed according to two different approaches. The first was a formal analysis, a prerequisite for determining which order's column was used. The second involved the analysis of the systematic proportions of the column orders. Through these analyses, the existence of classical proportion rules, which were introduced by leading architectural theorists [e.g., Vitruvius, Alberti, Serlio, Vignola and Palladio] and still in use in the 19th-century, were investigated. In addition, this study examined the question of whether the publication of *Usul-ü Mimari-i Osmani* (1873), which aimed to introduce the works of Ottoman classical architecture and outline the rules of a new national architecture for the Ottoman Empire, affected the creation of government palaces' column orders. The aim of this manuscript is to determine, with the help of measurements of the aforementioned government palaces, whether column height and intercolumniation were determined by the bottom column diameter, which represents the basic proportion rule of column orders. These measurements were realized using digital devices according to the metric system. The metric system had been accepted in the Ottoman Empire by 1875 and was then applied in architectural projects alongside the old Turkish yard [*ar in*].



Figure 1. Ta köprü government palace (Source: Ö. Aydın archive)

COLUMN ORDERS AND PROPORTIONS IN CLASSICAL ARCHITECTURAL THEORY

The basic proportion rule for column orders: The diameter/height ratio

As the writer of the first known systematic essay on proportions and architectural orders, the Roman theoretician and architect Vitruvius [85-20? BC] devoted book chapters [III-IV] to the study of the column order, in which he explains how to arrange the correlation between parts and whole in a building by the means of a module that is based on the proportions of the human body (Wittkower, 1971: 101). According to Vitruvius (1960: IV, 1.6), the starting point of column order is the foot/body ratio. In a building, this proportional ratio determines the relationship between the bottom column diameter and the column height, where the diameter [D] serves as the basic measurement in the definition of orders (Wilson Jones, 1989: 35). For example, in the case of Doric order columns, whose thick appearance is modelled after the male body, the ratio of the bottom column diameter to the column height is 6D, whereas in the case of Ionic order columns, which are characterized by the gracefulness of the female body, this ratio is 8D. However, as Vitruvius (1960: IV, 1.8) noted, over time the ratios of these orders were modified to be 7D and 9D, respectively, for aesthetic reasons. In Tuscan order columns [a Roman variation of Greek Doric columns], the ratio is 7D, as in the original Doric columns (Vitruvius, 1960: IV, 7.2).

During the Renaissance, with the increasing importance of classical antiquity, theoreticians overemphasized column orders and were in tendency to follow the similar patterns of Vitruvius (Wilson Jones, 1989: 35). Alberti [1404-1472] determined the proportions of column orders using a series of permutations of the numbers 6 and 10, which ancient mathematicians considered ideal numbers. Alberti also obtained the ratios 1/6 and 1/10 from the proportions of the human body. Based on these ratios, the ideal Doric, Ionic and Corinthian column ratios were calculated to be 7D, 8D and 9D, respectively (Forssman, 1984: 17). Filarete [1400-?] introduced a different system of proportions that were still based on the human body. He stated that the proportional relationship between the capital and column should be the same as that between the head and the body. According to this relationship, Filarete obtained interesting ratios: 9D for Doric, 8D for Ionic and 8D for Corinthian (Kruft, 1995: 57; Onions, 1988: 163). Serlio [1473-1553] systematically organized columns into five orders: Doric, Ionic, Corinthian, Tuscan and Composite. He determined the height of columns in these orders using whole numbers, where the diameter equals the module: 6D for Tuscan, 7D for Doric, 8D for Ionic, 9D for Corinthian and 10D for Composite (Serlio, 1982: 8, 30, 65, 87, 115). Serlio (1982: 3) emphasized that this systematic classification, which was still based on that of Vitruvius, should be used to suit various circumstances. Vignola [1507-1573] was one of the most important theorists to outline absolute and constant proportion rules within the column order system. Vignola identified all of the elements that may affect the arrangement of a building according to a single module. Unlike Serlio, Vignola calculated column orders values not arithmetically but by the empirical observation of real building measurements. Nevertheless, because his survey was restricted to Roman remains, which did not include any example of the Tuscan order, he eventually followed the authority of Vitruvius (Vignola, 1999: 26; Kruft, 1995: 89). To Vignola (1999: 26, 36, 48, 60), the module was the bottom column radius instead of the diameter; thus, the column height was determined 14 modules [7D] in the Tuscan order, 16 modules [8D] in the Doric order, 18 modules [9D] in the Ionic order, and 20 modules [10D] in the Corinthian and Composite orders. Much like Serlio and Vignola, Palladio [1508-1580] based his classification of column orders directly on that of Vitruvius, although some differences may be observed with respect to certain details (Forssman, 1999: 45). The column heights established Palladio (1965: 13-24) are as follows: 7D for Tuscan, 7.5 or 8D for Doric, 9D for Ionic, 9.5D for Corinthian and 10D for Composite. Scamozzi [1548-1616] ascribed a metaphysical meaning to both column proportions and column orders. In fact, Scamozzi modelled the ideal proportions after nature; therefore, they, like nature, were created by God and were absolute and true in themselves (Kruft, 1995: 112). Scamozzi used mostly fractional numbers for his system of proportions: $7\frac{1}{2}D$ for Tuscan, $8\frac{1}{2}D$ for Doric, $8\frac{3}{4}D$ for Ionic, $9\frac{3}{4}D$ for Corinthian and 10D for Composite (Kruft, 1995: Abb.57; Barbieri, 2015: 3).

After the Renaissance, with the rise of classicism, column orders again became a prime issue in architectural discourse. An inflammatory debate occurred between those who held that the proportions of the five orders were adaptable and those, following Vignola's *Regola* [i.e., canon of the five orders], who claimed that they were absolute and constant. Vittone [1705-1770] was one of the most earnest followers of Vignola's doctrine of column orders (Kruft, 1995: 220). By contrast, Perrault [1613-1688] objected to classical idea that beauty originates from permanent numbers (Perrault, 2010; Naredi-Rainer, 2001: 27). A similar attitude was expressed by Durand [1760-1834], whose reference to column orders remained nothing but a formality; in particular, the column order was quite unrelated to any proportional meaning and was therefore totally alien to the classical approach (Naredi-Rainer, 2001: 100; Kruft, 1995: 311). Nevertheless, the rules set out by Vitruvius and Renaissance theorists generally held the most authoritative legacy (Forssman, 1984: 15-16). As a result of claims of national identity, another prominent discussion took place in relation to the creation of a 'national order'. To this end, many architects sought to create a 'national sixth order' in addition to the accepted five orders. The attempt of Delorme [1510-1570] to elaborate a French sixth order through an

eclectic combination of different elements from the orders of classical antiquity (Kruft, 1995: 135) stands as an eminent source for the subsequent activities of numerous scholars in both France and England who, instead of establishing an original new order, simply adopted conventions of form and proportion from the past (Kruft, 1995: 146, 288).

At the beginning of the 19th-century in Europe, the theory of proportions based on mathematical calculations was no longer effective in either architectural discourse or practice (Wittkower, 1960). The decline of this tradition was actually the result of classical architecture revisions. In other words, in the 19th-century, as a result of the historicist approach that gave rise to eclecticism, a rather different attitude towards the use of classical proportions appeared. The Renaissance's dogma, according to which the column radius was used as a module for the proportions of not only the columns but also of the whole façade, was abandoned. By then, although the use of proportions was no longer effective as a unitary system of composition for buildings, in particular sections of the façades [e.g., porticos and balustrades] columns appeared in eclectic fashion (Forssman, 1984: 112), and they were consistent in terms of the formal application of classical orders and specially defined with accurate proportions. A clear example of this attitude is displayed in the Ionic columns of the front façade of Schinkel's Altes Museum in Berlin (Forssman, 1984: 89; Summerson, 2005: 116). In any case, at least for the design of these parts of the façades, the legacy of Vitruvius and the Renaissance theorists continued to survive in various parts of the world, particularly in America and France. Among the theorists, Vignola in particular gained new popularity (Ware, 1994: 3).

Table 1: Column height/column diameter relationship according to classical architectural theorists

	Tuscan	Doric	Ionic	Corinthian	Composite
Vitruvius (Old)	-	6D	8D	-	-
Vitruvius (New)	7D	7D	9D	-	-
Alberti	-	7D	8D	9D	-
Serlio	6D	7D	8D	9D	10D
Vignola	7D	8D	9D	10D	10D
Palladio	7D	7,5 8D	or 9D	9,5D	10D

Intercolumniation

As with column height, intercolumniation played a central role in the aesthetics of classical antiquity. In the case of intercolumniation, the proportion system was based on the bottom column's diameter. Without referring to any column order, Vitruvius (1960: III, 3.1-3.11) indicates a specific proportion between the height of columns and their intercolumniation in temples (Table 2). The principle underlying the determination of this ratio depends rather heavily on the columns' dimensions: thick columns have wider spacing, whereas thin columns have narrower spacing. Vitruvius defined the temples with the best ratio between the height of columns and their intercolumniation as eustilos. In eustilos temples, the intercolumniation is 2.25D. The central spacing in front of the door, which is wider to allow easy passage, is an exception, with an intercolumniation of 3D (Vitruvius, 1960: III, 3.6). The ratio of the column height in eustilos, which is equivalent to 9D, is the same as that of Ionic order columns. Alberti (1986: 141) and Serlio (1982: 35) did not refer to Vitruvius' classification in a systematic way. They generally used diastilos instead of the Doric order, although the intercolumniation of central columns was set wider in the former [2.75D-4D-2.75D]. Furthermore, both used eustilos [2.25D-3D-2.25D] instead of the Ionic order. Serlio (1982: 103) also used diastilos instead of the Corinthian order. Vignola, who did not set any difference between central intercolumniation, coinciding with the door axis, and lateral intercolumniation, pursued a

different approach. Vignola used diastilos instead of the Doric order and eustilos instead of the Ionic order. Vignola's intercolumniation value for other orders was 2.33D (Vignola, 1999: 38, 49, 60). Palladio was the theorist who best dealt with the systematization of Vitruvius' intercolumniation order (Forssman, 1984: 30). He adapted Vitruvius' araestilos to the Tuscan order, diastilos to the Doric order, eustilos to the Ionic order, systilos to the Corinthian order and pycnostilos to the Composite order. However, he did not use the column heights prescribed by Vitruvius in araestilos and diastilos. Finally, Palladio (1965: 13) did not base his work on central intercolumniation; he determined the ratio for side spacing, wherein he simply provided a wider central intercolumniation (Table 3).

Table 2: Vitruvius' intercolumniation/column diameter relationship in temples

	Intercolumniation	Column Height
Araestilos	4D	8D
Diastilos	3D	8,5D
Eustilos	2,25D-3D-2,25D	9D
Systilos	2D	9,5D
Pycnostilos	1,5D	10D

Table 3: Intercolumniations according to classical theorists

	Tuscan	Doric	Ionic	Corinthian	Composite
Vitruvius	3D-5D-3D	-	-	-	-
Alberti	-	2,75D-4D-	2,25D-3D-	-	-
Serlio	-	2,75D	2,25D	3D-4D-3D	-
Vignola	2,33D	2,75D	2,25D	2,33D	2,33D
Palladio	4D	2,75 or 3D	2,25D	2D	1,5D

A Proposal for the New Ottoman Orders from the Publication of *Usul-ü Mimari-i Osmani*

In addition to the influence of classical rules and column orders on Ottoman architecture, another important issue is whether the publication of Montani and Boş a ıyan Efendi's *Usul-ü Mimari-i Osmani* [1873] affected the use of column orders in the Ottoman Empire's government palaces. Theoretically contrived under the influence of Vitruvius's legacy, this book was conceived as a guide to set out rules for a 'New Ottoman Architecture' (Çelik, 1996: 119-120). It is possible to identify two important objectives of the book: The first one was to revise the classical Ottoman forms and use them to create a contemporary national architecture. The second was, in reference to the revised Ottoman forms, the reorganization of Ottoman orders into a Western classical syntax to demonstrate how the new Ottoman architecture could also have a European identity (Saner, 2005a: 602).

To establish a new set of orders for Ottoman architecture, Montani and a ıyan (1873: 17) organized the three Ottoman column orders in a new fashion and attributed a new value to the capital forms of classical Ottoman architecture, which was similar to the Greek triad: the *Mahruti* order, equivalent to [or substituted for] the Doric order; the *Müstevi* order, equivalent to the Ionic order; and the *Mücevheri* order, equivalent to the Corinthian order (Figure 2) (Saner, 1999: 72). The *Mahruti* order, with a conic capital that employed piers instead of columns, was suggested for places that required simplicity and for lower floors. The *Müstevi* order, which used Turkish triangles in the capitals, was suggested for tomb structures, exterior spaces, and porticos and in façades under the *Mücevheri* order. The *Mücevheri* order, with a

Muqarnas capital, was suggested for upper floors to symbolize glory and affluence (Montani and a ıyan, 1873: 15). However, the proportions defining each order were not quite clear: 10 26 fold the radius [5D 13D] could occasionally be used to determine column shaft height. It is suggested that lower values [starting from 5D] were used for the *Mahruti* order, which was the equivalent of the Doric order, whereas peak values of up to 13D were used for the *Mücevheri* order, which was equivalent of the Corinthian order.

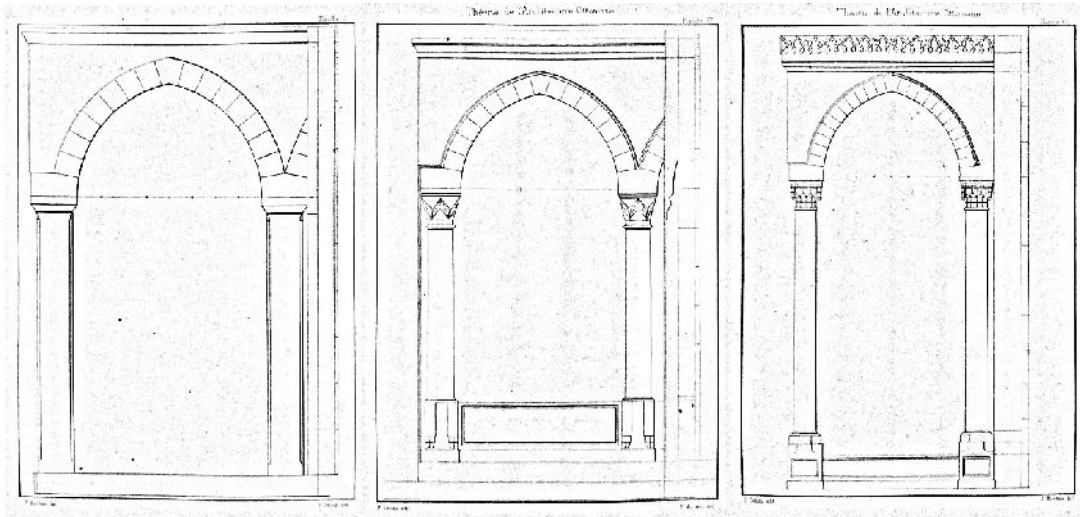


Figure 2. *Mahruti*, *Müstevi* and *Mücevheri* orders (Source: Montani and a ıyan 1873: Pl. II, IV, VI)

COLUMN ORDER ANALYSIS OF GOVERNMENT PALACES FROM THE PERIOD OF SULTAN ABDÜLHAMID II

Kastamonu government palace

Formal analysis:

The Kastamonu government palace, which was designed by Architect Vedat [Tek] Bey, has Tuscan columns (Figure 3). The column capital, which is located between the columns' drop arches on and the circular cross-sectional and unfluted shaft, has abacus, echinus sections. In the typical column base of the Tuscan order, there is a fillet between the plinth and torus (Palladio, 1965: 14, VIII).

Proportional analysis:

Diameter [D]:

Bottom circumferences of the column shafts: 131 cm

$$\text{Diameter} = 131 \div 3.14 = 41.72 \text{ cm}$$

The diameter/height ratio:

$$\begin{aligned} \text{Height/diameter} &= 291 \div 41.72 \\ &= 6.98 \end{aligned}$$

The ratio = ~7D

The diameter/intercolumniation ratio:

$$\begin{aligned} \text{Intercolumniations/diameter} &= 314 \div 41.72 \\ &= 7.53 \end{aligned}$$

The ratio = ~7.5D

Ergani government palace

Formal analysis:

After the surveys of the Ergani government palace's columns, it was understood that they were generally similar to the Doric column, which has been applied with a local interpretation (Figure 3). There are abacus and echinus in the capital. However, the necking [i.e., trachelium], which should be located under the echinus and is interpreted in a more rounded manner

according to classical form, was manufactured as a mono-block attached to the echinus. With its unfluted, circular cross-sectional shaft, the column rests on a pedestal.

Proportional analysis:

Diameter [D]:

Bottom circumferences of the column shafts: 100 cm

$$\text{Diameter} = 100 \div 3.14 = 31.85 \text{ cm}$$

The diameter/height ratio:

$$\text{Height/diameter} = 156 \div 31.85$$

$$= 4.90$$

$$\text{The ratio} = \sim 5D$$

The diameter/intercolumniation ratio:

$$\text{Intercolumniations/diameter} = (48 \div 31.85) - (255 \div 31.85) - (49 \div 31.85)$$

$$= 1.51 - 8.01 - 1.54$$

$$\text{The ratio} = \sim (1.5D - 8D - 1.5D)$$

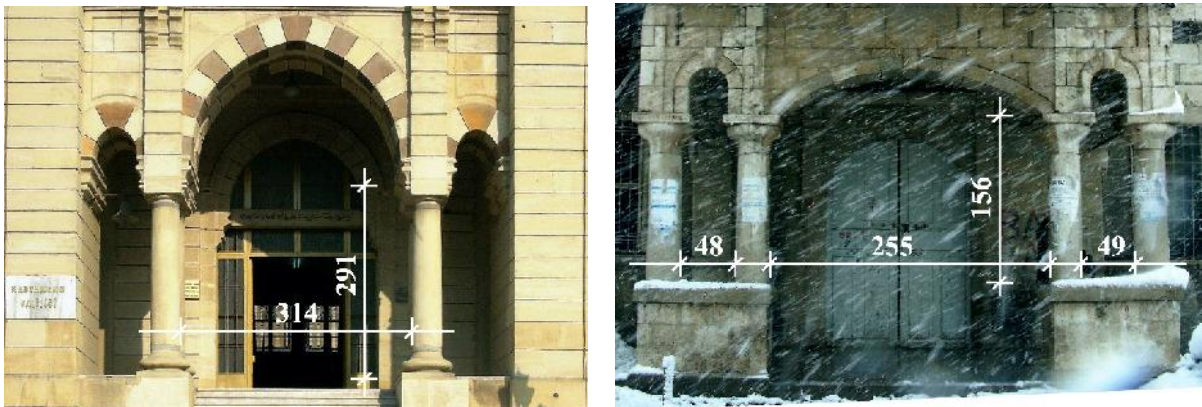


Figure 3. (Left) Kastamonu government palace, entrance columns; (Right) Ergani government palace, entrance columns (Source: Ö. Aydın archive).

Sinop government palace

Formal analysis:

In general terms, two columns in the Sinop government palace's portico were based on an interpretation of the Doric column (Figure 4). Echinus sections of the column capital were connected to square plates with diagonals and thus lost the form of a spherical part. In the bottom section of the capital, the astragal section, which was perceived as a part of the capital, is a part of the column shaft in classical architecture. The column with a circular cross-sectional and unfluted shaft rests on a pedestal without base as in the antique period of the Doric order.

Proportional analysis:

Diameter [D]:

Bottom circumferences of the column shafts: 139.7 cm

$$\text{Diameter} = 139.7 \div 3.14 = 44.49 \text{ cm}$$

The diameter/height ratio:

$$\text{Height/diameter} = 268 \div 44.49$$

$$= 6.02$$

$$\text{The ratio} = \sim 6D$$

The diameter/intercolumniation ratio:

$$\text{Intercolumniation/diameter} = 532 \div 44.49$$

$$= 11.96$$

$$\text{The ratio} = \sim 12D$$

Sivas government palace

Formal analysis:

The columns in entrance of the Sivas government palace, which are situated under the drop arches, were built in the Doric order (Figure 4). Column capital have abacus, echinus and necking sections, and the column shaft is circular cross-sectional and unfluted. Column base, which was produced to closely resemble the capital, resembles the properties of the Attic column base.

Proportional analysis:

Diameter [D]:

Bottom circumferences of the column shafts: 119 cm

$$\text{Diameter} = 119 \div 3.14 = 37.90 \text{ cm}$$

The diameter/height ratio:

$$\text{Height/diameter} = 302 \div 37.90$$

$$= 7.97$$

$$\text{The ratio} = \sim 8D$$

The diameter/intercolumniation ratio:

$$\text{Intercolumniations/diameter} = (95 \div 37.90) - (380 \div 37.90) - (95 \div 37.90)$$

$$= 2.51 - 10.03 - 2.51$$

$$\text{The ratio} = \sim (2.5D - 10D - 2.5D)$$

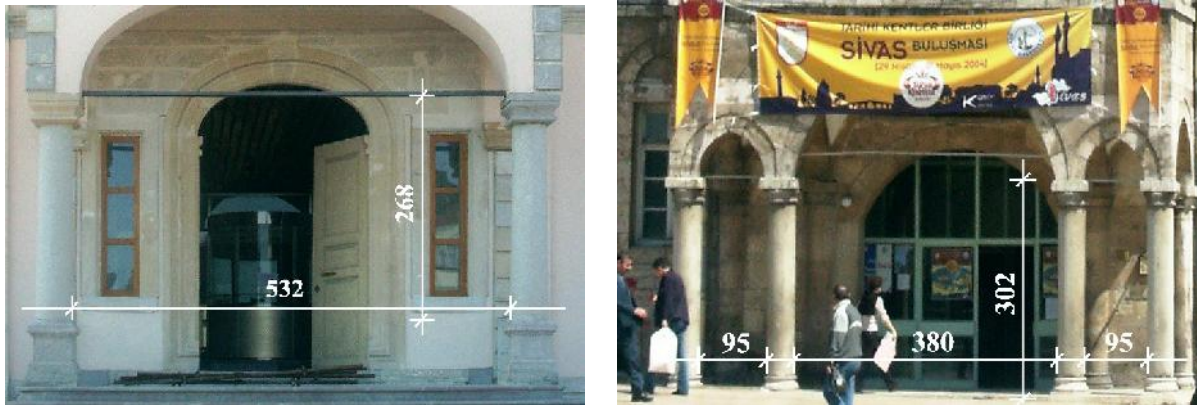


Figure 4. (Left) Sinop government palace, entrance columns; (Right) Sivas government palace, entrance columns (Source: Ö. Aydın archive).

Kütahya government palace

Formal analysis:

The Kütahya government palace's columns are again based on a local interpretation of the Doric column, and they are located under the semicircle arches (Figure 5). The octagonal form can be seen in each part of column, which was originally shaped according to the circular form. The capital has abacus, echinus and necking sections over the shaft, on which the octagonal corner lines create a fluting effect. The column base that rests on a pedestal is an interpreted version of the Attic column base. Additionally, octagonal elements—plinth, torus, scotia and top torus—are part of this base.

Proportional analysis:

Diameter [D]:

The octagon's edges in the bottom section of the column shaft = 19 cm.

The diameter of the circle that was used as the column's bottom diameter and passed through the corners of the octagon = 49.65 cm

The diameter/height ratio:

$$\text{Height/diameter} = 323 \div 49.65$$

$$= 6.51$$

$$\text{The ratio} = \sim 6.5D$$

The diameter/intercolumniation ratio:

$$\begin{aligned} \text{Intercolumniations/diameter} &= (188 \div 49.65) - (346 \div 49.65) - (188 \div 49.65) \\ &= 3.79 - 6.97 - 3.79 \end{aligned}$$

$$\text{The ratio} \approx (3.75D - 7D - 3.75D)$$

Kalecik government palace

Formal analysis:

The Kalecik government palace's columns, which are situated in the portico of the building's south façade, are based on a local interpretation of the Doric column (Figure 5). Instead of having a circular cross-section, the shaft has an octagonal cross-section, and the shaft's corner lines continue in the capital. Although a simple original abacus can be seen in the capital, the echinus and necking parts were derived by deforming the classical geometries, and these two were manufactured like a single part. The column base differs from the classical base, particularly in the transition to the column shaft: here triangles were used as the transition element. There are the elements of the Attic base and scotia, torus and plinth sections below this part. The continuing lines of the polygonal column shaft in the base disrupted the circular cross-sectional, horizontal geometries of the scotia and torus. Apart from these, Biber (2003) indicated that the north façade's portico, which defined the building's second entrance, had been demolished in the fifties.

Proportional analysis:

Diameter [D]:

The octagon's edges in the bottom section of the column shaft= 12.5 cm.

The diameter of the circle that was used as the column's bottom diameter and passed through the corners of the octagon= 32.67 cm

The diameter/height ratio:

$$\begin{aligned} \text{Height/diameter} &= 260 \div 32.67 \\ &= 7.96 \end{aligned}$$

The ratio= ~8D

The diameter/intercolumniation ratio:

$$\begin{aligned} \text{Intercolumniations/diameter} &= (155 \div 32.67) - (155 \div 32.67) - (155 \div 32.67) \\ &= 4.74 - 4.74 - 4.74 \end{aligned}$$

$$\text{The ratio} \approx (4.75D - 4.75D - 4.75D)$$



Figure 5. (Left) Kütahya government palace, entrance columns; (Right) Kalecik government palace, entrance columns (Source: Ö. Aydın archive).

Çivril government palace

Formal analysis:

Two columns in the Çivril government palace's portico show characteristics of the Doric column, which is interpreted in an Orientalist manner (Figure 6). Although some elements [e.g., abacus, echinus and necking] appear in the capital, these consist of square cross-sectional,

right-angled elements. On the echinus, there is ornament called dentils, which is located in the eaves in classical architecture. The corners of the square cross-sectional column shaft were bevelled and thus made polygonal. The base, which rests on a pedestal consisting of a plinth and torus, is smaller than classical bases. The columns' bottom sections are non-equilateral octagons.

Proportional analysis:

Diameter [D]:

The octagon's edges in the bottom section of the column shaft= 22 cm and 8.5 cm [in the corners]

The diameter of the circle that was used as the column's bottom diameter and passed through the corners of the octagon= 40.50 cm

The diameter/height ratio:

$$\begin{aligned} \text{Height/diameter} &= 322 \div 40.50 \\ &= 7.95 \end{aligned}$$

$$\text{The ratio} = \sim 8D$$

The diameter/intercolumniation ratio:

$$\begin{aligned} \text{Intercolumniation/diameter} &= (315 \div 40.50) \\ &= 7.77 \end{aligned}$$

$$\text{The ratio} = \sim 7.75D$$

Milas government palace

Formal analysis:

There are two columns that show characteristics of the Doric order's column in the Milas government palace's entrance façade (Figure 6). With its abacus, echinus and necking, the column capital is a typical Doric element. The column shaft is circular cross-sectional and unfluted, and the column base consists of a plinth, torus, astragal and fillet.

Proportional analysis:

Diameter [D]:

Bottom circumferences of the column shafts: 142 cm

$$\text{Diameter} = 142 \div 3.14 = 45.22 \text{ cm}$$

The diameter/height ratio:

$$\begin{aligned} \text{Height/diameter} &= 451 \div 45.22 \\ &= 9.97 \end{aligned}$$

$$\text{The ratio} = \sim 10D$$

The diameter/intercolumniation ratio:

$$\begin{aligned} \text{Intercolumniation/diameter} &= 522 \div 45.22 \\ &= 11.54 \end{aligned}$$

$$\text{The ratio} = \sim 11.5D$$



Figure 6. (Left) Çivril government palace, entrance columns; (Right) Milas government palace, entrance columns (Source: Ö. Aydın archive).

Safranbolu government palace

Formal analysis:

Doric and Corinthian elements were used together in the Safranbolu government palace's columns (Figure 7). This eclectic approach is particularly visible in the capital. The abacus section is thin as in the Corinthian column. The echinus, which is a Doric element, was adorned with ornaments that are interpreted with Corinthian palmets, two-dimensional acanthus leaves and volutes. In accordance with the Doric column, the necking part is located under the bottom section of the capital. The column shaft has an unfluted, circular cross-section. There is an incomplete Attic base in the bottom section of the column, which rests on a pedestal, consisting of plinth, torus and semi scotia.

Proportional analysis:

Diameter [D]:

Bottom circumferences of the column shafts: 123 cm

$$\text{Diameter} = 123 \div 3.14 = 39.17 \text{ cm}$$

The diameter/height ratio:

$$\begin{aligned} \text{Height/diameter} &= 333.5 \div 39.17 \\ &= 8.51 \end{aligned}$$

$$\text{The ratio} = \sim 8.5D$$

The diameter/intercolumniation ratio:

$$\begin{aligned} \text{Intercolumniations/diameter} &= (224 \div 39.17) - (294 \div 39.17) - (228 \div 39.17) \\ &= 5.72 - 7.51 - 5.82 \end{aligned}$$

$$\text{The ratio} = \sim (5.75D - 7.5D - 5.75D)$$

Erdek government palace

Formal analysis:

In general terms, the main parts in the column's capital in the Erdek government palace display the features of a Doric column (Figure 7). Apart from the abacus, which was designed in a quite exaggerated manner, the capital has no echinus and leads directly to the cylindrical shaft. The cylindrical part, which is the upper part of the capital, is adorned with acanthus leaves. In this sense, it is associated with the Corinthian capital. The column base that was located under the unfluted column shaft is an interpretation of the Attic base. The elements of the base contradict the original proportions. Furthermore, the top torus, which is smaller than the bottom torus in the original classical state, is made even smaller and turned into an astragal.

Proportional analysis:

Diameter [D]:

Bottom circumferences of the column shafts: 109.5 cm

$$\text{Diameter} = 109.5 \div 3.14 = 34.87 \text{ cm}$$

The diameter/height ratio:

$$\begin{aligned} \text{Height/diameter} &= 365 \div 34.87 \\ &= 10.47 \end{aligned}$$

$$\text{The ratio} = \sim 10.5D$$

The diameter/intercolumniation ratio:

$$\begin{aligned} \text{Intercolumniations/diameter} &= (182 \div 34.87) - (182 \div 34.87) - (182 \div 34.87) \\ &= 5.21 - 5.21 - 5.21 \end{aligned}$$

$$\text{The ratio} = \sim (5.25D - 5.25D - 5.25D)$$



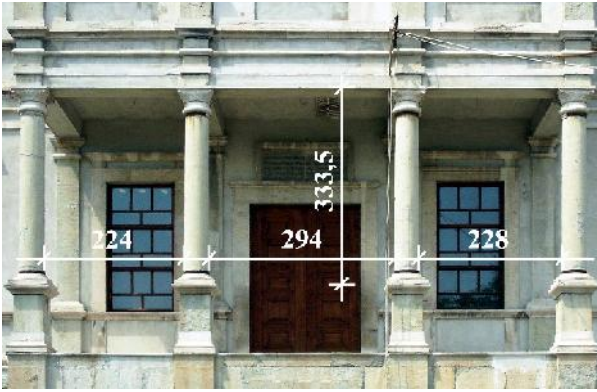


Figure 7. (Left) Safranbolu government palace, entrance columns; (Right) Erdek government palace, entrance columns (Source: Ö. Aydın archive).

Ta köprü government palace

Formal analysis:

The Ta köprü government palace's columns generally show characteristics of the Doric column (Figure 8). Abacus, echinus and necking sections are found in the capital, which belongs to the Doric column. In addition, the leaves in the corners were interpreted from the Corinthian capital. Located under the unfluted shaft and interpreted from the Attic base, the column base has plinth, torus and scotia [adjacent to the torus]. However, the torus has a bulbous form, and thus the height of the torus was kept higher.

Proportional analysis:

Diameter [D]:

Bottom circumferences of the column shafts: 81 cm

$$\text{Diameter} = 81 \div 3.14 = 25.80 \text{ cm}$$

The diameter/height ratio:

$$\begin{aligned} \text{Height/diameter} &= 258.5 \div 25.80 \\ &= 10.02 \end{aligned}$$

$$\text{The ratio} = \sim 10D$$

The diameter/intercolumniation ratio:

$$\begin{aligned} \text{Intercolumniations/diameter} &= (174 \div 25.80) - (246 \div 25.80) - (175 \div 25.80) \\ &= 6.74 - 9.53 - 6.78 \end{aligned}$$

$$\text{The ratio} = \sim (6.75D - 9.5D - 6.75D)$$



Figure 8. Ta köprü government palace, entrance columns (Source: Ö. Aydın archive)

Mu la government palace – north entrance

Formal analysis:

There are two different porticos in north and south façades of the Mu la government palace. In a general manner, the columns in north portico, on which semi-circle wooden arches are

located, display Doric column features (Figure 9). The column capital has abacus and echinus sections; the lower corners of the abacus were bevelled, and small leaf motifs were carved in inner section for a Corinthian effect. There is a fillet as the upper element of the column shaft which is circular cross-sectional and unfluted. In the lower part of the column, a circular cross-sectional element that is larger than the shaft exists instead of a classical base.

Proportional analysis:

Diameter [D]:

Bottom circumferences of the column shafts: 81 cm

$$\text{Diameter} = 81 \div 3.14 = 25.80 \text{ cm}$$

The diameter/height ratio:

$$\begin{aligned} \text{Height/diameter} &= 258.5 \div 25.80 \\ &= 10.02 \end{aligned}$$

The ratio = ~10D

The diameter/intercolumniation ratio:

$$\begin{aligned} \text{Intercolumniations/diameter} &= (174 \div 25.80) - (246 \div 25.80) - (175 \div 25.80) \\ &= 6.74 - 9.53 - 6.78 \end{aligned}$$

The ratio = ~ (6.75D - 9.5D - 6.75D)

Mu la government palace – south entrance

Formal analysis:

The columns in the south entrance of the Mu la government palace show mostly characteristics of the Doric column (Figure 9). There are abacus, echinus, fillet and necking in the capital. However, acanthus leaves in the lower corners of the abacus were derived through an interpretation of the Corinthian column. The capital leads to the shaft with an astragal that is a part of the unfluted, circular cross-sectional shaft. The baseless columns rest on the floor with fillets in the bottom section of the shafts.

Proportional analysis:

Diameter [D]:

Bottom circumferences of the column shafts: 92.5 cm

$$\text{Diameter} = 92.5 \div 3.14 = 29.46 \text{ cm}$$

The diameter/height ratio:

$$\begin{aligned} \text{Height/diameter} &= 353 \div 29.46 \\ &= 11.98 \end{aligned}$$

The ratio = ~12D

The diameter/intercolumniation ratio:

$$\begin{aligned} \text{Intercolumniations/diameter} &= (157.5 \div 29.46) - (157.8 \div 29.46) - (157.4 \div 29.46) \\ &= 5.35 - 5.36 - 5.34 \end{aligned}$$

The ratio = ~ (5.33D - 5.33D - 5.33D)



Figure 9. (Left) Mu la government palace, north entrance columns; (Right) Mu la government palace, south entrance columns (Source: Ö. Aydın archive).

Mesudiye government palace**Formal analysis:**

It is difficult to define the column order in the Mesudiye government palace (Figure 10). The base differs from classical examples, and the column shaft, which appears to be fluted, is octagonal cross-sectional. The only element that resembles the classical columns is the column's capital. Although it has a different local interpretation, the acanthus leaves are stylised. Furthermore, considering its general form, the capital can be seen to resemble the Corinthian capital.

Proportional analysis:

Diameter [D]:

The octagon's edges in the bottom section of the column shaft= 13 cm.

The diameter of the circle that was used as the column's bottom diameter and passed through the corners of the octagon= 34cm

The diameter/height ratio:

$$\begin{aligned} \text{Height/diameter} &= 373 \div 34 \\ &= 10.97 \end{aligned}$$

The ratio= ~11D

The diameter/intercolumniation ratio:

$$\begin{aligned} \text{Intercolumniation/diameter} &= 340 \div 34 \\ &= 10 \end{aligned}$$

The ratio=10D

Siverek government palace**Formal analysis:**

In the entrance of the Siverek government palace, there are five columns that end with semi-circle arches (Figure 10). These columns can be generally defined as local interpretations of the Corinthian column. The column's capital is adorned with stylised Corinthian leaves, and its abstracted geometry is also in line with the Corinthian order. The base, which is located under the unfluted, cross-sectional column shaft, is the same as the capital.

Proportional analysis:

Diameter [D]:

Bottom circumferences of the column shafts: 88 cm

Diameter= $92 \div 3.14 = 29.30$ cm

The diameter/height ratio:

$$\begin{aligned} \text{Height/diameter} &= 248 \div 29.30 \\ &= 8.46 \end{aligned}$$

The ratio= ~8.5D

The diameter/intercolumniation ratio:

$$\begin{aligned} \text{Intercolumniations/diameter} &= (30 \div 29.3) - (264 \div 29.3) - (266 \div 29.3) - (262 \div 29.3) - \\ &(30 \div 29.3) \end{aligned}$$

$$= 1.02 - 9.01 - 9.08 - 8.94 - 1.02$$

The ratio =~ (1D - 9D - 9D - 9D - 1D)

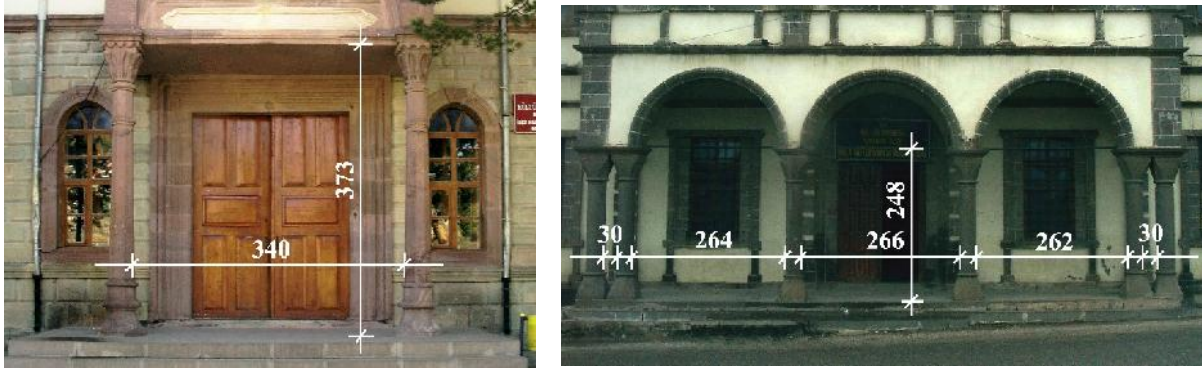


Figure 10. (Left) Mesudiye government palace, entrance columns; (Right) Siverek government palace, entrance columns (Source: Ö. Aydın archive).

DISCUSSION OF THE RESULTS OF THE COLUMN ORDER ANALYSIS OF GOVERNMENT PALACES

The column orders that the analysed government palaces used can be divided into four main groups:

- *The Tuscan order:*

Because the Tuscan order was derived from the Doric order, these two orders are highly similar. Until the 19th-century, the most significant difference between the orders was the use of fluting in the shaft. Whereas Doric columns had fluting, Tuscan columns were unfluted. However, the simplicity and eclectic attitude introduced in the 19th-century led to the use of unfluted column shafts in all orders. The only difference between these two orders is related to base use. Among the analysed government palaces, the only building with a Tuscan base and other building elements, yielding Vitruvius' order height ratio [7D], was the Kastamonu government palace (Table 4, 5).

- *Doric Interpretations:*

The Ergani, Sinop, Sivas, Kütahya, Kalecik, Çivril and Milas government palaces, whose capitals comply with the Doric order and which have no Attic base or bases, were analysed. In terms of form, characteristics of the Doric columns in the Sivas and Milas government palaces are similar to those of the original Doric column; however, the other palaces' columns are examples of cases in which Doric column elements were newly interpreted. The column heights of the Sinop government palace, whose columns have no bases [6D], comply with the Greek Doric order as defined by Vitruvius; on the other hand, the column proportions in the Ergani government palace [5D] are lower than the traditional Doric proportions. However, the ratio [5D] is close to the values used in ancient Greek temples (Waddell, 2002: 1-31; Adam, 1990: 72-73). The height of the columns in the Kütahya government palace [6.5D] is similar to the classical value. The Sivas, Kalecik and Çivril government palaces show the Doric proportions [8D] espoused by Vignola and Palladio. In terms of form, the column height ratio of the Milas government palace [10D], which is the closest to the classical Doric order, is greater than the Doric proportion (Table 4, 5).

- *The Eclectic Use of Classical Elements:*

The Safranbolu, Erdek, Ta köprü and Mu la government palaces included in this group have original or interpretive Doric column elements. Nevertheless, motifs belonging to Corinthian capitals were eclectically incorporated into Doric capitals. This kind of column capital was also used in 18th-century Ottoman architecture [e.g., the Zeynep Sultan Mosque]. According to Saner (2005b: 83), the 18th-century Ottoman capitals with leaves or volutes in the corners are derived from medieval [Romanesque-Gothic] column bases. However, Kuban (1954: 125) defined this situation as the effect of the Doric style and believed that the leaves in the corners were interpreted from acanthus leaves. It is interesting that the column height proportions comply with or even exceed those of the Corinthian order, which are the greatest among the classical orders: Safranbolu [10.5D], Ta köprü [12.5D] and Mu la [10D and 12D] (Table 4, 5).

Thus, it can be concluded that in these examples, the Doric order was transformed into the Corinthian order with the addition of adornment motifs and increased column height.

- *Corinthian interpretations:*

Among the analysed buildings, there were no columns that exhibited typical characteristics of the Corinthian order. However, the Corinthian order was interpreted in some of the buildings, namely the Siverek and Mesudiye government palaces. The Siverek government palace showed a column height that is similar to that of the Corinthian order [8.5D], whereas the column height of the Mesudiye government palace exceeded that of the Corinthian order [11D] (Table 4, 5).

Based on the classification system described above, it is understood that although Doric-Tuscan orders and Corinthian interpretations were effective, no examples of the Composite or Ionic orders were observed, the main reason for which may be the influence from France, which made its mark on 19th-century architecture. Depending on the use of Roman Corinthian columns by French architects of the Empire style that came to light at the beginning of the century (Forssman, 1984: 112) and the use of Doric-Tuscan orders within the context of Vignola's influence on the Beaux-Art style (Kruft, 1995: 315), Ottoman architecture should have been affected as much as the rest of the world.

If intercolumniation can be generalized, it is observed that some of the analysed examples achieved classical arrangement proportions: the south columns of the Kalecik, Erdek and Mu la government palaces are of the araeostilos order. Furthermore, there is one intercolumniation in the Sinop, Çivril, Milas and Mesudiye government palaces. Although the width of the intercolumniation in these government palaces is greater than the measures used in classical architecture, it was observed that intercolumniations were proportioned relative to the column diameter. Moreover, the central intercolumniation is larger than that of other government palaces. As mentioned above, classical theorists proposed retaining the central intercolumniation, which makes the door wider than the typical intercolumniation. The side intercolumniation of the Kastamonu government palace [2.25D] is of the eustilos type, and that of the Ergani government palace [1.5D] is of the pycnostilos type. In the rest of the government palaces, the side and central intercolumniations exceed the classical proportions. However, they are all proportioned relative to the column diameter.

Table 4: Identification and measurements of government palaces' column orders













Government Palaces	Photos of Column Capitals	Column Orders	Column Bases	Column Heights (cm)	Bottom Column Diameter(cm)	Measures of Intercolumniation (cm)
Kastamonu		Tuscan	Tuscan	291	41.72	314
Ergani		Doric Interpretation	-	156	31.85	48-255-49
Sinop		Doric Interpretation	-	268	44.49	532
Sivas		Doric Interpretation	Attic Interpretation	302	37.90	95-380-95
Kütahya		Doric Interpretation	Attic Interpretation	323	49.65	188-346-188
Kalecik		Doric Interpretation	Attic Interpretation	260	32.67	155-155-155
Çivril		Doric Interpretation	Attic Interpretation	322	40.50	315
Milas		Doric Interpretation	Attic	451	45.22	522
Safranbolu		Eclectic	Attic Interpretation	333.50	39.17	224-294-228
Erdek		Eclectic	Attic Interpretation	365	34.87	182-182-182
Taşköprü		Eclectic	Attic Interpretation	350	28.03	137-176-138.5
Muğla (South)		Eclectic	-	353	29.46	157.5-157.8-157.4
Muğla (North)		Eclectic	Non-Classical characteristics	258.50	25.80	174-246-175
Mesudiye		Corinthian Interpretation	Non-Classical characteristics	373	34	340
Siverek		Corinthian Interpretation	Repetition of Column Capital	248	29.30	30-264-266-262-30

Table 5: Similarities between the government palaces' column orders and the proportions of classical architecture theorists [D= bottom column diameter]

Government Palaces	Column Order	Column Height						Intercolumniations
		Measured	Vitruv	Alberti	Serlio	Vignola	Palladio	Measured
Kastamonu	Tuscan	7D	X			X	X	7.5D
Ergani	Doric Interpretation	~5D						1.5D-8D-1.5D
Sinop	Doric Interpretation	6D	X					12D
Sivas	Doric Interpretation	8D				X	X	2.5D-10D-2.5D
Kütahya	Doric Interpretation	6.5D						3.75D-7D-3.75D
Kalecik	Doric Interpretation	8D				X	X	4.75D-4.75D-4.75D
Çivril	Doric Interpretation	8D				X	X	7.75D
Milas	Doric Interpretation	10D						11.5D
Safranbolu	Eclectic	8.5D						5.75D-7.5D-5.75D
Erdek	Eclectic	10.5D						5.25D-5.25D-5.25D
Taşköprü	Eclectic	12.5D						5D-6.25D-5D
Muğla (South)	Eclectic	12D						5.33D-5.33D-5.33D
Muğla (North)	Eclectic	10D						6.75D-9.5D-6.75D
Mesudiye	Corinthian Interpretation	11D						10D
Siverek	Corinthian Interpretation	8.5D						1D-9D-9D-9D-1D

Another important point is to compare the column orders of government palaces with the orders of the book of *Usul-ü Mimari-i Osmani*: No formal relationship was found between the analysed government palaces and the 'new Ottoman columns' defined in the book of *Usul*. However, there are some similarities between the order rules defined in the book of *Usul* and the column orders of the government palaces:

- The rule that column heights should be a whole-number multiple of the column 'radius' was adhered to in all government palaces.

- In addition, the column proportions of the Erdek [10.5D], Ta köprü [12.5D], Mu la-South Façade [12D] and Mesudiye [11D] palaces, which fall outside the range of classical column height proportions [6D – 10D], are within the range defined in the book of *Usul* [column shaft heights: 5D – 13D].
- The idea of placing drop arches on the columns was a characteristic of the Kastamonu, Sivas and Kalecik government palaces.

CONCLUSION

Within the context of the analysed buildings, Ottoman architects' interpretations of classical antiquity's column orders can be summarized as follows:

- In all of the analysed examples, the columns were related to the classical column orders in terms of form. Elements of the classical column orders were incorporated into Ottoman architecture, sometimes remaining faithful to their original forms and sometimes newly interpreted.
- In terms of proportion, although intercolumniations did not comply with the classical arrangements, they were proportioned according to the diameter. With respect to column heights, even though they did not 'completely' comply with proportions of primary authorities [Vitruvius, Alberti, Serlio, Vignola and Palladio], the column height was determined to be a whole-number multiple of the 'radius', using the column diameter as the module (Table 5).
- After these formal and proportional observations, it appears more convincing to conclude that the focused system of "Ottomanized" versions of column orders have some similarities with European classical canons within the context of basic proportion principles.

In addition to these, the fact that the columns rose only over one floor led to the design of columns with thin shafts and wider intercolumniations. However, in Western classical architectural theory and applications, porticos rise along the entire façade, which leads to columns with thick shafts and narrower intercolumniations. Planning perceptions and the classical Ottoman architecture tradition should be considered as reasons for this design feature: as a functional preference, there were cantilevers in the rooms that were designed for the highest-ranking officers, which were mostly located on the porticos of Ottoman government palaces. Furthermore, unlike in the original Western classical examples, the fact that the porticos rose to the first floor created a more modest scale that did not suppress the people, which is also a widely known characteristic of the classical Ottoman architecture tradition.

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