

# **Bird's eye views – visual axes – scenographic effects: Filippo Juvarra's multi-perspective spatial conception in CAD visualization**

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The present essay is intended to describe the aims and findings of the case study "Filippo Juvarra's 1705 Palace Project and Garden Plan", conducted by the Bibliotheca Hertziana in the framework of the 3D-BRIDGE Project<sup>1</sup> funded by the EU and other sponsors. This Project ran from September 2005 to August 2006. Its task was to suggest ways in which the architectural heritage of Europe could be documented and disseminated through 3d-visualization and what contribution virtual models could make to the solution of problems in architectural history<sup>2</sup>. The case study of the Bibliotheca Hertziana derived from the research interests of Elisabeth Kieven. It aimed to recreate the multi-perspective spatial conception of Filippo Juvarra (1678-1736) by means of an all-inclusive CAD model of his 1705 Palace Project and Garden Plan (fig. 1)<sup>3</sup>.

The Sicilian-born architect Filippo Juvarra<sup>4</sup> (1678-1736) came to Rome in 1704 and entered the workshop of Carlo Fontana, who invited him to participate in

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<sup>1</sup> Homepage of the Project: <http://www.arthis.jyu.fi/bridge/jkl.php>

Homepage of the Bibliotheca Hertziana 3d-bridge project research findings:

<http://www.biblhertz.it/deutsch/forschung/3d-bridge.htm>

<sup>2</sup> cf. Schlimme, Hermann: "CAD und wissenschaftliche Methodik. Die Rekonstruktion von Borrominis erstem Entwurf für die Fassade von San Carlino", in: *Der Modelle Tugend. CAD-Modelle und die neuen Räume in der Kunstgeschichte*, Marcus Frings (ed.), Weimar: VDG, 2001, pp. 133-144; Schlimme, Hermann: "Les restitutions d'édifices en trois dimensions. Une façade non-réalisée pour Saint-Charles-aux-Quatre-Fontaines" in: *Méthodes en histoire de l'architecture. Cahiers de la recherche architecturale et urbaine*, numéro 9-10, janvier 2002, pp. 109-112.

<sup>3</sup> The procedures and findings described here were already presented in an abridged version at the conference "3D-BRIDGE – Transferring Cultural Heritage with new Technology", held in Rome from 19 to 21 June 2006; Homepage of the Conference:

<http://www.arthis.jyu.fi/bridge/rome.php>

<sup>4</sup> On Juvarra see among others: Gritella, Gianfranco: *Juvarra. L'architettura*, Modena: Panini, 1992; Millon, Henry A.: "Filippo Juvarra (1678-1736)", in: *Storia dell'architettura italiana. Il settecento*, Giovanna Curcio and Elisabeth Kieven (eds.), Milano: Electa, 2000, pp. 516-539.

the Concorso Clementino held by the Accademia di San Luca in 1705. The object of the competition was to design a *Regio palazzo in villa per il doporto di tre personaggi egualmente divido e distinto per se stessi, e loro Corte con tutti gl'annessi, e connessi nella conformità* (“Royal palace in villa as residence for three personages, evenly divided and separated for themselves and their court, with all annexes and surrounding buildings in conformity”).

Juvarra won the first prize with his project (here named “1705 Palace Project and Garden Plan”) that was sensational in several respects. First of all, his drawings measuring 1.00 x 1.30 m were the largest ever entered for a competition<sup>5</sup>. Juvarra also set new standards with the quality of his architectural design and the quality of his drawings. He designed a huge garden, which is developed as approximately three quarters of a circle/dodecagon around the palace placed at its centre. A canal, passing along the site, opens up to form a depressed octagon in front of the palace. The octagon is delimited by bridges and surrounded by four secondary buildings (fig. 2). A crucial feature of Juvarra’s plan is that he did not only design the palace itself (and its ancillary buildings), but also the circular colonnade that surrounds it and a whole series of further architectural features, such as garden walls, raised parterres or *orangeries*. These condition the visibility of the central palace building and turn it into a scenographically framed architecture that becomes visible in ever-changing spatial contexts.

The layout is vast in measurement. The enormous circular element formed by the garden has an overall diameter of c.824 m; the circular court surrounding the palace at its centre has a diameter of 305 m. Even if the garden is enclosed with walls and on the outside, additionally, by a screen of high trees, it has nothing of the intimacy of a Renaissance garden. With its width of 188 m, it would appear wide-open to the person strolling through it. In addition, visual axes are created by gateways in the outer perimeter through which paths radiate outwards far beyond the garden itself, i.e. they lead into an even greater dimension. So Juvarra has not only grasped the huge extension of his project, but also carefully differentiated it. Admittedly, in point of size alone, Juvarra’s project is dwarfed by Versailles (fig. 3),

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<sup>5</sup> On Juvarra’s architectural drawings cf. Kieven, Elisabeth: *Von Bernini bis Piranesi. Römische Architekturzeichnungen des Barock*. Stuttgart: Stuttgarter Galerieverein e.V. ; Graphische Sammlung, Staatsgalerie Stuttgart, 1993; Marconi, Paolo; Cipriani, Angela; Valeriani, Enrico: *I disegni di architettura dell'Archivio Storico dell'Accademia di San Luca*. Roma: De Luca, 1974; cf. also the research project “Lineamenta”, a database of architectural drawings, Homepage: <http://lineamenta.biblertz.it:8080/Lineamenta/>

but the palace buildings themselves are similar in dimension. Juvorra's project, besides, – as we have just mentioned – is not circumscribed but continues outwards beyond the edges of the drawing as a park layout.

In his second drawing (fig. 4) Juvorra concentrates on the palace building at the centre of his layout. In the upper half of the sheet are the section and elevation; in the lower half, a ground plan, showing two storeys of the building, on a fictive inset sheet (all on the scale of 1:224). The palace building is developed around a hexagonal courtyard. Three cuboid palace wings alternate with three more slender wings, each containing a large convexly projecting oval salon. The wings are firmly concatenated. The oval salons seem like hinges connecting the cuboid wings. But at the same time, each of the oval salons forms the midpoint of a continuous concave facade, which appears as an absolutely coherent element, though it is made of parts of the salon wing and the adjacent cuboid wings. The result is a continuous facade and a ground plan, which seems to be in a rotary movement.

The third drawing (fig. 5) shows the complex seen from afar and from close up. The two upper registers contain longitudinal and transverse sections through the whole layout, from one end of the park to the other. The third register and the lower left part of the sheet show detailed views of one of the side buildings; a series of different garden portals is represented to the lower right. The simultaneous presentation, with its rapid alteration of standpoint and distance, enables the spectator to grasp the project in all its complexity, as Elisabeth Kieven has pointed out in a lecture held at the International Congress of the History of Art in Montreal<sup>6</sup>.

Juvorra produced the biggest sensation in his bird's eye view (fig.6), which had not been called for in the competition announcement. The curvilinear and spatially complex project would in fact have been hardly presentable in the form of orthogonally projected plans, elevations and sections alone. As Kieven has shown in her above-mentioned lecture, Juvorra's intensive engagement with the bird's eye view (he for example used it also for the design of the Royal Palace in Lisbon, 1719) reflects the contemporary representational modes of the *veduta*. Juvorra was a friend of the then celebrated painter of *vedute* in Italy, Gaspar van Wittel (1656-1736). Walter Vitzthum first indicated the strong reciprocal relationship between the

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<sup>6</sup> Elisabeth Kieven, "Vedutismo als bauliches Konzept. Zur Analyse bildorientierter Raumvorstellungen mit aktuellen Visualisierungstechniken", lecture given at the 31<sup>st</sup> International Congress of the History of Art, 23-28 August 2004, Montreal, Canada.

perceptions (Blickweisen) of Juvarra and the representations of van Wittel<sup>7</sup>. A further precondition of this image-oriented representational technique consisted of the urban scenographies of seventeenth-century Rome. Especially the great piazzas of Rome (Piazza San Pietro, Piazza del Popolo, Piazza Santa Maria della Pace) were equipped with spectacular visual axes and motion sequences and thereby transformed into urban stages. Pope Alexander VII. asked Giovan Battista Falda (1643-1678) to represent this new urbanistic performance in series of engravings. The serial production of urban *vedute* of Rome culminated between the late seventeenth and mid-eighteenth century and put not only the monuments themselves but also their urban situation into the focus of attention. The Spanish Steps and the Fontana di Trevi are not just spectacular buildings – they transform their surroundings into theatrical sets and turn thereby *vedutismo* into an architectural concept. Architectural drawing is correspondingly enriched with bird's eye views and perspective projections; the urbanistic context transforms the ground plans into presentations of secondary importance. In this process, Filippo Juvarra played a key role. Not by chance at the same time he invents a new type of scenographical drawing, the architectural *capriccio*, i.e. a fantastic scenographic composition assembled piecemeal from architectural fragments. The importance of scenographical representation for the work of Juvarra is furthermore underlined by hundreds of stage set designs from his hand (see below). For Juvarra, however, the bird's eye view was conceived not only as a form of representation, but was also his tool for architectural planning itself<sup>8</sup>.

Juvarra was appointed court architect in Turin in 1714 and was given the opportunity to design and build a series of important buildings, both secular and religious, in Turin and its environs, for which the scenographic approach is particularly evident. As Kieven was able to show in the above-mentioned lecture<sup>9</sup>, Juvarra, in his design for the Superga, the new funerary and votive church built for the house of Savoy on a dominant hilltop above Turin (from 1716, fig. 9), explored the building's scenographic effect with the help of sketches. Thanks to its hilltop position, the building was visible from a wide range of viewpoints. Juvarra paid

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<sup>7</sup> Walter Vitzthum, "Gaspar van Wittel e Filippo Juvarra", in: *Arte Illustrata*, 41-42 (1971), pp. 5-9.

<sup>8</sup> Elisabeth Kieven, "Vedutismo als bauliches Konzept. Zur Analyse bildorientierter Raumvorstellungen mit aktuellen Visualisierungstechniken", lecture given at the 31<sup>st</sup> International Congress of the History of Art, 23-28 August 2004, Montreal, Canada.

<sup>9</sup> Ibidem.

special attention to the effect of the oblique axes. Undoubtedly his decision not to align the two flanking *campanili* with the dome of the church, in the way he had done in his church plan of 1707 (fig. 7), but to thrust them back until they are almost standing behind the dome, was motivated by scenographic considerations: for in this way the dome is better visible and at least one of the towers would be visible alongside the dome from whatever diagonal viewpoint one looked.

That this scenographic approach must have already played a decisive role in the composition of the palace design of 1705 is made plain not only by the bird's eye view but also by a detail drawing now in Madrid (fig. 8). There, Juvorra examines how the palace would be visible from one of the approach roads.

If we look at the drawings for the 1705 palace project, we could well assume they were only conceived for their graphic effect. We in fact recognize their formal coherence and graphic perfection. But we must understand the palace project also as a plan intended to be built. The project functions in detail: the stairs in the palace have a gradient of 1:2, in other words they have a comfortable ascent, as prescribed for princely residences. The stables have the right dimensions in all details. The roads are some 18 m in width: broad enough, in other words, for two coaches to comfortably pass each other without inconveniencing those walking in the palace grounds. The paths in the garden parterres, clearly designed for pedestrians, are 6 m broad. Here a well-developed functional conception is apparent. And it is precisely these details that in the end differentiate a project that can actually be built from a well-represented conceptual idea. This is underlined not least by the care with which Juvorra handles the garden details (fig. 5). The bird's eye view (fig.10) however does not show the project as presented in the other drawings (figs. 2,4,5). It shows the palace building outside its planned context and instead surrounded by only a few perfunctorily drawn garden details that are meaningless in themselves and only serve to fill up the space and to give a context to the building. The palace with a façade length of approximately 28 m is clearly represented too small in the bird's eye view. According to the scale of the ground plan (fig.4) it ought to be 62 m broad. Furthermore the palace in the bird's eye view differs in several details from the other drawings, for example as far as the fenestration of the oval volumes is concerned.

**To sum up:** (1) the 1705 palace project is to be understood not just as a brilliant conceptual idea, but as architecture that, from a conceptual point of view, attained a state of actually being realizable. (2) Filippo Juvorra adopted a

scenographically dominated planning method. (3) The bird's eye view, demonstration of this approach, does not show the real project (fig.10): the building represented in it is clearly smaller and is shown without its crucially important context. We therefore do not have the "scenographic version" of the 1705 palace project presented in the figures 2, 4 and 5. But it is precisely this information that would be of crucial importance for understanding it. The scenographic character of the project can, however, be reconstructed and elucidated with the help of a virtual CAD model. So it was meaningful and necessary to build a virtual model. A wooden model, by contrast, would hardly be suitable to discover the *vedute*, scenographies, etc. that Juvarra had in mind: only by getting inside the model, and moving about within it, would it be possible to discover Juvarra's intentions.

**The CAD-model:** In a previous feasibility study, the present writer had produced a virtual model (fig. 7) of the church project that Juvarra prepared on the occasion of his election as member of the Accademia di San Luca in 1707 (dono accademico). As in the feasibility study, the CAD model for the palace project was deliberately kept simple in its elementary cubic forms and textured with the corresponding parts of the drawings. The 1705 palace model was produced by Günter Eger using the Maya programme and made accessible through the Unreal Tournament engine in the web (fig. 1)<sup>10</sup>. Unreal Tournament was specifically developed for computer games. This technology was of particular interest to the Hertziana case study, since it permits the observer to move about through the model in real time and in an intuitive way. The text of Günter Eger<sup>11</sup>, published on the same website as the present text, describes how the model was developed from a more technical viewpoint and describes the findings about Juvarra's project that emerged during the elaboration of the model.

In the following, some new insights regarding Juvarra's Palace Project, which have been achieved with the aid of the CAD model, will be outlined. Let us take a comparison between Juvarra's Madrid sketch (fig. 8) and the model (fig. 11) as a starting point. Seen from a distance the silhouette of the palace seems compact. But the closer the observer comes, the effect of the building changes. As soon as the observer walks through the colonnade and gains an unhindered view of the palace façade, the central block of the building emerges clearly in the foreground, while the

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<sup>10</sup> Download page: <http://www.biblhertz.it/deutsch/forschung/3d-bridge.htm>

<sup>11</sup> Günter Eger's text can be found on the website  
<http://www.biblhertz.it/deutsch/forschung/3d-bridge.htm>

side wings retreat into the background (fig. 12). The difference between the view from close up and the view from afar is even more significant on the axis road, which leads towards the convexly projecting oval salons (Axis B). Here the compact silhouette of the façade in the view from afar (fig. 13) becomes a concave frontage, which opens itself up and seems to welcome the visitor (fig. 14). In both cases the visitor who approaches the palace building along the main axes always sees the respective central projecting block (risalit) in its full width and, in some sense, as the goal of movement, whereas the rest of the palace is overlaid by the garden walls and colonnades that flank the access roads. As soon as the palace becomes fully visible, it completely fills *c.*60°-67° of the field of vision (fig. 15). This angle corresponds roughly to the field of vision that a spectator had of the stage in theatres of the time, if he were sitting close to the stage. It thus seems to correspond to the maximum that a stage was intended to occupy in the spectator's field of vision (cf. the Teatro Ottoboni in Rome, for which Juvarra later produced some of his stage designs [fig. 17] and which he drew in plans and section<sup>12</sup>). So the palace also has a powerful visual effect, if it is observed from within the colonnade. In the view of the observer, who moves about inside the colonnade, the strict symmetry of the palace complex immediately disintegrates, and constantly new sections of the many-layered and dynamically conceived palace architecture will disclose themselves to him as he strolls about. Since these sections are framed by the columns and the entablature of the colonnade, they have a similar effect as theatrical sets. Further aspects underline this analogy: just as in a theatre the spectator looks at the brightly illuminated stage from the darkened auditorium, so he sees the lit-up palace from the shadowed colonnade (figs. 16, 18). A direct comparison between the scenographic effect of the palace and Juvarra's later stage-set designs will show the similarities (figs. 16-17; 18-19)<sup>13</sup>. The interaction between the palace exterior and the colonnade is of course only one of the many interactions between the buildings of the plan. As a further

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<sup>12</sup> Juvarra's drawings are in the Biblioteca Nazionale in Turin, Ris. 59,1, ff.1, 2a and 3; published in Viale Ferrero, Mercedes: *Filippo Juvarra. Scenografo e architetto teatrale*, Torino: Edizioni d'arte Fratelli Pozzo, 1970, pp. 298, 300-301. For people seated in the middle of the galleries of course the stage occupied a much smaller field of vision. Juvarra drew the fields of vision from different positions on the galleries into the section and one of the plans of the Teatro Ottoboni.

<sup>13</sup> Juvarra's designs for stage sets are published by Griseri, Andreina; McPhee, Sarah; Millon, Henry A.; Viale Ferrero, Mercedes: *Filippo Juvarra. Drawings from the Roman Period. 1704-1714*. Part II, Roma: Edizioni dell'Elefante, 1999; Viale Ferrero, Mercedes: *Filippo Juvarra. Scenografo e architetto teatrale*, Torino: Edizioni d'arte Fratelli Pozzo, 1970.

example we may cite the interaction between bridges, one of the secondary buildings and the palace, which also recurs in Juvorra's designs for stage sets (figs. 20-21).

It is equally informative to observe which parts of the layout can be seen from the *piano nobile* of the palace (fig. 22). While the artificial lake remains well within the field of vision, nothing is visible of the enormous garden parterres that surround the palace, since they are hidden by the colonnade and the circular building that runs concentrically round it, presumably intended to serve as *orangeries*. The outer perimeter of the garden can only be surmised from the tall rows of poplars. Visible, on the other hand, are the garden entrances, crowned with obelisks, that are no less than 23 m high. The immediate context of the palace is revealed as a rather urban and not a villa-like situation.

A comparison with the scenographic effect of wooden models is also interesting. In 1718 Carlo Maria Ugliengo built a wooden model based on Juvorra's drawings for the planned castle layout in Rivoli. The building of the castle itself was begun in the same year, without being ever completed. Within 3d-bridge, the wooden model was also transformed into a CAD visualization form (figs. 23-24). In Rivoli Juvorra neither planned nor drew any ancillary buildings. Yet the building itself is not without scenographic effects: scenographic interaction takes place in its sequence of rooms, for instance in the stairwells in the north-west side, which are partly incorporated in the projecting blocks and partly left open. These situations are comparable with the vaulted passages in the 1705 palace project and also with the corresponding designs for stage sets (figs. 25-26).

**Results:** Filippo Juvorra's 1705 palace project must be described as a fully realizable design for a palace and its surroundings. The fact that the competition announced by the Accademia di San Luca called for the project to be represented in the orthogonal projections of ground plan, elevation and section had hitherto concealed the scenographic quality of the 1705 palace project and garden plan, which is one of the main distinguishing feature of Filippo Juvorra's completed buildings. This quality was hitherto only partially visible in the drawing preserved in Madrid and in the bird's eye view, which however shows a reduced version of the project. Thanks to the use of critical CAD visualization it was possible to make this scenographic quality of the palace project comprehensively visible and accessible to art-historical analysis. In the process spatial concepts became visible that recur in Juvorra's later buildings and stage-set designs. Juvorra conceived the spaces within



and between the buildings as sceneries: the buildings reciprocally condition their visibility and are turned into scenographically framed architectures that become visible in ever-changing spatial contexts. The differentiation between the view from close up and the view from afar was evidently studied in detail by Juvarra. The project, in its design of the palace at the centre of a huge surrounding garden layout, is characterized as an urban rather than villa-like layout since the garden is not even visible from the *piano nobile*. The CAD model that was developed also provides a viable basis for further research. The role of the 1705 palace design as a prototype for Juvarra's castle in Stupinigi, built from 1729 on (fig. 27), seems to be confirmed. A comparative examination of the scenographic features of both projects, transcending the immediate goals of the present case study, has already been begun. Altogether the case study has extended our understanding of Juvarra's design methods and spatial concepts and at the same time has shown how the use of a virtual CAD model can help elucidate scientific questions in the history of architecture and contribute to a better understanding of Europe's cultural heritage. In this sense the case of Juvarra's palace project is paradigmatic. The drawings for the 1705 Palace Project and Garden Plan were exhibited in the Roman Accademia di San Luca for over a century. The European aristocracy sent their architects to study at the Roman Academy in the seventeenth and eighteenth century. Cultural transfers like this made a decisive contribution to the development of a European court style in the eighteenth century.

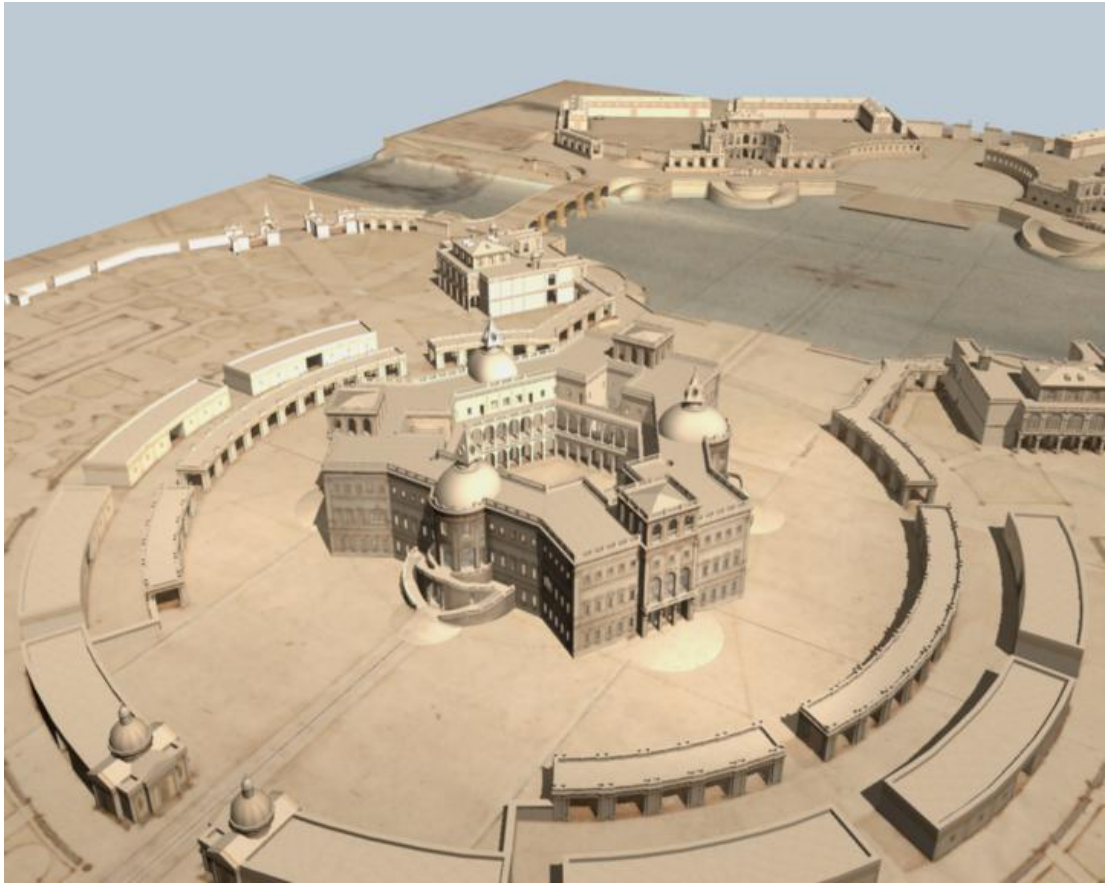


fig.1: Filippo Juvarra, Palace Project, 1705, CAD model

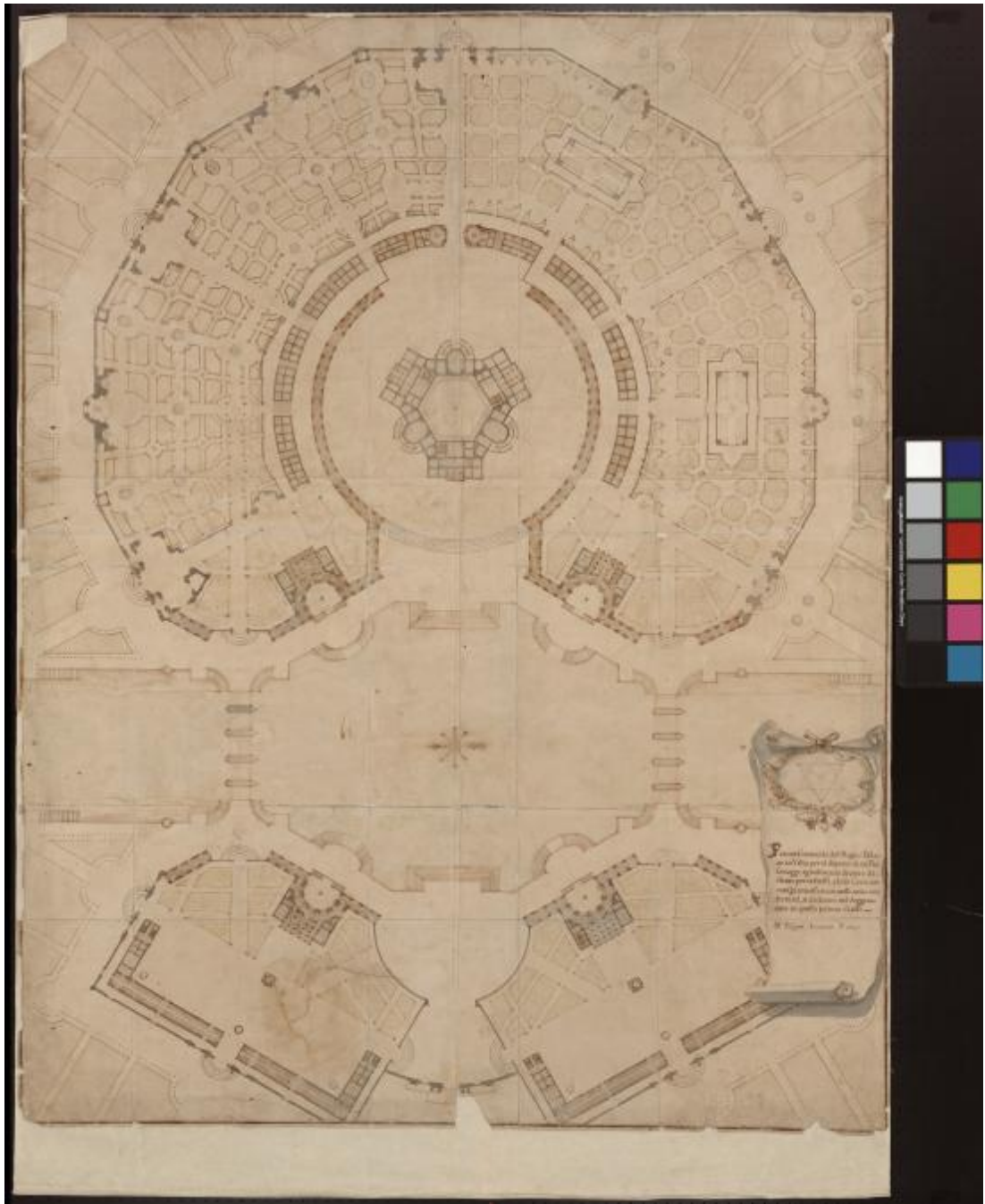


fig.2: Filippo Juvarra, Palace Project, 1705, Archivio Storico dell'Accademia di San Luca, Roma, 140

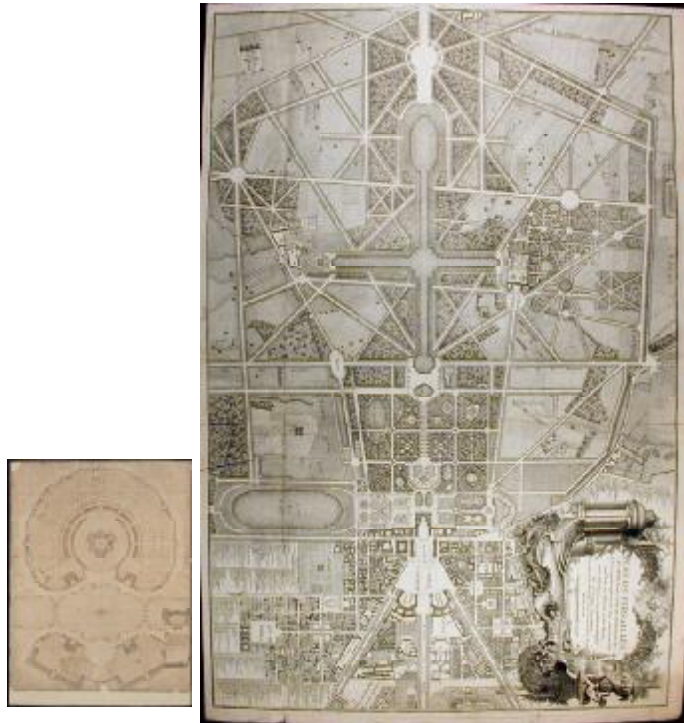


fig.3: Scale comparison of size: (1) Filippo Juvarra, Palace Project, 1705, Archivio Storico dell'Accademia di San Luca, Roma, 140; (2) Jean Delagrive, Plan de Versailles, du Petit Parc, et des ces Dependences, 1746

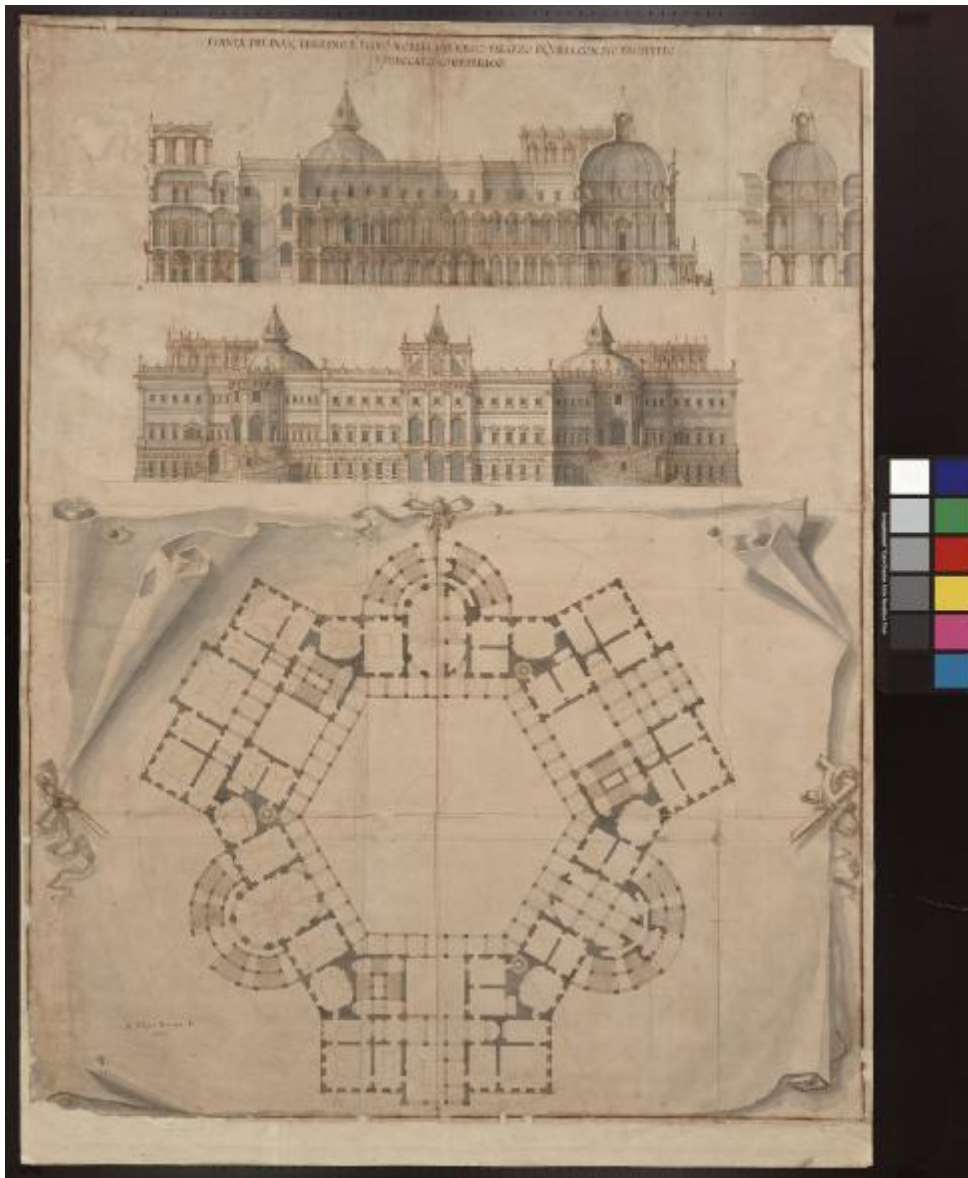


fig.4: Filippo Juvarra, Palace Project, 1705, Archivio Storico dell'Accademia di San Luca, Roma, 141

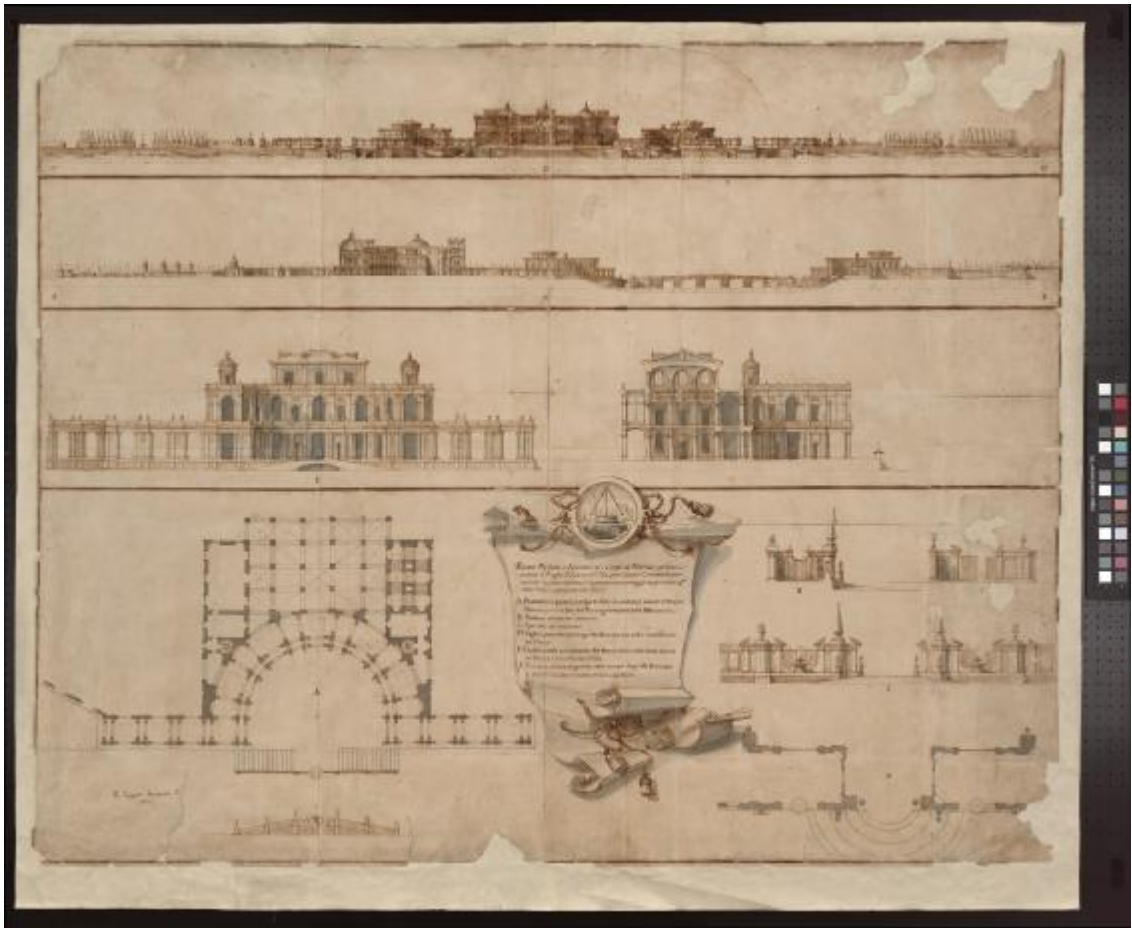


fig.5: Filippo Juvarra, Palace Project, 1705, Archivio Storico dell'Accademia di San Luca, Roma, 142



fig.6: Filippo Juvarra, Palace Project, 1705, bird's eye view, Berlin, Kunstbibliothek, Hdz. 1151



fig.7: Filippo Juvarra, Church Project, 1707, CAD model

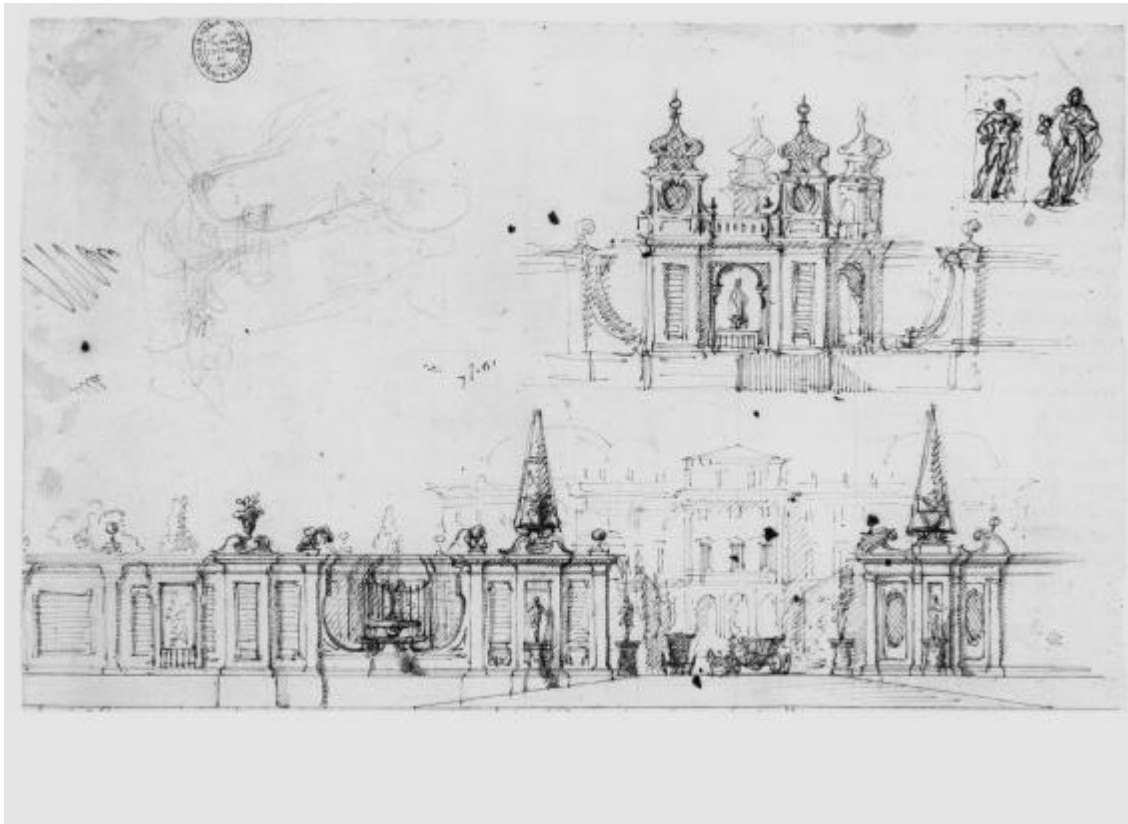


fig.8: Filippo Juvarra, Palace Project, 1705, Sketches of a central approach road to the palace, Madrid, Biblioteca Nacional, Dib. 8163



fig.9: Filippo Juvarra, Superga near Turin, from 1716



fig.10: Comparison: (1) Filippo Juvarra, Palace Project, 1705, bird's eye view, Berlin, Kunstbibliothek, Hdz. 1151; (2) Filippo Juvarra, Palace Project, 1705, CAD model, bird's eye view





fig.11: Filippo Juvarra, Palace Project, 1705, CAD model, axis road A, view from afar



fig.12: Filippo Juvarra, Palace Project, 1705, CAD model, axis road A, view from close up



fig.13: Filippo Juvarra, Palace Project, 1705, CAD model, axis road B, view from afar



fig.14: Filippo Juvarra, Palace Project, 1705, CAD model, axis road B, view from close up

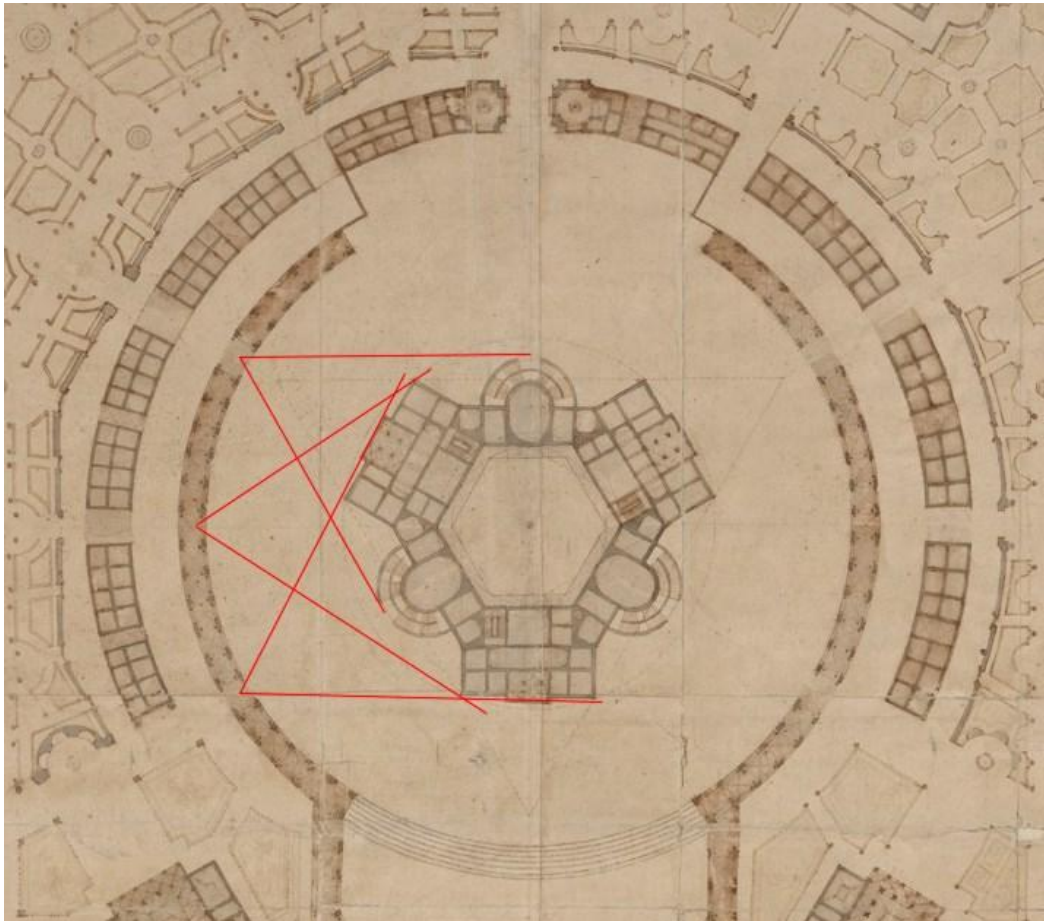


fig.15: Filippo Juvarra, Palace Project, 1705, Archivio Storico dell'Accademia di San Luca, Roma, 140, with angles of field of vision



fig.16: Filippo Juvarra, Palace Project 1705, CAD model, view of the palace from the colonnade



fig.17: Filippo Juvarra, design for stage-set for the third scene of the stage play *Teodosio il giovane*: “Imperial Palace and Part of the Garden”. Performed in the Teatro Ottoboni in Rome, 1711. London, Victoria and Albert Museum, f. 42 (from: Viale Ferrero, Mercedes: *Filippo Juvarra. Scenografo e architetto teatrale*, Torino: Edizioni d’arte Fratelli Pozzo, 1970, fig. 26, p. 144)



fig.18: Filippo Juvarra, Palace Project, 1705, CAD model, view of the palace from the colonnade

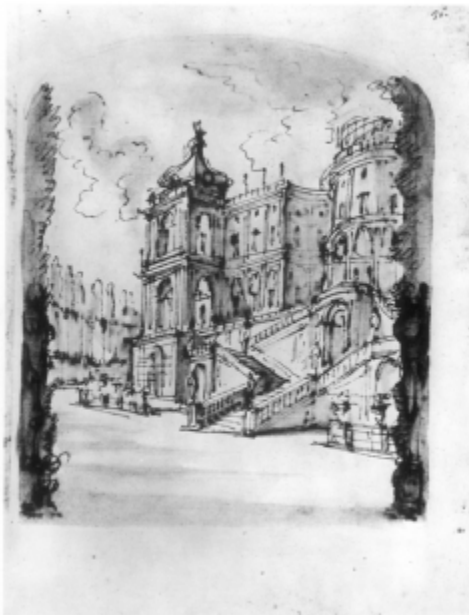


fig.19: Filippo Juvarra, design for stage-set for an unidentified stage play. London, Victoria and Albert Museum, f. 42 (from: Viale Ferrero 1970, op. cit., fig. 108, p. 226)



fig.20: Filippo Juvarra, Palace Project, 1705, CAD model, view of a bridge, a secondary building and the palace



fig.21: Filippo Juvarra, design for stage-set for the fourth scene of the stage play *Ricimero*: “Roman Vedute”. Performed in the Palazzo Reale in Turin. Turin, Museo Civico, (B), Dis. n. 114 (from Viale Ferrero 1970, op. cit., fig. 163, p. 281)



fig.22: Filippo Juvarra, Palace Project, 1705, CAD model, view from the *piano nobile* of the palace

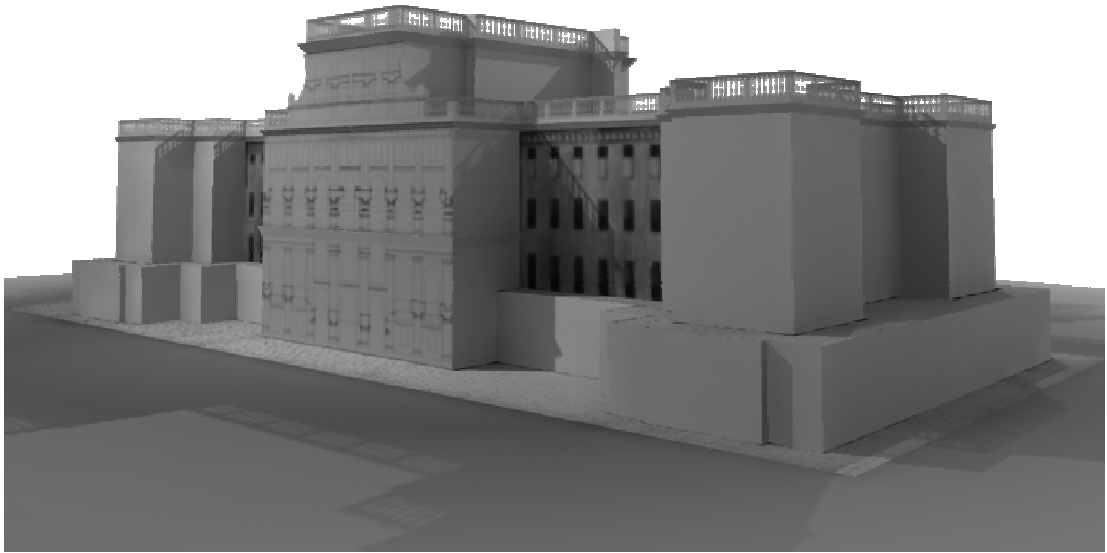


fig.23: Carlo Maria Ugliengo, wooden model based on Filippo Juvarra's design for the castle at Rivoli, 1718, Turin, Museo Civico d'Arte Antica e Palazzo Madama. CAD visualization, view from west

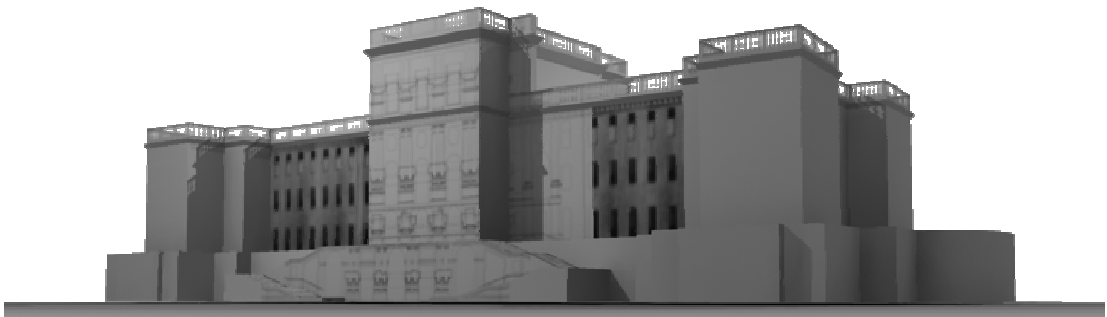


fig.24: Carlo Maria Ugliengo, wooden model based on Filippo Juvarra's design for the castle at Rivoli, 1718, Turin, Museo Civico d'Arte Antica e Palazzo Madama. CAD visualization, view from south





fig.25: Filippo Juvarra, Palace Project, 1705, CAD model, passage through the palace



fig.26: Filippo Juvarra, design for stage set for an unidentified stage play. London, Victoria and Albert Museum, f. 75 (from: Viale Ferrero 1970, op. cit., fig. 113, p. 231)



fig.27: Filippo Juvarra, castle of Stupinigi near Turin, from 1729