

Nineteenth-Century Working Drawings: An Art, A Craft, An Ideology

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Introduction

When reporting the progress of the Paris Opera project, Charles Garnier proudly stated once that the number of large size working drawings, completed between 1862 and 1867 neared 30,000.¹ Garnier's methods were not unique. Voluminous and elegant working drawings became a typical feature of architectural practices of the Second Empire—a sharp contrast even with the 1840's, when drawings were done in much smaller numbers and with more modest graphic technique.² A few decades earlier, working drawings were almost nonexistent—or at least very few drawings from this or from earlier periods have survived.³ If a plausible story of French working drawings could start with their virtual absence in the eighteenth century, it will culminate with a true explosion in the middle of the nineteenth century.

Architects outside of France tried to augment the status of the profession in their own countries by following this practice.⁴ Richard Morris Hunt was among many architects from abroad and one of the first from America, who became familiar not only with the style, but also with practice of architecture during the Second Empire.⁵ A few Americans followed Hunt's experience of architectural studies in France, coming back with high standards of professionalism.⁶ Many more followed the style of the Second Empire and tried to imitate the methods of its production through secondary sources.⁷ French architects of this period and their drawings became subjects of legends, which circulated in the American architectural professional press until the beginning of the twentieth century.⁸ By then architectural working drawings in America were also produced in great numbers and with exceptional graphic mastery.⁹

The explosion of working drawings reflected a fundamental shift in the ideology of French architects and their American followers. According to sociologist Magali S. Larson, one of the roles of ideology in the process of professionalization was to render the privileges attached to the professional status as natural and consensual.¹⁰ French historian of architectural practice Jean-Pierre Épron gives an account of professionalization of architects in nineteenth century France.¹¹ He shows a connection between the evolution of contractual practices, architects' struggle to coordinate construction trades and the shift in professional ideology. One of the claims, on which nineteenth century architects based their quest for authority, became their growing expertise in very menial aspects of construction, which would have been considered inappropriate by their counterparts from earlier periods. The concept of *La fédération des métiers*

was emblematic of the ideology accepted by French architects in the condition of the nineteenth century capitalism.¹²

The juxtaposition of this paradigm with the earlier models is at the core of the argument of this paper. An analysis of the evolution of construction documents reveals another contrast between these two periods. Before the end of the nineteenth century the prevalent method of communication between architects and builders were written texts, with minimal graphics. By the mid-nineteenth century this was completely reversed, with more succinct texts and with architectural graphics having evolved into a discourse shared by architects and contractors. The role



Fig. 1: A sculptural portrait of Richard Morris Hunt, represented as master-mason. A decorative detail of W. K. Vanderbilt mansion, Fifth Avenue, New York, 1879. Source: Baker, Paul R. *Richard Morris Hunt* (Cambridge, Mass.: MIT Press, 1980).

of this discourse—as well as the role of any language, as post-structural theories claim—was to serve as a masquerade of tropes, giving an appearance of timeless, immutable truth to social constructs.¹³ This was not unrelated to another masquerade—costumes of medieval master-masons, whose image late-nineteenth century architects often embraced as an epitome of their professional identity insert Figure 1 here. This paper will outline socio-economic developments behind the construction of the new paradigm that allowed a pre-professional architect

to throw on the garb of the mythical Medieval Craftsman over his suit of a nineteenth century businessman or his blouse of a French bohemian artist.

Eighteenth Century Architectural Graphics: An Exclusionary Discourse

The fact that few working drawings are known to exist prior to

the nineteenth century has not gone unnoticed by architectural historians, even though few of them discussed the subject in depth. The advance of construction technology, the growing division of labor and the pluralism of architectural forms have often been mentioned among the factors that might have catalyzed the process.¹⁴ Other historians have suggested that the paucity of surviving working drawings simply meant less formal relations between eighteenth century architects and builders,

describing such informality in terms implying either greater authority of the architect, supported by the royal power, or greater trust between designers and executors of their designs.¹⁵ I would like to argue that neither of these interpretations could adequately explain the phenomenon. The first of them, true in some cases, does not, however, take into account the fact that quite a few projects in the nineteenth century were not unlike those dating to the seventeenth and the eighteenth centuries and produced almost without working drawings at all.¹⁶ And, contrary to the second perception, construction documents of the eighteenth century were often extensive and formal. Instead of drawings, however, they consisted of written specifications.¹⁷ Characteristically, unlike their contemporary equivalents, specifications from the eighteenth century and beyond included such data as overall building dimensions, heights, sizes of structural members, descriptions of decorative elements—in other words, information that we would expect to find within the realm of architectural graphics. Drawings—and often quite elaborate drawings—were also produced, but mostly for the purpose of discussions with clients. They were considered, it seems, a discourse between the architect and his noble patron, from which the builder was excluded.

The traces of this attitude could be found in several architectural treatises starting from the late seventeenth century. A table from a treatise by Charles-Augustin d'Avilier is one such example.¹⁸ The purpose of the table was to make architects aware of possible discrepancies in terminology with craftsmen, which might have arisen when describing the same architectural elements. The graphics themselves would be sufficient by modern standards, and the necessity of a verbal translation demonstrates the prejudice of the seventeenth century architect.

Pierre Bullet, one of the first members of the Royal Academy of Architecture, expresses this notion in a treatise, published the same

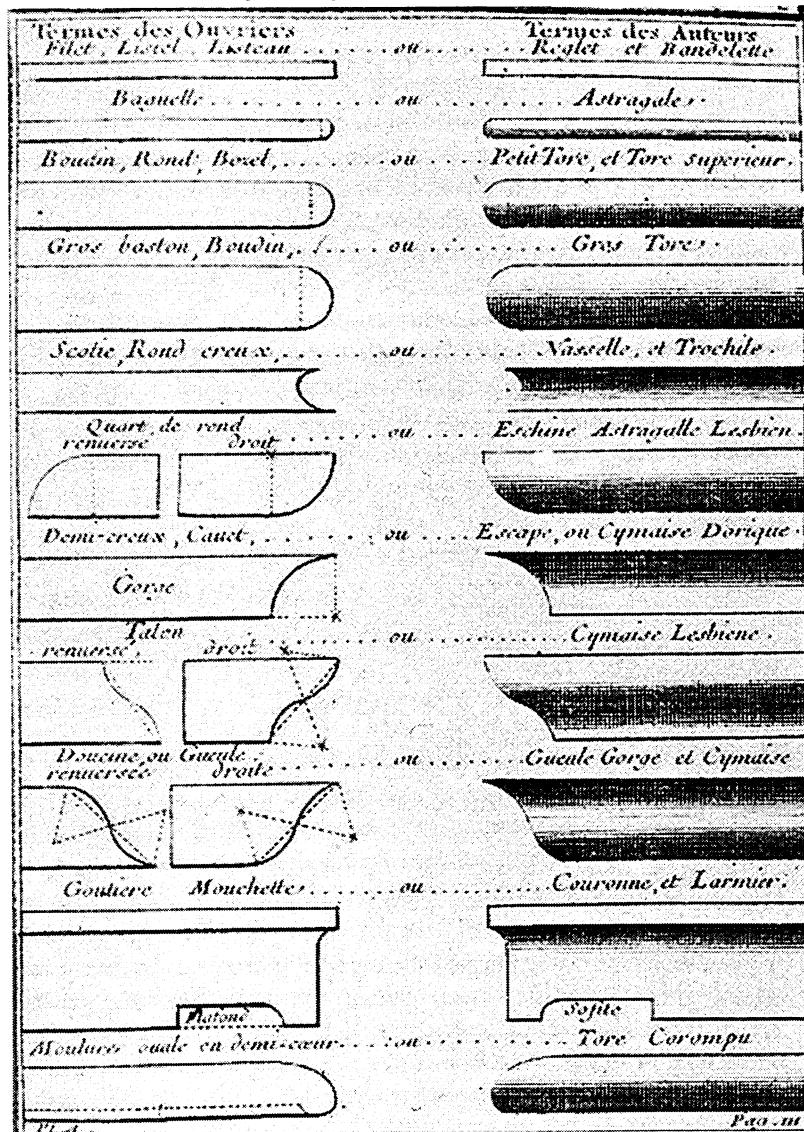


Fig. 2: A table from the treatise of Charles-Augustin d'Avilier. On the left side of the page are terms used by builders; on the right, those used by architects. Source: Picon, Antoine. *French Architects and Engineers in the Age of Enlightenment* (transl. By Martin Thom, Cambridge, England; New York, N.Y.: Cambridge University Press, 1992)

year as d'Avilier's. Architects, he explains, having completed their studies in drawings, should write building specifications—through which builders should be given instructions.¹⁹ In a treatise, written as late as the beginning of the nineteenth century, Jean Baptiste Rondelet formulates the same concept with exceptional clarity:

“A detailed description of a project to be built is referred to as specifications. Such specifications serve to explain its form, the dimension of each of its elements, the manner of their execution... The contractors and the construction workers are usually dealt with by the means of specifications... The specifications are instructions which will be followed by contractors and workers... Therefore, prior to drafting its conditions, it is necessary to determine, by the means of scale drawings and details, the volumes and dimensions of the project.”²⁰

As important as they are, drawings, according to both Bullet and Rondelet, remain an intermediate phase, i.e., not self-sufficient for the purpose of communication between the builder and the architect. French theorist and historian of engineering Antoine Picon describes a similar tendency in the case of eighteenth-century engineers. He admits that their specifications were at least as important as their drawings—even for the purpose of explaining shapes and dimensions of elements.²¹ In contrast to this attitude American professional guidelines some hundred years later are adamant that written instructions—specifications and written notes on drawings—should describe only properties that were impossible to be shown in graphics.²² And such properties did not seem to be numerous—according to the authors of these aforementioned guidelines, as well as judging by American late-nineteenth drawings themselves, whose eloquent graphics seem to cover all aspects of structures with almost no

text attached.

This change in the balance of graphics and written texts is a phenomenon that should be approached from several directions. The drastic drop in the price of paper, which occurred between the 1820's and the 1830's and which transformed it into a thrift material, must have been one of the factors that greatly influenced the development of working drawings.²³ The notion of projective drawing being a natural and an objective mode of representation—which was part of the hegemonic regime of vision, a regime that, according to several theorists, emerged in the beginning of the nineteenth century—was another important condition that allowed the practice to thrive.²⁴ The phenomenon could also be partially explained by the difference between the concept of contract in the eighteenth and the nineteenth centuries, and this aspect—with which architectural historians are not very familiar—needs additional clarification.

The nineteenth century concept of contract viewed every agreement as a mechanism whose role was to establish prices for various products and services every time anew, reflecting a particular state of supply and demand.²⁵ The eighteenth century contracts represented a different perception of the nature of prices. According to this notion, prices for most products and services remained stable over time. They were considered a matter of common knowledge and even if they fluctuated, it was within narrow limits. It was not unusual for the eighteenth century judges to declare contracts void, if they were based on prices that were not “fair.” The nineteenth century contract, on the other hand, allowed each party to bargain to as low a price as they could get, regardless of any precedent, as long as the very exchange was over a legal product or service.

Épron argues that the later concept of contract became the hidden mechanism behind the emergence of the contemporary architectural project.²⁶ Since the beginning of the nineteenth century building contracts *forfaits* have aimed to provide clients with guaranteed stipulated costs of the entire future building or at least of important portions thereof. The concept of the architectural project *projet de l'architecture* emerged to accommodate this type of contracts.

A comprehensive graphic description—the core of contemporary architectural project—was not therefore so critical for the purpose of the *marché*, which was the typical eighteenth century building contract. *Marchés* usually covered smaller portions of the building and did not guarantee the price of the total construction. The prices of materials and labor being fixed, stipulated cost was not the subject of the bargain.²⁷ Measuring during construction was more important—to insure that the number of units was accurate—and, according to Épron, it was one of the protected privileges of building guilds.²⁸ Contrary to the common perception, eighteenth century craftsmen were not disfranchised executors of royal

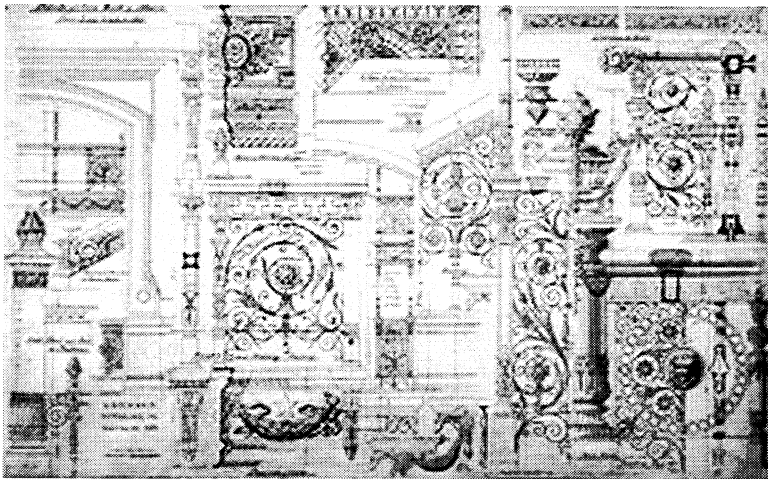


Fig. 3: A typical late nineteenth century American working drawing. Source: Brownell, Charles E. et al. *The Making of Virginia Architecture* (Richmond: Virginia Museum of Fine Arts; Charlottesville: distributed by University of Virginia Press, 1992).

architects' whim. The royal power, the main source of the architect's authority in pre-revolutionary France, also protected the right of the crafts to operate according to their own rules. As architectural historian Robert Neuman explains, contractors were paid upon presenting their certificates *mémoires*, which were based on the estimation method called *toisé*.²⁹ This method of measuring was at the core of the debate that permeates architec-

tural treatises throughout the eighteenth century. Architects attempted to expose the method as unscientific and misleading, often using terms which were belligerent towards craftsmen.³⁰ As an alternative, architects proposed post-construction detailed drawings.

Today it may be difficult to grapple with the notion of construction drawings being done after the completion of a building,

yet this was the case of several construction sketches among those few, surviving from the eighteenth and the early nineteenth centuries. Picon gives indirect, but interesting evidence of the fact that part of the responsibilities of architectural and engineering draftsmen was to record the work at different phases of completion. He noticed that in order to explain structural design eighteenth century draftsmen often showed the future building as if it was incomplete, thus indicating their familiarity with sketching out partially built structures.³¹

A late yet significant example of post-construction detail drawings were those mandated by regulations issued in 1841 by the state agency of *Bâtiments civils*. According to these regulations, contractors were required to keep construction site journals *Attachements* and to make regular entries there, describing in writing and in drawings the work they had completed. Entries were to be reviewed and signed by supervising architects for the purpose of payment to the contractor. In other words, until the beginning of the nineteenth century construction documents in France were primarily written texts, while working drawings were often embraced for the purpose of policing the builder. Working drawings have retained this role up until now. However, the new concept of contract—and the evolution of the surveillance technique—has since overshadowed the role of working drawings.³² Beginning with the nineteenth century, working drawings have been considered rational and objective means of communication between architects and builders. The following sections will question their neutrality and will discuss some intermediate steps of the shift from text to graphics.

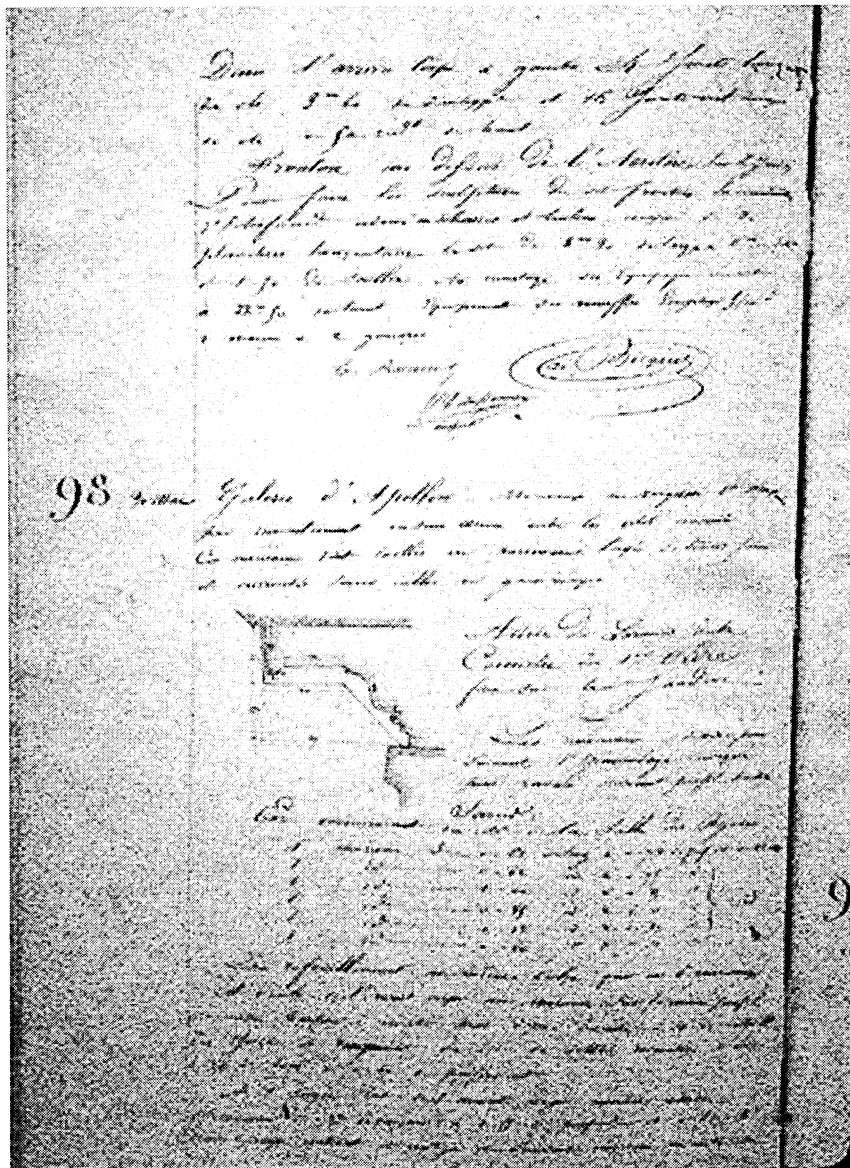


Fig. 4: An entry in a construction journal (*Attachements*) kept during the restoration of the Palace of the Louvre under the direction of Felix Duban in the late 1840s. Source: Archives Nationales de France, Paris.

From Rondelet's treatise to Architects' Construction Sketchbooks

If the nineteenth century concept of contract had been the economic rationale of the contemporary architectural project, it was the French Revolution—the source of new ideals and the end of the practice of craftsmen guilds—that catalyzed the process, eventually leading to a new paradigm of architectural professionalism. Thus, according to Épron, the void created by the ban of construction guilds and architects' search for new sources of their authority were prevalent motifs behind the proposal of reorganization of public construction works, presented by Rondelet to the Revolutionary Government in 1794.³³ The project envisioned a state run construction enterprise, based on a strictly military discipline, with tens of thousands of workers and with architects serving as officers of different ranks.

Rondelet's treatise, therefore, while displaying some attitudes of the eighteenth century architect, also indicates the search of the new ideological basis for the architect's authority. Furthermore, the treatise, written in the 1800's, while Rondelet was developing the course of construction in the Ecole des Beaux-Arts, became itself instrumental in laying down the foundation for the professional ideology of nineteenth century architects in France. The course was to become, according to Rondelet, the first attempt to teach building technology to architects.³⁴ Omitting this aspect of architectural education, he claimed, caused innumerable grievances to generations of architects.³⁵ Rondelet aimed to correct the situation, and proposed to reunite technological and aesthetic aspects of architecture within one system of comprehensive graphic system of representation. Picon notices that with Rondelet sketches of ruins of Antiquity—a long time preoccupation of architects—became an analysis of structure as well as of form.³⁶ This, according to Épron, is a turning point in the evolution of architectural theory, an anticipation of the rationalism of Viollet-le-Duc and Choisy.³⁷ Although Rondelet himself believed that contractors were to be dealt with by means of written specifications and envisioned his own and students' drawings as academic exercises, his treatise and his course indicate a turning point in architects' practices as well.

One of such practices, some first construction sketches, be-

comes reflected in sketchbooks of architectural students and practicing architects in late 1830's.³⁸ As contemporary sketchbooks are usually reserved for analytical studies, freehand drawings and notes, today such a format of construction documents and records might be surprising. A few words should be said, therefore, about this cultural phenomenon, which has yet to be studied. Sketchbooks in general seem to have become a matter of fact only around the 1830's. They were often similar in format, in fact they quite often literally came from the same place: from *Alex. Reichmann, Papeterie et Articles de Dessin, Rue St. Benoît*, a store, located near the Ecole des Beaux-Arts.³⁹ Their content was also similar, representing a social portrait of their owners. Accounts of personal expenses, mixed with brief notes about important professional and social meetings, are found on the same pages as drawings. Small analytical diagrams, comparing buildings of the same type, are found next to sketches of architectural elements. Many sketches reflect Rondelet's influence—they attempt to show both the form and the structure of architectural elements.

Sketchbooks, designated specifically for the purposes of construction administration, looked very similar to architects' personal sketchbooks.⁴⁰ Construction sketchbooks contained, typically, the names of contractors, accounts and observations over the progress of the works, and drawings. These drawings differed in their content—from diagrammatic cross sections and

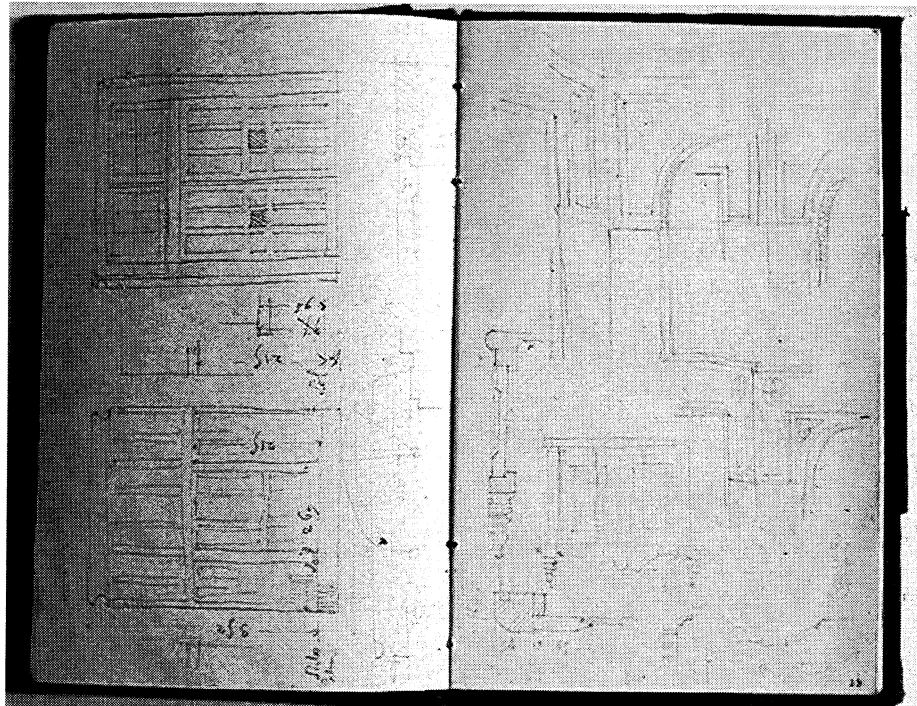


Fig. 5: One of Henry Labrouste's construction sketchbooks. Source: Fond Labrouste, Académie d'architecture, Paris.

elevations to large-scale details—but all of them are done rather informally; without using a straight edge. Many of these drawings were done, most likely, while discussing details on a construction site.

Towards the 1860's, however, the sketchbook and the practice of working drawings parted in different directions. Informal sketches, made for pleasure or self education, and unrelated to the mundane business of construction, stayed on the pages of sketchbooks, while working drawings reappeared in a formal arrangement, on standard large sheets of paper. The common origin of these types of architectural graphics, which are now so far apart, is, however, quite telling of their common social role.

Working Drawings and the Image of the Architect as the Master

Working drawings of French and American Beaux-Arts architects represent a very diverse and virtually unexplored field. However, one apparent characteristic—the absence of written instructions—is consistent throughout the work of many different architects. Working drawings, containing minimal written instruction and relying on graphic symbols, signal to many contemporary practitioners and historians a high level of cooperation between the architect and the builder.⁴¹ This paper, however, argues that this notion, now deeply ingrained in the culture of architectural practice, is in fact a product of a cultural construction dating to the second quarter of the nineteenth century.

An increasing involvement in the matters of construction went hand in hand with a significant shift in architects' rhetoric, which stood in sharp contrast with the image of the craftsman as the

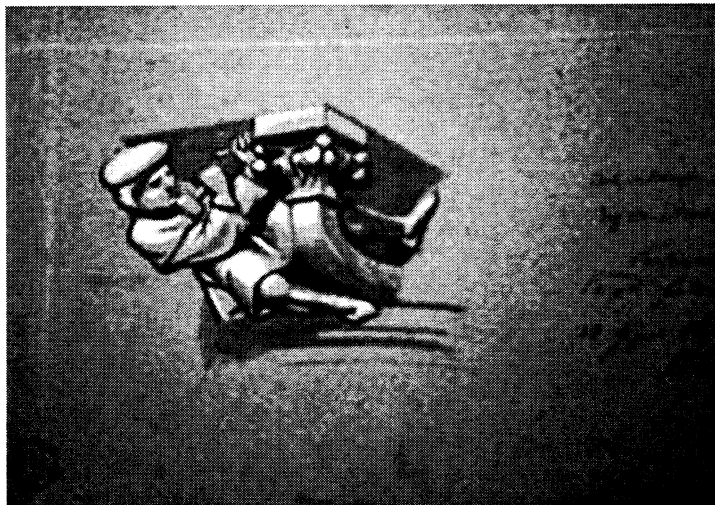


Fig. 7: A working drawing from the restoration of the Imperial Castle of Pierrefonds by E. E. Viollet-le-Duc. Source: *Médiothèque du Patrimoine de France, Paris*.

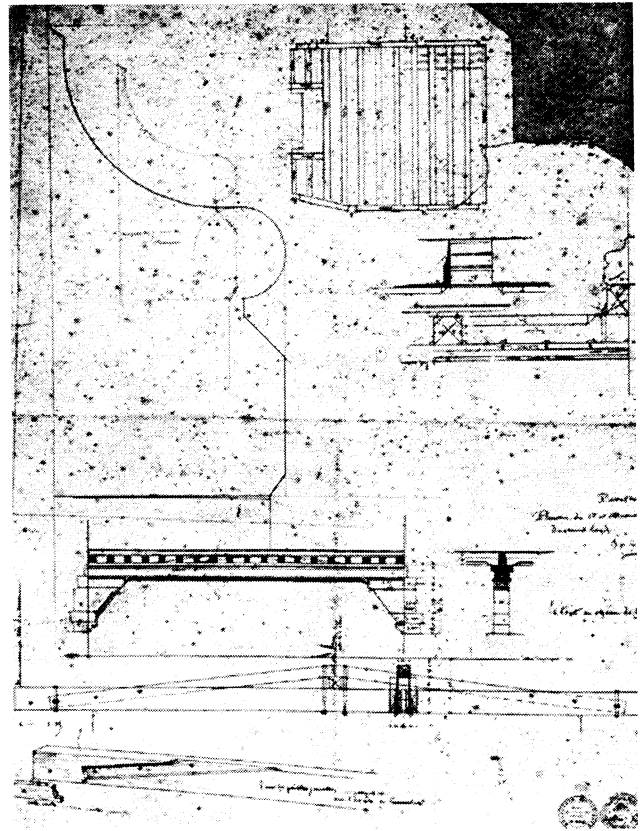


Fig. 6: A working drawing from the restoration of the Imperial Castle of Pierrefonds by E. E. Viollet-le-Duc. Source: *Thaon, Bernard, Pierrefonds, ou L'impossible jardin (Paris: Editions latines, 1987)*

architect's competing counterpart that permeated architectural discourse from Philber Delorme to Rondelet. Épron and sociologist Gérard Rincon detect the tone of reconciliation with builders in various theoretical courses, taught in the Ecole.⁴² Historian Marc Saboya mentions that by the second quarter of the nineteenth century the first magazines that were discussing architecture in France addressed contractors as well as architects.⁴³ Unlike the craftsman of the *ancien regime*, the nineteenth-century's building contractor is also included into the discourse of architectural graphics. Drawings ceased to function as a dividing line between the architect and the patron on one side, and the builder on the other. The architect and the builder start using the same language, and though only one of them was speaking and the other was listening, they understood each other without the assistance of a translator *à la d'Avilier*. As anthropologist Edward Robbins stated, the social role of architectural drawings is "[t]he production of consent."⁴⁴ Whether consent existed on construction sites in France of the middle of the nineteenth century and in America some twenty years later, working drawings of the period forcefully insisted on its appearance.⁴⁵

Considering Viollet-le-Duc's fascination with the medieval art and architecture, it is not surprising to find him presenting architects and builders as collaborating craftsmen.⁴⁶ Charles Garnier, whose creative principles

are quite often presented as opposite to Viollet's, shared, however, many of his views regarding the basis of architectural professionalism and discussed collaboration between architects and builders in terms, unthinkable in the eighteenth century. Even as he was having an argument with one of the contractors, he explained specifically, which tasks would augment him to the status of the architect's collaborator and which would not.⁴⁷

This concept of different building trades reaching different levels of collaboration with the architect is present in architectural graphics as well. As theorist of visual perception Kathryn Henderson points out, the level of codification of graphics easily translates into economic and social status.⁴⁸ If the opening of the discourse does signify a democratic ideal, shared by many



Fig. 8: Anton Pilgram, one of the builders of St. Stephen's cathedral in Vienna. Source: Harvey, John Hooper. *The Mediaeval Architect* (London: Wayland, 1972)

of mid-nineteen century French architects, the hierarchy within it is no less telling. Working drawings of this period display architects' mastery of several levels of the discourse. They may be rather dry, when they are directed to builders who performed relatively unsophisticated tasks. On the other hand, when prepared for true collaborators, true craftsmen, such as wood and stone carvers and sculptors, drawings becomes elaborate pieces of graphic art. This hierarchy, however, did not contradict the

architect's self identification with the master-mason, coordinating craftsmen of less prominence, yet performing manually the most complex tasks.

In America, with its Jeffersonian ideal of a society of "worthy men," the ideological appeal of professional architecture represented as a craft, was especially strong. Hunt's personal logo, which was based on his sculptural portrait, incorporated into decorations of W. K. Vanderbilt's New York's mansion, was a reflection of this appeal. An interesting paradox is worthy of mention in this respect. When incorporating their portraits into ornament of their buildings—a practice not infrequent in the case of medieval master-masons to whom Hunt alluded—craftsmen often showed themselves with squares and compasses. Hunt, however, is shown in the process of hewing a stone, an operation which he seldom—if ever—performed himself. The irony of this exchange of tropes is quite telling. In the late Middle Age the square and the compass stood for a growing social division between the leading master and less prominent builders, and it was with these attributes that the medieval craftsman aspired to be represented. During the evolution of the professional architect from the Renaissance until the eighteenth century the ability to draw was increasingly contrasted with the manual—and inherently inferior—skills of builders. Architectural draftsmanship was considered as a social barrier between the architect and his client on one side, and the builder on the other—until the middle of the nineteenth century, when professional architects started communicating with contractors through working drawings, while representing themselves as craftsmen, performing manual operations. A few remaining working drawings of Hunt show the graphic mastery and the competence in technical aspects of construction merging together. While the title of "the Ambassador of Art" might have represented his highest ambition, Hunt's profound knowledge construction technology, his attention to the smallest details of his projects, were also among important aspects of his contribution to architectural professionalism in America.⁴⁹

As "The Ambassador of Arts" and "The Dean of American architects", Hunt tried on many masks. One can also argue that Garnier, for example, preferred pageants, which represented him as a hero of a tragedy.⁵⁰ Yet both—and many other architects with very different creative principles and from very different social backgrounds—shared the ethos of hard work, a self-identification with the class of producers. These, according to Larson, were important parts of the ideology behind the process of professionalization, and in the case of American architecture the image of the mythical Mediaeval Craftsman turned out to be especially suitable.⁵¹

But, as sociologists argue, while legitimizing inequality, ideologies also function as inspiration.⁵² The architect's involvement with the smallest details of construction—a practice that could be burdensome, but also one of the most rewarding aspects of the profession—starts in this period.⁵³ A discourse over architectural elements, which traditionally took place on construction sites, moved towards drafting tables. Behind the manu-

als about the production of working drawings from the turn of the twentieth century one can imagine architects' offices with full-scale details, hanging from the walls, young draftsmen, observing architects' concepts taking shape in drawings that seemed to give exhaustive—and objective—images of future buildings.⁵⁴ These practices let the late nineteenth century architect, a middle class urban dweller, see himself the master of the shop, and fed his lust toward greater involvement into even smaller details of the construction process.

Conclusion

The present study points out at several significant paradoxes, revealed through a study of the history of construction documents.

Working drawings—as well as the professionalization of architecture in general—removed architects from the construction site even while their involvement in the smallest details of the building kept increasing. This gap between the manual labor and the architect's preoccupation with paper and intricate ink line work kept widening all the while architectural practice was dressing up in the garb of the craftsman. Changes in contractual practices indicate increasing competition within the building industry, yet, in contrast, the discourse—of architectural graphics as well as in the professional literature—rendered the relations between architects and builders as the collaboration of fellow craftsmen.

Working drawings today seldom display elegance, which marked the practice in the past. Written texts reappeared on drawings and in books of specifications. I have argued that the shift in emphasis from text to image was intended to build consensus in a more collaborative work context. Perhaps the lower aesthetic and the recourse to text in contemporary construction documents reflect the fact that this consensus has not been achieved.

NOTES:

1. Fond Garnier, La Bibliotheque Nationale de France. Garnier, Charles, *Marché des travaux pendant l'année 1866. Rapport à S. E. Monsieur le Marechale de France, Ministre de la Maison de l'Empereur et des Beaux-Arts, Paris, le 28 Janvier 1867.*
2. The history of the design and construction of the Palace of the Louvre is a good example to illustrate this statement. Drawings produced under the direction of Felix Duban (1848-1854) and of Henry-Martin Lefuel, who succeeded him and remained in this position until the 1870's, stand in a sharp contrast (drawings by both architects and a few documents from their predecessors are found in *Archives Nationales de France*). Lefuel's office issued several million drawings (!), many of which were quite elaborate pieces of architectural graphics. Among this plethora, which has not been studied in all details, it is difficult to say how many of drawings were strictly working drawings, as many of them were design study drawings and those, which were to be presented to Napoleon III, who kept a close interest in the project. Duban's drawings are rather modest in numbers and in their graphic elaboration. As to their predecessors, very few drawings survive at all. I would like to express my extreme gratitude to Mr. Emmanuel Jacquin, official historian of the Palace of Louvre, who gave me an exceptionally informative introduction into the collection of drawings.
3. There is a few exceptions where a large number of construction drawings was produced in earlier periods. A notable case was the project of the temple of St. Genevieve in Paris (begun 1757, now the Pantheon). Remarkably, most of these drawings as well as the supervision of the construction was done by J. B. Rondelet, whose work is treated in this paper as a pivotal point in the theory and the practice of architecture.
4. According to architectural historian Alfred Halse (*A History of the Development of Architectural Drafting Techniques*, Ph.D. Thesis, New York University, 1952: 338), the President of RIBA visited Garnier's office and the construction site of the Opera in 1864 and upon his return gave a very enthusiastic presentation to the Institute. Part of the presentation consisted of displaying 167 original sheets of working drawings, given to him by the French architect.
5. Richard Morris Hunt is the first known American architect to study at the Ecole des Beaux-Arts (1847-53). After his studies he shortly worked (1854-55) on the project of the New Louvre under his former patron Lefuel. After establishing his highly influential practice in the United States he regularly visited France in the late 1860's and the 1870's. During this period he saw the progress of the construction of the Louvre, as well as offices of several former schoolmates, including Garnier. He also sought acquaintance with E. E. Viollet-le-Duc, and was given tours of several of Viollet's projects. Several notes in Hunt's diaries indicate that he was greatly impressed by the increased level of architectural professionalism in France. See Paul R. Baker, *Richard Morris Hunt*. Cambridge, Mass.: MIT Press, 1980.
6. See Joan Draper. "The Ecole des Beaux-Arts and the Architectural Profession in the United States: The case of John Galen Howard," in Kostof, Spiro, ed. *The Architect: Chapters in the History of Profession*. (New York and Oxford: Oxford University Press, 1977).
7. See, for example, Bates Lowry, *Building a National Image: Architectural Drawings for American Democracy, 1789 - 1912* (National Building Museum, Washington, D.C., 1985: 58-62) for a description of practices and drawings of Alfred Mullett.
8. One of such legends is retold by American architect Harold Van Buren Magonigle in his article "The Preparation of Working Drawings in *The Architectural Review* (Boston), v. XVI, n. 12 (1909: 157). "It is said of Garnier that he drew the full-size details of every part of the Paris Opera himself; and, whether one likes it or not, [the project is] Garnier's and no one else. This is not possible under the usual conditions of practice to-day and in this country - but every architect ought to be able to do it; if he is not, the work cannot properly express his own personality." This statement tells about Magonigle's perception of architectural professionalism more than it does about Garnier. Garnier never pretended that he produced all or most of the drawings for the Opera. In fact, he was proud of having a number of very fine draftsmen working for the project. See Christopher Curtis Mead, *Charles Garnier's Paris Opera: Architectural Empathy and the Renaissance of French Classicism*.

- (New York, N.Y.: Architectural History Foundation ; Cambridge, Mass.: MIT Press, 1991).
9. Architect Eugene Clute gives the following evidence of the size of typical working drawings around the turn of the nineteenth and the twentieth century. "The drawings for the Denver Post Office were at one-eight-inch scale and they were about 4 feet x 5 feet ... the drawings for the Missouri State Capitol were even worse in these respects. They were 4 feet x 7 feet and with the mechanical and structural drawings there were seventy of them, which formed a roll that had to be carried around in a wheelbarrow." See Eugene Clute, *Drafting Room Practice* (New York: The Pencil Points Press, Inc., 1928: 155).
 10. Magali Sarfatti Larson, *The Rise of Professionalism: A Sociological Analysis*. (Berkeley: University of California Press, 1977).
 11. Jean-Pierre Épron, *Comprendre L'Eclectisme*. (Paris: Norma Editions, 1997).
 12. Épron (1997: 94).
 13. Relations between ideology, discourse and legitimization of domination are important part of the work of a large number of critical theorists from the 1960's through the 1990's. One of the earliest cases of a discussion of the Marxist notion of the ideology obscuring social and economic structures in terms of structural linguistics is found in Roland Barthes, *Mythology* (selected and translated by Annette Laverro, New York: Noonday Press, 1972).
 14. See Diana Balmori, "George B. Post: The Process of Design and New American Architectural Office (1868 –1913)," in *Journal of Architectural Historians*. XLVI (1987): 342 –355; Charles Brownell, et al. *The Making of Virginia Architecture*. (Richmond : Virginia Museum of Fine Arts; Charlottesville: Distributed by the University Press of Virginia, 1992); David Gebhard and Deborah Nevins, *200 Years of Architectural Drawings* (New York: Whitney Library of Design for the Architectural League of New York and the American Federation of Arts, 1977); Jordy, William. H. and Christopher R. Monkhouse. *Buildings on Paper: Rhode Island architectural Drawings* (Bell Gallery, List Art Center, Brown University, The Rhode Island Historical Society, Museum of Art, Rhode Island School of Design, 1982); O'Gorman, *On the Board: Drawings by Nineteenth-Century Boston Architects* (Philadelphia: University of Pennsylvania Press, 1989).
 16. Such a view is expressed, for example, by Richard Neutra in his *Survival Through Design* (London, Oxford, New York: Oxford University Press, 1954: 295).
 17. See a remark by architect and historian Edward Ford in his *The Details of Modern Architecture* (The MIT Press, Cambridge, Massachusetts; London, England, 1990:7).
 18. An almost total absence of architectural graphics, used for the purpose of communications between architects on the one side, and masons, carpenters, plumbers, joiners, and stone carvers, on the other, is quite telling, considering the fact that eighteenth century architects conserved written construction documents with great care. Beside specifications (*devis*), they consist of contracts (*marchés*), and contractor's proposals (*mémoires*). One outstanding example is the *Fond de Robert De Cotte*, in *Bibliothèque Nationale*, Paris, a remarkably well preserved collection of drawings and business correspondence of an architect, who was the *Première Architecte du Roy* from 1708 until 1734. Part of the collection, which covers construction activities of de Cotte, consists of a large number of *devis*, *marchés* and *mémoires*. But out of two and a half thousand drawings done under de Cotte's direction, there are just a few, which might be considered as working drawings. Even if architectural historian Robert Neuman, the author of a biography of Robert de Cotte, is correct in his assumption that "[de Cotte] was ... responsible for the execution of ... detailed construction drawings to be used on the site" (*Robert de Cotte and the Perfection of Architecture in Eighteenth Century France*, Chicago : University of Chicago Press, 1994: 18), and that these drawings were "normally discarded" later (Ibid: 38), such an attitude is remarkably different from that towards written documents and other types of drawings, that were preserved with much diligence. See also Francois Fossier, *Les Dessins du Fonds Robert de Cotte de la Bibliothèque Nationale de France: Architecture and Décor* (Paris, Rome: Bibliothèque Nationale de France/ Ecole Française de Rome, 1997).
 18. Charles-Augustin d'Avilier, *Cours d'Architecture* . . . Paris, 1691.
 19. See Bullet, quoted by Gérard Ringon, *Histoire du métier d'architecte en France* (Press Universitaire de France, 1997: 49).
 20. Jean Baptiste Rondelet, *Traite Theorique et Pratique de l'Art de Batir* (Paris, chez l'Auteur, Place de Pantheon, de l'Imprimerie de Fain, palce de l'Odeon, 1817, v.8: 572).
 21. Antoine Picon, *French Architects and Engineers in the Age of Enlightenment* (transl. by Martin Thom. Cambridge, England; New York, NY, USA : Cambridge University Press, 1992: 155-6). Picon's statement is the more significant, as he makes it while arguing that end-of-the-eighteenth-century working drawings, done by engineers, reached a more advanced stage than those by architects.
 22. See for example Magonigle (1909: 158).
 23. Dard Hunter, *Papermaking, The History Techniques of an Ancient Craft* (New York: Alfred A. Knopf, 1943).
 24. See Jonathan Crary (*Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*, Cambridge, Mass.: MIT Press, 1990) and Alberto Pérez-Goméz & Louise Pelletier (*Architectural Representation and the Perspective Hinge*, Cambridge, Mass.: MIT Press, 1997) for an argument that visual perception went through most serious changes and that it was not until the beginning of the nineteenth century when the modern "observer" emerged.
 25. The main authority in intellectual history of the law of contract remains Patrick S. Atiyah, *The Rise and Fall of Freedom of Contract* (Oxford, England: Clarendon Press, 1979). For a concise explanation of the concept of the "fair price" — versus the nineteenth century reign of contract — see the chapter "The Triumph of Contract" in Morton J. Horwitz, *The Transformation of American Law, 1780/1860* (Cambridge, Mass: Harvard University Press, 1977). While above theorists examined the Anglo-American law, the philosophical provenance of the main principles of the French law of contracts was similar.
 26. Épron, 1997: 98.
 27. French eighteenth century standard specifications for royal works were a manifestation of such a perception. These specifications, signed by the King, the Superintendent and the Première Royal Ar-

- chitect, were issued first in 1688 and then were revised after regular periods of time. These specifications minutely described properties of structural elements, their materials, their prices and methods of constructions.
28. Epron, 1997: 100.
 29. Neuman, 1994: 18.
 30. According to Épron, the issue was discussed for the first time in the aforementioned treatise of Bullet and since then it remained (in the core of the struggle between architects and builders (Epron, 1997: 334, n.48). Rondelet complained about the practice of *toisé* as well (Rondelet, 1817). Also see M. H. Port, "The Office of Works and Building Contracts in Early Nineteenth-Century England," in *Economic History Review*. Ser 2; 18 (Aug.-Dec., 1965): 94-110, for a similar account of the struggle between eighteenth century English architects, contractors and surveyors in the end of the eighteenth – the beginning of the nineteenth centuries.
 31. Picon, 1992:155.
 32. The old function of drawings completely faded with farther evolution of the means of discipline – social and technical means that is, i.g., photography. Duban became interested in photography soon after it had been discovered by Daguerre in 1839. His interest towards photography was primarily as a tool for the purpose of restoration and conservation. But he also appreciated photography as a means of construction administration. See Barry Bergdoll, "Duban et la Photographie," in Bellenger, Sylvain and Françoise Hamon, eds. *Felix Duban, 1798 –1870: Les Couleurs de l'Architecte*. (France): Gillimard /Electa, 1996: 229). Soon after, the project of the Grand Louvre under Lefuel's direction became the first construction site in history of architecture, where photography was used on daily basis, for all kinds of purposes (see Barry Bergdoll, "Une Question de Temps: Architectes et Photographes Pendant Second Empire," in Malcolm Dame, ed. *Edouard Baldus, Photographe*. Paris: Reunion des musées nationaux, 1994). It is hardly a coincidence that Lefuel's Louvre became first of the great projects of the Second Empire, famous for the volume and the graphic perfection of working drawings, produced in the course of its construction.
 33. Rondelet presented this project in the capacity a member of the Committee of Public Works—*La Commission des travaux publiques*—(Rondelet, 1817:563-6; v. 8).
 34. Épron agrees with this claim of Rondelet (Épron, 1997: 94-5).
 35. Rondelet 1(817; v. 1: 3).
 36. Picon, 1992.
 37. Épron (1997: 115). Pérez-Goméz and Pelletier also emphasized the connection between Rondelet's treatise and rationalist theories of the second half of the nineteenth century (Pérez-Goméz and Pelletier, 1997: 314).
 38. I base this tentative discussion on my observations of sketchbooks of Henry Labrouste (Fond Labrouste, # 336; 338, Academie d'Architecture, Paris), R. M. Hunt (Hunt's Collection, AIA American Architectural Foundation; Washington, D.C.), and some sketches from Grand Prix de Rome, published in *Inventaire des Archives de l'Ecole Nationale Supérieur des Beaux-Arts et de l'Ecole Nationale Supérieur des Arts Décoratifs* (Paris: Archives Nationales, 1978).
 39. Many of the above sketchbooks, and most of those which date to the late 1830's and the 1840's have the stamp of the store.
 40. Thus two of Hunt's sketchbooks, kept in Hunt Collection of Drawings in American Architectural Foundation have been until now considered to be his travel sketchbooks.
 41. See, for example, Brownell who notes, when describing a typical drawing from this period an "incredible level of delineation," which conveyed the architect's concept "with exceptional clarity" (1992: 176; see Fig. 3). Brownell states further that by today's standard of construction documents those characteristics would not be sufficient for the element that the drawing described to be manufactured and installed. Brownell's conclusion was that the drawing indicated "a level of confidence between the architect, the builder and the supplier," which must have existed a century ago.
 42. Rincon agrees with Épron, who specifically argues that the ton of reconciliation served to obscured social conflict on actual construction sites.
 43. See Mark Saboya, *Press et architecture: Cesar Daly et La Revue generale de l'architecture et des travaux publiques* (Picard: Ville et Societe, 1991).
 44. Edward Robbins, *Why Architects Draw* (Cambridge, Massachusetts: MIT Press, 1994: 40).
 45. See n. 42.
 46. See Brigitte Herman's interview with Geneviève Viollet-le-Duc, Viollet's great-granddaughter, in *Eugène Emmanuel Viollet-le-Duc, 1814-1879* (London: Architectural design profile, Academy edition, 1980).
 47. Fond Garnier, La Bibliotheque Nationale de France.
 48. See Kathryn Henderson, *On Line and Paper: Visual Representations, Visual Culture, and Computer Graphics in Design Engineering* (Cambridge, Mass.: The MIT Press, 1999).
 49. See Baker (1980).
 50. Close to the end of his life Garnier wrote a libretto for an opera. The main character was an architect, who, a victim of the libel of his enemies was unjustly charged with some crimes. He had a chance to compromise his project – in exchange for his freedom. The architect did not sacrifice his creation and died in prison (Mead, 1991).
 51. See Larson (1977).
 52. See Larson (1977). The concept is further developed by Dana Cuff in *The Story of Practice* (Cambridge, Mass., London, England: The MIT Press, 1991: 24).
 53. American architects of the turn of the nineteenth and the twentieth centuries were aware of the process. A publication, comprehensively covering the scope of competence of the American architect in the beginning of the twentieth century, states it in the following way: "The character of [working] drawings has changed very much, even in the last few years, an astonishing amount of details being put into working drawings, while the architectural drawings of the English and Italian Renaissance show that the old masters must have studied much of their details while the building was being erected." (*Cyclopedia of Architecture, Carpentry and Building*, 10v., Chicago: American Technical Society, 1907, v. 6: 314).
 54. See Magonigle (1909). Also see Clute (1928).