

Research into drawing and building

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ABSTRACT:

This paper introduces two case studies of the role of representation and specifically drawing in the process of designing buildings. These case studies are Notre Dame du Haut at Ronchamp by Le Corbusier and All Saints Church in Brockhampton, England by William Lethaby. The described investigations are preliminary case studies whose goal is to establish a methodology for a larger body of research concerning the use and role of drawing in architectural practice and theory in different moments in time. This research will lead to examining nature of architectural representation and its influence on the current condition of architectural thought and practice.

CONFERENCE THEME: On Approaches

KEYWORDS: Archives, Drawing, Building, Representation

INTRODUCTION

This paper is the result of a research project that was funded by a Scholarship and Creativity grant awarded by Montana State University and conducted in the summer of 2008. It analyzes two preliminary case studies of the role of drawing in the process of architectural design and its influence on the constructed building that is a result of that design process. Buildings chosen for these case studies are Notre Dame du Haut at Ronchamp by Le Corbusier and All Saints Church in Brockhampton, England by William Lethaby.

These two explorations are conceived as preliminary studies for a series of further investigations that will share the same or similar methodology and will result in a wider and more comprehensive body of research which will focus on the study of the relationship between buildings and their representation and on the role of that relationship in the shifts in theory and practice of the discipline of architecture. The primary goal for the two preliminary studies described in this paper is to develop a methodology that will be then employed in the remaining case studies.

I. THE QUESTION OF ARCHITECTURAL REPRESENTATION

The relationship between building and its representation is essential to architectural practice. As Robin Evans said architects do not make buildings, they make drawings of buildings. (Evans 1997) For the past few hundred years, the basic task of an architect has been to imagine, visualize and represent a building to be built. Throughout the creative process of design the architects have used different kinds of drawings to communicate and manifest different ideas about the building to themselves and to others. At the end of this process the architect produces a set of drawings which describes the final design of the building and constitutes a set of instructions for others to follow in construction of the actual building. Thus, drawing as a tool for communicating either with oneself or with others is a crucial element of architectural practice.

In recent years many architectural critics and scholars have shown a strong interest in various aspects of architectural representation. People such as Alberto Perez – Gomez, David Leatherbarrow, and Robin Evans (Perez-Gomez 2000, Leatherbarrow 1998, Evans 1997) have focused their attention on understanding the nature of architectural drawing – in history as well as in the present – and its relationship to the built building. The reason for architectural representation becoming the

subject of architectural research in the past decade is that the relationship between drawing and the building is right now at the critical moment of its development. The advance in digital technology in drawing, modelling and fabrication has brought architectural practice, as we know it, to the point of radical change. All the modelling software such as 3DMax, Rhino, Form Z and tools such as CNC (computer numerical control) machines and 3D printers allow for creating visual / digital representation of an object (such as building) and then direct production of that object without involvement of another human being. Thus, the new software and tools focus on eliminating the gap between the process of drawing an object and the process of building that same object. That means that one of the crucial moments of interpretation, translation and communication between the designer and the builder, between the drawing and building, is eliminated.

This kind of change in the creative process of designing and building is so radical and so crucial to the profession of architecture that it brings to mind a comparison with the processes that were initiated by the Renaissance appearance of the widespread use of architectural drawings, such as plans, sections, elevations and most of all perspective. Until that moment the work of the architect was synonymous with that of the builder. Since the architect and the master builder did not have sufficient tools to imagine and visualize the building and its space ahead of time, the building was designed as it was being built. The way that the builders communicated with each other was through sets of geometrical rules and instructions that were memorized and applied to the layout and the façade of the building or through full size templates used in the tracing shops for design and repetition of specific parts of the building. (Fitchen 1961) Thus, before the Renaissance there was no actual distinction between the process of design and the process of building. With architects visual imagination empowered by the renaissance linear perspective they were now able to use those and other architectural drawings – plans sections and elevations as tools for finalizing and presenting their designs on paper and prior to the beginning of construction. Since the architect was now able to communicate with the builder with a substantial degree of precision he was also able to remove himself from the physical process of building. Thus, the use of drawings – roughly the same as architects have been practicing until now, allowed for the work of the architect to be separated from that of the builder and allowed for the profession of architecture to become its own independent entity

Digital technology is today employed in almost every architectural office and all architecture students learn how to use digital modelling and fabricating tools. Quite often though the fascination with the efficiency, smoothness and the “coolness” of the new media leaves us blind to its real cultural implications.

I believe that taking part in that moment of radical change puts us in a position that has advantages and disadvantages at the same time. The disadvantage is that being intimately engaged in the changes that are taking place we do not have enough space and objective view to be able to really understand what is happening. The advantage of our position is in witnessing the end of an era and in being able to look in an analytical but still intimate way at the condition that has been established for quite a while and is just about to fundamentally change. I believe that understanding what the creative process of designing and producing a building has been until now will bring us closer to understanding the changes that are taking place at the present moment and it will make it possible for us to be conscious of our place in that moment of change in architectural practice.

2. PRELIMINARY CASE STUDIES

2.1. SIGNIFICANCE OF THE CHOSEN BUILDINGS

The overarching research project whose part is described in this paper (two of a series of case studies) focuses on a number of specific moments in the history of architectural practice and thought where the moments of change can be recognized by the change in the established conventions of the architectural representation. Thus, the shift in the use of architectural drawing indicated and manifested the change in architects’ thinking about space and construction. These case studies will establish a context for the examination of the current condition that I described in the first part of this narrative.

These moments include:

- The early use of drawing in the Renaissance which I mentioned and which caused the split between the profession of architecture and building,
- The 19th century and the Industrial Revolution which resulted in complete change of the means of production as well as in development of the descriptive geometry which in turn immensely influenced the precision and objectivity of the architectural drawings,
- The peak and the end of the Arts and Crafts movement when the skills and the pride of the craftsmen allowed for a very unique communication between the architect and the builder,
- The peak of the modern period in architecture

This paper focuses on two preliminary case studies and explores the creative processes leading to the design of two buildings similar in type, size and scope but conceived and completed in different times and as parts of different movements. These buildings are: All Saints Church in Brockhampton, Herefordshire, England (1902) by William Lethaby and Chapel of Nôtre Dame du Haut in Ronchamp, France (1955) by Le Corbusier. (figures 1 and 2)



Figure 1: Chapel at Ronchamp



Figure 2: All Saints Church in Brockhampton, England

I chose these two buildings because they both represent moments of change in different design thought continuums.

Brockhampton church was designed and built at the peak of the Arts and Crafts movement where all creative endeavours were rooted in the craftsman, and builders taking full pride in their work. That meant that the architect could leave parts of the building design (such as details) off his drawings and still expect them to be done properly and at high quality – according to the craftsman's learned and inherited knowledge. Lethaby on his part was also known for believing strongly in bringing together design and production. Such belief on the part of the architect together with the building culture of the times must have resulted in the architect producing a set of drawings that was very specific for that particular moment in time which is definitely now gone.

When Le Corbusier designed Ronchamp Chapel he was one of the most famous architects in the world. He had a lot of experience in designing buildings as well as in seeing them built. I chose this building for my research project because it was a building that was very different from every other project done by the same architect. Its form and in result the space enclosed by the forms, were not governed by strict geometrical rules. They rather seem to be free flowing and soft. Thus, Le Corbusier needed to employ the tools that he had already mastered more than anyone else and was very familiar with to develop and communicate form and space that was not familiar to him and what's even more important it was new to the builder and client.

2.2. METHODOLOGY

Both studies were initiated by visiting archives that hold the original drawings produced for both buildings - the Le Corbusier Foundation and the archives of the Royal Institute of British Architects - and examining these drawings. Both buildings were then visited directly after the archives in order to discover the subtleties of the relationship between the drawings and the buildings. Conclusions were then drawn in regards to the role of different kinds of drawings in the process of design as well as their manifestation of different aspects of architectural thought and its influence on architectural practice.

Examining original drawings created for each building is crucial in this method of investigation. In both cases it has been important to understand the medium, the size and the overall tangible quality of the drawings. Different kinds of drawings created by architects, especially when they are created by hand, become a personal and somewhat intimate signature. Through examination of that drawing, and even more so a series of drawings, one maybe able to read the process of thinking, designing and production. This kind of intimate and tangible quality is lost in the case of drawings created with digital media.

In order for both case studies to be comparable I chose to examine a similar series of drawings in each case. I looked briefly at the entire holding of the archives and chose a few drawings in each case that represented the process of design from the inception of the concept, through development of the design to drawings used for construction. I then examined these chosen drawings carefully in order to develop an understanding of the process itself.

There were significant and immediate differences noticeable between both buildings and both architects. The Le Corbusier foundation holds a very complete collection of a few hundred Ronchamp Chapel drawings. These drawings are not available to be examined in person, but they are scanned at very high resolution and available to be seen on a computer screen. This mediation through the screen does not allow for the actual tangible contact with the drawings. It is quite difficult to understand the texture of the medium used and to really, physically understand the size of the drawings – the sizes are given in numerical terms, but having the size in terms of numbers is very different than being confronted with the actual drawing and its size and material. On the other hand the high quality of the scans makes it possible to understand the lines, strokes and in some ways the texture of the drawings. It is also possible to enlarge details and see them more “up close”.

The way of examining the drawings by William Lethaby, produced for the All Saints Church that are held at the Royal Institute of British Architects archives was very different. I was able to look at each drawing, in its original and tangible form, directly and in person, without any mediation. I was

able to relate to each drawing's size and texture. However, there were only 12 drawings that were held in the archives.

2.3. DRAWINGS FOR NOTRE DAME DU HAUT AT RONCHAMP

Drawings for the Chapel at Ronchamp were done by Le Corbusier's office, which means that only a few of them were produced by Le Corbusier himself and others were approved by him while produced by someone else.

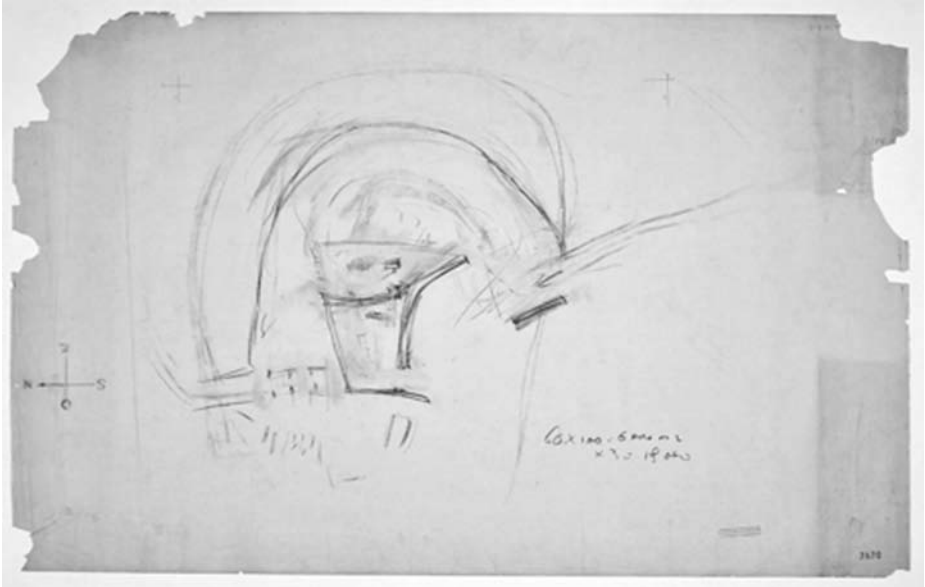


Figure 3: Charcoal sketch by Le Corbusier (Le Corbusier Foundation , Paris)

The early sketches that were done by Le Corbusier in the very initial stages of design, and especially the charcoal sketch that was done on June 6 1950 (figure 3) establish the overall form and quality of the building. The sensual, textural quality of form and light that is very strongly present in the building is already present in this charcoal sketch. The general form of the plan of the constructed building is already delineated in this sketch.

The plan's four lines are indeed a response to the site; they are two curves opening up onto a vast landscape and designed to receive the pilgrims; two straight lines that rejoin them and close the figure. (Pauly 1983, 55)

The lines that respond to the different horizons and would eventually become the basis for development of different facades are there and so are the spatial qualities of all four sides of the building. Thus, the spatial engagement of the exterior of the building is already embedded in the curvature and texture of the charcoal line. I believe that there is a specific, physical way in which that spatiality had been embedded in this drawing and then consequently in the building. That reason is the medium and dimensions of this drawing. This drawing is 75cm by 118.5 cm (30 inches by 46.5 inches) large. That is large enough for one to be compelled to engage his or her body, beyond the wrist or even elbow in making this drawing and especially in drawing the continuous lines of the four facades. It seems to me that such bodily engagement with a drawing must result in the drawing taking on the spatial qualities associated with a human body. This feeling of body's engagement in the drawing is further emphasized by the softness and messiness of charcoal. A line made with charcoal has a very distinct texture and light to it. In addition these lines are easily erased and smudged. It is clear that the lines made by Le Corbusier were smudged, erased and redrawn a few times. This process gave

the drawing not only multiple layers of information but also physically multiple layers of charcoal powder on the paper, which gave additional ambiguity to the drawing. Daniel Herbert discussed this drawing in depth. He spoke of in the context of the conventions of architectural drawing:

for early study drawings it is assumed that conformance to conventions is less rigorous than for later drawings; lines are assumed to be both ambiguous and mutable. ... He (Le Corbusier) assumes that all these lines are ambiguous and mutable in that he may interpret or ignore any line, or add new lines in this or subsequent drawings. (Herbert 1993, 59)

If one compares this sketch, which was the first physical manifestation of the Ronchamp's space with a section of the building one can notice that these two drawings have many similar attributes. The spatial qualities of the plan found their continuation in the section. And again, what seemed to be so striking in experiencing the building, the continuous but not direct relationship between the space of the exterior of the building and its interior, is also embedded in the sketches that started the design process. This drawing is not simply an image of the future building but it has experiential qualities itself.

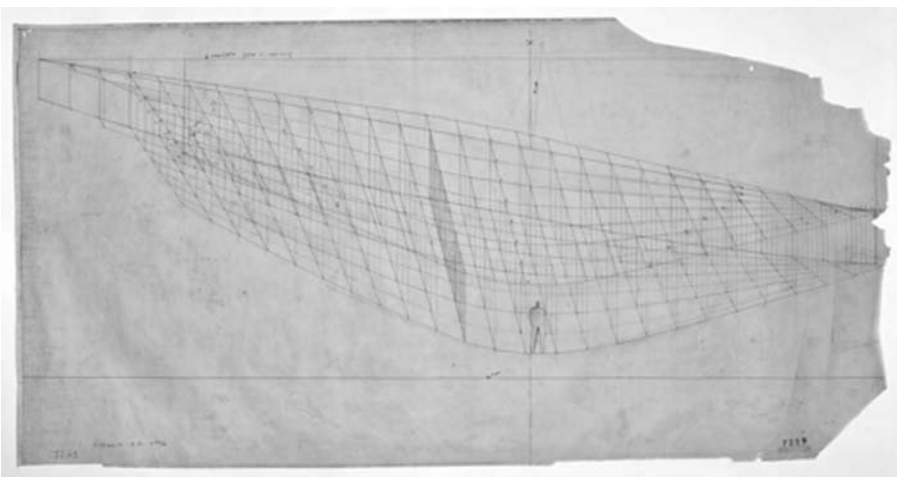
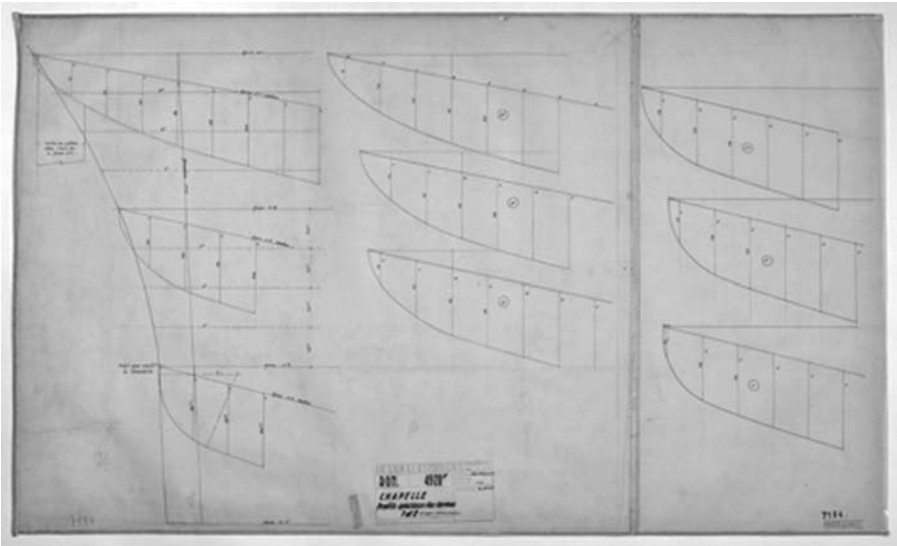


Figure 4 and 5: Analytical drawings of the Ronchamp Chapel's roof (Le Corbusier Foundation, Paris)

Two drawings that were also in the group that I chose to examine, and that I would like to position in contrast to Le Corbusier's early charcoal sketch discussed above are the analytical drawings delineating the form of the roof. These two drawings are examples of a whole series of drawings prepared by the architect's office that reveal the exactitude and authority of each physical element of the building. Both of these drawings show development of the roof and both of them approach the roof not as a sensual form (as it is seen in the sketches) but as a accurately defined geometrical and mathematical volume. The first drawing (figure 4) is a study of multiple profiles of the edge of the roof. The roof is sliced and taken apart in order to give it specificity and exactness. The second drawing (figure 5) takes that information and assembles it. It shows a precisely developed three-dimensional mesh of the roof's volume. These drawings are of course drafted with very precise pencil lines; they do not show shadow and texture, they show the precision of surface. However, there are two aspects of the mesh drawing that relate it directly to the experiential nature of the building. The first one is the modular man drawn within the volume of the roof which reveals the study of the volume's proportions in relation to human body. The second are the lines that define the surface of the roof. They predict the lines that the concrete formwork will leave on the underside of the finished roof. These lines are very noticeable in the building as they give strong spatial sense to the interior portion and curvature of the roof in the building.

Looking at the series of drawings representative of the process of design of the Ronchamp chapel, one can see a very clear contrast between sketches done by Le Corbusier himself as well as textured and shaded elevations which are partially drafted and partially sketched and highly analytical series of sections and axonometric drawings which very precisely and accurately define the actual form of the major elements of the building such as the roof, walls and towers. Considering that Le Corbusier was designing the chapel but not building it, these "irregular" forms had to be described very carefully in order to communicate clearly to the builder. I believe the active use of these two kinds of drawings throughout the design process where the extremely disciplined and accurate drawings of forms are developed by the office in response to the experientially rich drawings done by Le Corbusier set up a tension which was the driving force of the process of design and which is now present in the building itself.

This tension is between the softness and organic quality of the forms, textures and light and the mathematical exactitude of the forms and surfaces. The visitor's mind oscillates between the two different understandings and experiences. I think that this oscillation is at the root of the experience of Ronchamp's space.

2.4. DRAWINGS FOR ALL SAINTS CHURCH IN BROCKHAMPTON

Drawings developed by Lethaby for the Brockhampton Church proved to be quite different and they revealed a very different process of design. The tangible and tactile quality of these drawings was striking. The majority of them were done on highly textured paper with use of drafted line and watercolor poche. All the drawings that I examined have the same quality as they were done either by the same person or by few people working closely together. These drawings are quite heavily annotated with notes, sometimes in red, which were clearly added after the drawings themselves were finished, during later phases of design or construction. (figure 6, figure 7)

All Saints Church in Brockhampton was designed and built in 1901-02. It was William Lethaby's last building.

Like many other Arts and Crafts architects Lethaby believed that the way for architects to become real builders as in the past was to assume, where possible, the responsibilities of both, building contractor and clerk of the works. (Robens 1986, 156)

This is why Brockhampton Church was built with direct labor and Lethaby's assistant acted as the clerk of the works. Constructing the building directly, without employment of a general contractor with whom the design would have had to be communicated, influenced the nature and character of the drawings produced for this church. The drawings kept developing and changing all the way through construction and they clearly became a tool for building. There is a great (much greater than in case of Ronchamp) continuity between drawings and the process of building which was very much in the spirit of the Arts and Crafts period and in the spirit of Lethaby's beliefs.

Lethaby was acutely aware of the growing divide between thinking and doing, designing and making and he sought all his life to bring together design and the experience of craft, and to allow workmen some dignity and responsibility in their tasks. This meant that everything should not be tied up in advance in drawings, instead there should be room for negotiation, development, experiment. The building should be allowed to evolve in response to the caresses of many creative hands. (Blundell-Jones 1990, 30)

In addition to all the notes and changes that are marked on the drawings, there are actual and quite substantial differences between drawings and the building as it was constructed. For example bay dimensions and dimensions of the windows are adjusted in relation to the drawings, even though

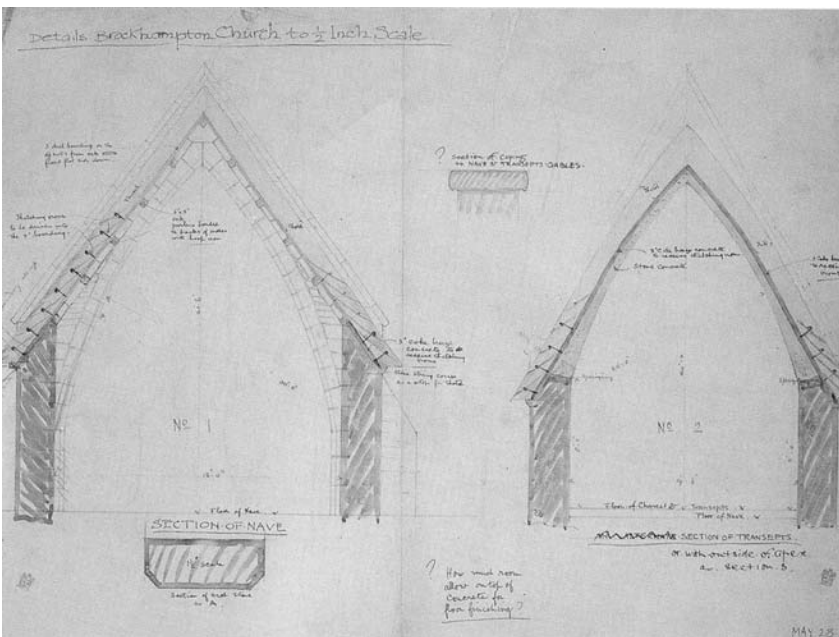
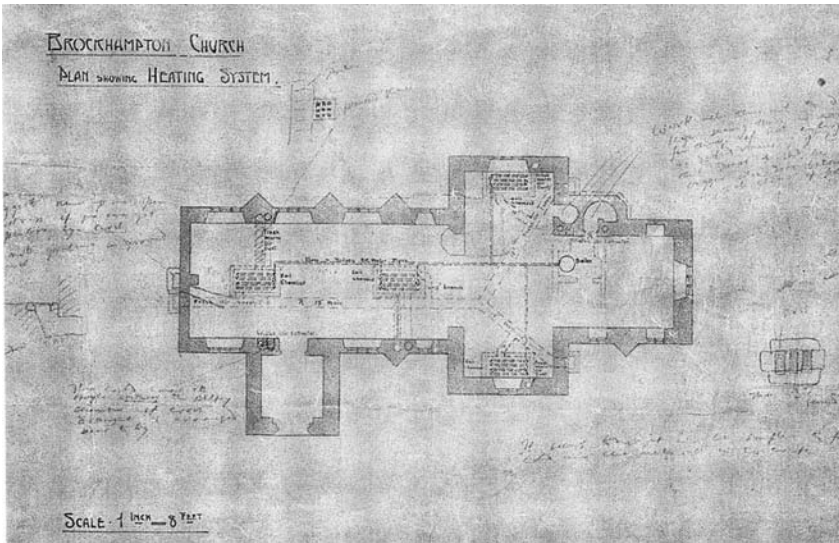


Figure 6 and 7: Plan and detail sections of All Saints Church in Brockhampton (RIBA archive, London)

they do not conform to any prescribed proportioning system, but adjusted during the construction phase based on what looked right. (Blundell-Jones 1990)

These “discrepancies” are a testimony to the building “growing” from and beyond the drawings rather than being fully defined and set by the drawings.

The drawings and the building are a continuation of each other. There is no distinction or clear moment when the drawings end and the building starts. In this case the words of Robin Evans that architects make drawings of buildings and not buildings do not hold. In this case the drawings are as present as the building.

3. CONCLUSION: EFFECTIVENESS OF THE METHOD AND FUTURE POSSIBILITIES

These two preliminary case studies will be treated as experiments that will now give me basis for thorough development of a methodology that will be employed in the overarching project. At this point they reveal the following difficulties:

- The inadequacy of the archives which in one case was extremely large and somewhat difficult to sort through as well as the direct access to the actual drawings was denied and the other one allowed direct access to drawings but the its holding was relatively incomplete.
- Importance of not only examining drawings but also acquiring information on the role of the architect himself or herself and other members of the office in preparing specific drawings
- Importance of acquiring information on the specific relationship between the contractor or builder and the architect

On the other hand these preliminary case studies do show promise of the eventual success of this project as they reveal that by methodological examination of drawings one can reconstruct not only the design process employed for a specific building but also the belief system of the architect, what his or her conviction on what the essence of architecture is and how they understand the relationships among the building, the outside world, the visitor, the architect and the builder.

In the case of more recent buildings it is very probable that the records available will be complete, however seeing and touching original drawings may not be relevant in case of buildings that have been designed exclusively with digital media. In such case I will visit the architect’s office in order to familiarize myself with his or her methods of working and tools that they are using. Understanding of these tools will be very important in understanding and analyzing the nature of the relationship between the representation and the constructed building. Another reason for an office visit and an interview with the architect will be to understand thoroughly the nature of the relationship between the architect, the office and the contractor, where this relationship has been changing significantly in the modern practice.

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