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I, Fulan Zhang, hereby submit this original work as part of the requirements for the degree of Master of Architecture in Architecture.

It is entitled:
The Methodology of Detail to Tectonic

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The Methodology of Detail to Tectonic

A thesis submitted to the University of Cincinnati
Division of Research and Advanced Studies
For Partial fulfillment of the requirement for the degree of
Master of Architecture
School of Architecture and Interior Design
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Abstract

The dichotomy between architectural conceptions and executions has been started since the architects were severed from the construction role since modern period. The architectural school education further emphasizes this deviation between conception and executions. This is due to the conventional over evaluating conception to executions and the lack of understanding the relationship between constructions and details.

The insufficient understanding constructions and details led to the uncertainty of accomplishing design conception, the gap between the concept and the final executions generated control problems and deprived the power of architects. This impairing of control power of architects in projects further weakened the original design prediction and impeded the maturity of an architect.

The modern techniques developed architecture to a more and more various discipline, made it impossible to be grasped all the design skills by one person, the collaboration of different divisions of architecture was inevitably became the way to handle the complexity of the architecture. However, the emphasis on efficiency and cooperation led the individual architects’ lack of comprehensive view of architecture. In most cases architecture is no longer the artworks of architects but the products of architectural firms.

Based on the problems that mentioned above, my essay tries to find a way to combine the conception and executions together to understand architecture in a holistic way. Specifically my essay focuses on details design. By summarizing the principle of essential details to solve the confusions. By gradually elaborate between conceptual and the realization of the architectural design, from structure type to details based on different materials, comparing how different materials meet and other alternative possibilities. Generally speaking, this essay is trying to find a method to design a building with enough details in an early design stage.

The method with will approach with several steps. The first step is to category details based on different material structures. It will focus on discussing with wood structure, masonry and steel structure; it’s the starting frame of a building. Then based on the frame system, the details well are further elaborated in different relationships: Materials and structures, materials and building code, materials and materials to generalize typical façade cladding and details. These details conclude processing will serve to the primary working flow and further understanding of the design process from details transcend tectonic methods.

Based on the research topic to explore the structures and details, the thesis project will be a relatively small building which contains as much as materials and structure types it can. The project will be an elementary school information center. It will provide the building the characteristic of an institution by applying the materials and structures forms. This relatively small and straightforward building will provide mainly two structures, which are steel structure intertwined with wood structure. How the structures express themselves in different characters and how details related to the structure will help to explain the design idea and process.
By using the methods that generalized above, it will show the process of integration of architecture details and performance. Should the materials have their expression characters or should the materials can be shaped into the buildings’ expressions served as toolkit?
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Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>2</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>4</td>
</tr>
<tr>
<td>The Methodology of Details to Tectonic</td>
<td>6</td>
</tr>
<tr>
<td>Structural systems and sizing</td>
<td>8</td>
</tr>
<tr>
<td>Material Cladding systems</td>
<td>9</td>
</tr>
<tr>
<td>Joint and detail as problem solving</td>
<td>10</td>
</tr>
<tr>
<td>Execution, touch feeling human engagement</td>
<td>11</td>
</tr>
<tr>
<td>Project narrative and detail rehearsal</td>
<td>12</td>
</tr>
<tr>
<td>Bibliography</td>
<td>19</td>
</tr>
</tbody>
</table>
The Methodology of Details to Tectonic

Why my thesis topic is about details? Detail is the foundation of understanding architecture as an architect. When I first learned architecture in China. The detail is a blank part in my study I never pay much attention to details. I was always pursuing the forms, the functions and the aesthetic of architecture. However most of the buildings in my school and the buildings in the city which I lived in were lack of details. The buildings are unattractive and unendurable. Some of buildings are started dilapidating in a very young age. I was always thinking why these buildings couldn’t be nicer looking and stay longer? This question for me and never get answered. Then after I graduated I found my work are even further to the constructional detail. We design the functions of building but seldom pay attention to the detail until it have over to construction document. This is due to the dichotomy of designer and shop drawing architects in China and the neglected attention to the details in whole China. Whenever I finished a design, I am not very sure what the building will look like after it’s finished. The control of details were in the hand of manufactures. Every time I scrutinized my design, tried to figure out how to make the building really beautiful when built. But I couldn’t find a way to control my building because I am lack the skill of detailing. So aiming at detail design became my main goal to go back to graduate school to study.

The detail is the way to codify the building and joint is the basic element of detail. The role of an expressed joint is to bridge the gap between our perception of a building as an assemblage and our perception of a building as a unified image, and therefore the role of a detail is to bridge between a constructive and an abstract understanding of the building. If a building is a music, then the detail is the every note of the music. Music needs to be performed based on the music score. Architecture needs to be executed based on the detailing. There are two main disciplines related to details design. One is the theory part, discussing the beauty, the meaning, the philosopher behind the detail through the notable text of Marco Frascari, Kenneth Frampton, and Ed Ford. To engage architecture by exploring, observing, touch, smell, memory and even imagination to add the meanings of the architecture. The other one is the practical part that is how to design or how to realize a detail. These books are more related to practical project and functional issues. The details here is more of a programming that predetermined by all kinds of conditions limits and requirements. Then followed by the rules the details will be produced based

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on the logic. New strategies and design principles can be **formulated** through an understanding of a material and tectonic history of architecture.

However I found this two approaches of details are aliened to each other in a certain way that even widen the gap between design and realization. In many aspects, the disconnection between the theory part and the practical part is due to a lack of collaboration between designers and manufactures. Designers who aim practice projects do not fully understand or even care about the relevant of theory, while the theory writers continue to innovate profound theory without explain the practical applications of their innovations. They are living in different life patterns. The practical architects are mired with mundane works, dealing with deadlines, cost control, code, and structural realization all kinds of practical daily issues. While the conceptual designers are focusing on the art, the form and some Avant-guard technical envision or on purely historical aesthetic philosophy. The practical trivia never bother them. Only a few star architects they fully developed their practical skills and profound philosophy theory and integrated them into their designs.

Unlike other art, architecture is based on the finished building. It is an art of more dependent on human cooperation, the success of the art will be eventually based on the performance of the building. To address my argument I would like call the first trend of detail study as philosophy detail. The second trend of tacking more practical ways to realized detail I would like to call application detail. The terms maybe change if I could find better words to describe them. The philosophy detail theory is more like a beacon, it pointed to the direction, and it gives architects aspirations to evoke their dreams and imaginations. But the beacon never show the path under foot, it is shining far away. The application detail on the other hand, like a concrete path unrolling under your feet to all directions. You never know which the right path you are aiming for unless you know the direction of the beacon. There are many study materials which are too pedantic to hold the holistic picture of architecture.

My thesis try to find way that combine the theory of detail and the practical method of working on detail. This is not a theory discussing profound philosopher nor is it a manual pamphlet to helping architects to quickly find their solutions in practical project. It is more of a learning process that integrate practical and theory to bridge the distance between theory and practice of architecture. In Ruskin’s *Seven Lamp of Architecture* he mentions about the deviation between execution and conception. “One of the most important I believe to be a certain neglect or contempt of refinement in execution, or, at all event’s a visible subordination of execution to conception, commonly involuntary, but not unfrequently intentional.” Architecture in all are a more practical discipline. Without the support of real projects, architecture is literature, without the guidance of theory, architecture is building stuff and no longer bears the character of architecture. There is a long time deviation between the theory and the practice especially in architectural details. “The art of detailing is really the joining of materials, elements, components, and building parts in a functional and aesthetic manner. The complexity of this art

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of joining is such that a detail performing satisfactorily in one building may fail in another for very subtle reasons.”

We see a building starts from a configuration that formed from elements of parts by resists and balances forces. With this stable function of a building set up that serve our needs and provide shelter from the inclement weather, thus we have our engagement with the building and started to notice more or we are willing to notice more of the building. This connect us and building to the world, extend our knowledge and levels of feeling towards the building. Tracing this cognition of architecture. I would like to discuss details started from its functional part, then interpreted its philosophy meanings. It’s a development way from practical to theory to understand details. There are multiple levels of meanings embedded in the historic fabric which allow endless possibilities for interpretation resulting in innovation in new designs. Details is important because the architect engages with the necessity of assembly from a series of parts. They show a level of constructional resolution in a building. This constructional resolution asks for the integration of the works both architects and craftsman. In my thesis I will start from the function of detail, then I will explore the profound meaning of detail.

The discussing of detail from practical part to theory part could be discussed in following four main parts.

1. Structural systems and sizing
2. Material cladding systems
3. Joint and detail as problem solving
4. Execution, touch feeling human engagement

The process of my details essay will grow in a morphology way. It will started from skeleton which starts from structure type. Then it will discuss the muscles and skins related to cladding and materials. Next by zoom in the each part joint, the essay will elaborate the joint and details based on different structure systems. Last by zoom out to see if the finished building accomplishing the initial design intention. This will also related to phenomenology examination of the details and materials deploying.

1. **Structural systems and sizing.**

   Structural systems is the start of functional and technical requirements that architects always faced with challenges of the whole arrangement of elements. The various structures sever the different forms, the edges and the joints, carry on different characters of the buildings. Construction is the art of making a meaningful whole out of many parts. Buildings are witness to the human ability to construct concrete things. Choosing the structural system and sizing the main structural elements is the first step to start build your buildings. The

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architect’s studio companion gives us a good guide line how to choose a structural system and how to sizing the structural elements. It categories structural systems in to wood, masonry, steel, site concrete framing and precast concrete these five major structure systems. Each main structural system has elaborated their own subcategory sizing based on their structural character and supportive method. For wood and steel structure, they are both good at tension, they are elastic materials. But steel has much more tension ability than wood. Based on their similarities, the wood and steel can be categorized as vertical supportive systems: slab, columns. Vertical slabs are stud walls, the sizing is determined by the spacing and span of the wood or steel studs. The typical wood stud size are 2”x4”, 2”x6”, 2”x8”, the typical steel wall studs are commonly spaced at 16 in or 24 in. The sizing of vertical wood and steel columns are determined by the tributary area. The typical steel column size are W4, W6, W8, W10, W12 and W14. Horizontal supportive systems: decking, joist. Vertical and horizontal combined supportive system: Rigid frame.

2. Material Cladding systems

Gottfried Semper connects assembly with the entire history of building when he separates wall from structure. For Semper the purpose of enclosure is to separate space and the roof or mound provides structure. He continues to explain that the enclosure is in fact not the realm of the stone mason or carpenter, as would be previously assumed, but rather the wall fitter or weaver of mats and carpets. “Hanging carpets remained the true walls, the visible boundaries of space. The often solid walls behind them were necessary for reasons that had nothing to do with the creation of space; they were needed for security, for supporting a load, for their permanence, and so on.”

Gottfried Semper proposed building build-up of discrete layers, each layers solving a separate condition. The monolithic construction of antiquity can. Modern buildings demand thermal, acoustic, humidity, structural, seismic, and environmental performance criteria that monolithic construction simply cannot provide. Thus, we have inherited a construction reality that necessitates the layered construction that Semper outlines. This separation of skin and structure enlighten the modernism, many architects interpreted Semper’s writings and began applying his principles to the emerging technologies and techniques of mass production. The analysis of detailing assemble approaches that have received critical articles, particularly by architects century experiencing a similar industrial revolution at the turn of the 20th such as Otto Wagner, Peter Behrens, and Carlo Scarpa, and through the notable text of Marco Frascari, Kenneth Frampton, and Ed Ford. Wagner fixes a thin veil of stone panels, as skin, to a underlying structure. The detail is the bolts affixing the panels are left exposed, revealing the reality that there is a skin over structure. This detail reveals, or to use Harries’ term, re-presents the panels as a manifestation of Semper’s enclosure (Bekleidung). The knot as joint in Semper’s

woven mats, is interpreted in modern stone and iron. As Frampton explains, “Thus for Semper, the most significant basic tectonic element was the joint or the knot.” The joints, or specifically the assembly process to display these joints, in the assembly of buildings can provide a rich area for meaning in architecture. Gregotti is known for stating “Gothic architects transformed materials into architectural facts; we assemble products.”

If one believes that architecture is the art of building, then it must tell us how it is built, and if this can be done only by partial exposure or by a symbolism of construction, how is it to be designed? If architecture is the art of building, then the partially exposed structure will be preferable to the clad one; the cladding that is descriptive of construction will be preferable to the cladding that is descriptive of history, and the cladding that is descriptive of history of construction will be preferable to the cladding that is descriptive of the history of anything else.

3. Joint and detail as problem solving

Details are the small scale and often highly technical design decisions embodied in a building. The individuals put together composted a new interesting object. The individual try to express themselves by showing the harmony of the whole. Ford provides a working generic definition of a detail as not simply the small parts of a building, but specifically the part between the parts. The process of detail design is described in structure design which through a small scale, discussed the connections, joints and support systems to illustrate the performance of details designs. By exploring the tectonic potential of the materials the building provide a more engaging and inviting gesture to the people who use them.

Good execution of detail can achieve the great performance of architecture. Good details is based on good joint design. The main function of building’s exterior joint is to shelter for human, provide suitable temperature to live in and keep water out building. The joint of exterior wall and roof play a key role on resisting water. Understand the basic function and analyze details in different categories will help us design details in a successful way. That is to achieve functional and esthetic way of a building. There are three ways to keep water out of building. First is to let the water flow away smoothly on a surface such as exterior walls. A metal flushing should be add at the end of continuous surface. Which we often see the flushing on top of window or at the bottom of a brick wall veneer. Second the water needs to flow far away from the building surface in horizontal way. Best solution is cantilever elements from the vertical surface, so that the water can flow away. These often happen at the bottom of horizontal surface, like drip groove of a window or the cantilevered roof. The third way to keep water out of building is the break the climbing path of the water, often this can be achieved by adding enough airspace, so that to keep the balance of air pressure from outside and inside. Therefore there’s no way for the water to climb. The functionality of a building piece, its complexity, and its mode of joinery can provide the most basic sense of success or failure in a building. Its failure is most clearly shown in bad

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6 Frampton. Tectonic Culture. 86.
8 (Ford, 2011) 174
9 (Ford, 2011) 306
detailing, specifically exterior details generally dealing with moisture flows or prevention, whose results are leaks, discolorations, and material failure. Indeed, a thorough process of detailing can prevent many instances that would cause building failure. “Thus the act of detailing is a question not just of part to whole, of construction to ornament, of style to reality, but of the relationship of ourselves to a work of architecture”

The chapter “Junctions” looks at the detailing of architectural joints as an expressive feature of architecture. Architects should be aware of the qualities of different materials and how they respond to loads and to environmental factors, and design the delicate spots where different materials and constructive elements meet accordingly. Carlo Scarpa is one of the architects whose works are cited extensively for the sensitivity of joint design. 10

The elements of a building must be composed together by meeting their joints together. The joints of a building control the performance quality of building both in practical view and esthetic view. Making a successful joint is the premise of making good building. It shaped the form, the edge and the functions of building and to fully express the design intention. A detail is considered articulated to the extent to which it expresses and demonstrates the resolution of the problems of weight, material, connection, and assembly. When it expresses the opposite – absence of weight, an indifference to material, a lack of apparent connection, and an apparent disregard for the elements – it is seen as abstract. 11 The point to such a complete abstraction of details is that the building is allowed to be perceived as an ideal whole rather than its parts. 12 Semper and Frampton maintain that the joint is still integral to the assembly between the separate elements of skin and frame.

4. Execution, touch feeling human engagement

Andrew Benjamin in his essay, Plans to Matter, argues that by understanding materials and material history in architecture we can open up a whole new potential of design possibilities. First, by better understanding “the potential of a given material.” Second, “informing how we can utilize the properties of one material to open up the architectural possibilities within other materials.” 13 When moving in a spatial place, the moods generated and retained through the engaging movement in the building, later the details, the materials and the sound of building reveal themselves by presenting them in different levels. These will trigger out the nostalgia memory combine with imagination which deeply rooted in early childhood vague experience some came from real memory, come from imaginations or dream. The means and methods by which we design along with the materials that we choose to design with should be expressed in the architecture itself.

Materials can express a poetic way in the context of an architecture, and though the dwelling activities of human life. The specific meanings reveal themselves by connecting certain feeling of materials. That is through the building’s timeline cast the memory from past and envision the prediction to the future. The human activities happen though the whole

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13 Benjamin, Plans to Matter. 17.
life circle of the building thus to interpret and find the meanings of a building. The pursuit of
the tectonic through the structural unit has the “potential poetic manifestation of structure in
the original Greek sense of poesies—the poetry as an act of making and revealing.”

The tectonic frame, traditionally wood, is the arrangement of members of different lengths joined
to encompass space, whereas the stereotaxic mass, traditional brick, is composed of identical
units stacked upon themselves. The most fundamental example of this joint is the idea of
brick foundation upon which the wood framing of the wall is placed. This joint between the
stereotaxic mass and the tectonic articulation is where the building comes into being.

After all the design work finished and realized into a solid building, the building providing us not
only basic functional meet, but also palpable sense of interacting. The designed architectural
atmosphere take effect when wondering in the building. The buildings unroll different
atmospheres they were trying to achieve. The reminiscent of historical masonry construction
building, the high tech structure of futurist, the warm cozy palpable atmosphere of wood
structure building. The details will manifest all these design intension by achieving high
quality of detail designs which will maintain the elegant and fineness of elements lies in
lines, surfaces, forms and spaces.

5. Project narrative and detail rehearsal

German Language School is located in Clifton Cincinnati between McAlpin Ave and
Resor Ave on North and South, Middleton Ave and Clifton Ave on West and East, the
property of the site is for elementary school. The site is located in the center of Clifton
residence area, which is a very convenient location. The project is information center
affiliated to the main existing school building at the south east corner. I want find a way to
generate wonder and nurture it- through the kids’ eyes and senses to create a memory place
for their childhood. Like the famous Italian physician and educator Maria Montessori says
“The environment must be rich in motives which lend interest to activity and invite the child
to conduct his own experiences.” By using tectonic language, the building will show its
clarity and architectural system to educate what architecture is. “Education is a natural
process carried out by the child and is not acquired by listening to words but by experiences
in the environment.”

By finding to answer basic questions from the given site, the topography the school
campus together determined the shape and location of the building. Works or objects of art
have multiple layers of meaning that they often overlap and concealed their original meaning
that can be interpreted in many ways according to different views of the observers. By
designing an elementary school, this building will integrate the children’s development
patterns and architectural details and materials in an architectural design language. That is
how to use architectural language to respond and interpret a certain development pattern. By
using different details and materials, the goal is to grasp certain detailing and materials skills,
and then how to transcend to a tectonic ways to present them to the users. By summarizing
the principle of typical details will solve the confusions. By gradually deep into the topic,

15 Ibid,95
from typical detail to fancy detail, from durable detail to esthetical detail, comparing how different materials meet together and other alternative possibilities. That is to develop a deeper meaning of an abstract design must have both functional and aesthetic performance well. By demonstrate and elevate the construction beyond the building physical achievement, the building will finally engaging people and show itself meanings. The joint as detail transcends the mere physical connection to function on multiple levels, playing a primary role in the birth of architecture and its articulation as a constructed object.

The reading information center uses steel frame and wood frame intertwine each other. Each structure represents a certain character of moods. The steel structure has rigid sloped roof which represent more openly public space. The wood frame shaped curved circular vault which represent a relatively more private space.

The steel structure has steep slope, which draw people’s attention to the roof. The steel structure has direct light go in through the building, delicate exposed structure which has an open gesture to people. While the wood frame structure has indirect light generated mysterious mood, the wood structures are moderate hide into the interior skin which give the structure a shell look.

The steel structure holds bigger space and adjacent to main entry, its fluid space has more linear direction, while the wood structure occupied smaller space, its space is separated by the intersection of steel frame formed into cellular individual study carrel.

The material applied on the steel structure and wood frame structure has different strategies. The steel frame is covered with glass curtain wall with vertical steel blinds covered outside the curtain wall. The modern material gives the steel structure a distance, and neutral feeling. The wood frame is covered with more traditional materials suggested nostalgic feeling. The paginated copper sheets covered on exterior façade which give the building a time look exterior appearance. The interior façade covered with wood slats integrated with carrel study unites gives the building a warm intimate moods that encourage and insure the pleasure of reading and study.

In architecture, there are two basic possibilities of spatial composition: the closed architectural body which isolates space within itself, and the open body witch embraces an area of space that is connected to with the endless continuum. The extension of space can be made visible through bodies such as slabs or poles placed freely or in rows in the spatial expanse of a room. The first step is to category details based on different material sand structure. Sort out the details on different conditions: materials and structure, materials and code, materials and materials. Generalize typical façade: masonry, curtain wall, wood and steel structure compare to correspondent traditional details. Then analyzing key projects will serve to further understanding from the design process from details to tectonic. Get to understand how the details sever the design and transcend to tectonic architecture. The sizing of the major structures can be the first step before achieving to detailing.

Sizing:

The major frame:

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Steel Structure: Single Story Rigid Steel Frames. Span 40’, the depth of shoulder 20”. Depth at base is 12”, Depth of crown is 12” Look up the chart Single story rigid steel frames. Because the width of beams and girders range from approximately one-third to one-half the depth of member. So the width of steel frame is 10”

Wood structure: Glue Laminated Wood Arches. The Span is 25 feet, the Depth of Base from 7 ½” for short span. The Upper tangent is 18”. 18

Substructure

Steel Structure: Roof rafter:

Girder: The girder between the span will support Roof rafter. The span between too major steel frames are 12ft and 19ft respective. The depth of the girders between these two span are 13”, the width of the girders are 5”. The distance between the two girders is 32ft.

Rafter: The depth of the rafter will be 12”, and the width of the rafter will be 4”. The rafters cantilever 5 ft. for the cantilevered part, the size of rafter will be 6” by depth and 4” by width.

Joist: The range of the span between two rafters is from 4’ to 6’. The size of the roof joist between rafters will be 6”by depth and 2” by width. Spacing 14”.

The Holding Joint: The holding Joint is between the roof rafter and the roof joist. The holding joint will adjust its angle to hold the change angle of the roof joist.

Wood Structure:

The spacing between two Glue Laminated Wood Arches is 12ft. The size of wood joists are 2in by 6in, Spacing 18”.

Masonry Structure

The height of the masonry wall is 19ft. The net width of the structural wythe is 8” CMU with brick facing, 2” cavity and 2” foam insulation.

Floor:s

Entrance Floor: The span of the wood joist is 23’. The depth of beam is 12” the depth of the lightweight steel floor joist is 8”. 20

Gutter Calculation

Gutter Length 180’, Roof plan width 55’, Roof length 180’

Ohio -- Cincinnati

19 Ibid 103
20 Ibid P95
Rainfall Intensity (10yr) = 6.8 in./hr.
Rainfall Intensity (100yr) = 9.3 in./hr.
Drainable Area (10yr) = 180 sq. ft.
Drainable Area (100yr) = 130 sq. ft.
Year Setting = 10 yr.
Plan Area = 9900 sq. ft.
Gutter length = 180 ft.
Max Gutter Served by Each DS = 90 ft.

Design Area = 10395 sq. ft.
Minimum Number of DS = 2
Max Roof Area Served by Each DS = 5197.5 sq. ft.

Min. Gutter Width = 9 in.
Min. Gutter Depth = 9 in.
Recommended Product: Contact us for custom options. (Custom gutter shapes available on projects exceeding 400 linear ft. of gutter) 21

After settle down the structure sizing, the next step is to make a detail strategy which will determine the major character of the buildings. I still don’t know very well how the different structures have different material detail strategy. How to differentiate detail strategy is very important to understand building. It is important to tell functional strategy from presentation strategy. Detail strategy usually comes from structural/material selection and function performance. For a building to function well, the details must function well. Functions include the technical performance of details that contribute building’s function. To understand the types and performance of each of these types of joints, the designer need to select an appropriate expression of the materials that are joined. Each joint then have their architectural opportunities. To understand details from its functional strategy to transcend to presentational strategy, the best way is to start studying from the basic typical examples to the typical famous building examples and comparing to my design strategy. I would like to discuss them in several architectural elements ranging from main structure selection to detailing method the closely related to my project.

Vaulted roof:
The artist Constantino Nivola, wrote that Le Corbusier never ‘lost sight of the intimate continuity that ties the past to the present, the recurring forms that are visible only to those who know how to see them and order them into a universal language.’ 22 Historically the vaults were built of brick or rammed earth. In my project the semi angular vault comes from the “fundamental Roman forms”. They are so intimately the outcome of a dominating, organizing type of thought


that they will always continue to haunt all human creations.\textsuperscript{23} In my project the beauty of the semi angular vault is that the building can be made up of repetitive modules or cells. This gives the building a reminiscent of ancient space and a quiet reading mood.

Skin:
Corbusier to denote a double-skin system which was first used in the Cite de Refuge project. This modular system was originally intended to cover all the facades, but during the design phase another concept came to light whereby the Modular was accorded a totally different use.\textsuperscript{24} In my project the angular vault covered with double skins, like most typical classic vault sections, the double layers sever different function to the building, the outside layer is to show the form of a building, the inside layer is to engage people in the building. In my project the building has angular module systems, each carrel study bay carries the same structure and cladding system. This repetitive module systems makes the building can focusing more on its own detailing and still easy to be executive.

Gutter:
To keep water flow out the roof is the main function of gutter. Instead of like traditional gutter used as a pure function keeping water out. As the book leaves of Iron mentioned: Glenn Murcutt experienced with water as an animating element in his building. The expression of water has limited in scope to carrying rainwater from the roof down to the ground. The gutters and downpipes of the Kempsey Museum and Tourist Information center were enlarged and detailed in such a way as to draw attention to the transport of the rainwater. Moreover the large pipe section was protected by a curved sheet of break pressed metal as a further rhetorical device to comment on the role of the downpipe.\textsuperscript{25} Le Corbusier integrated the gutter into the curved valley of the roof. Such cases we can find in Chapel of Notre Dame-du-Haut, the valley sculptured concrete roof serve as roof gutter, where the downspout was exaggerated as a beak pointing out of the roof surface, it became the part of the roof sculpture. Similar cases can be also found in Secretariat in Chandigarh where Le Corbusier uses the same curved sculpture roof containing roof gutter. Both Glenn Murcutt and Le Corbusier use roof gutter as a sculpture element of building. The exaggerated scale and the integration of the roof structure gives the gutter an independent expression not only limited in function well but also give the meaning of the gutter.

My project has a butterfly roof, the gutter is the valley of roof, the connection between the downspout and the gutter will be integrated in the roof structure framing, so the gutter system will actually sever as one of the sculpture element of roof just the same idea as Glenn Murcutt’s rain gutter.

Touchable details
Le Corbusier designed door handles and handrails to invite touch and support the body. In my project the elevated floor to enable people to touch the glue laminated structure and to feel how this element derive from supportive structure to touchable decoration.

Furniture
Usually furniture can be divided in to two distinct categories, movable and storage.\textsuperscript{26} In Louis Kahn’s Exter Library, his carrel study is a combination of furniture and architecture. The carrel

\footnotesize{\textsuperscript{23}Ibid 6. P28  
\textsuperscript{26}Ibid 6. P59}
study space has these two types of furniture as well. The glue laminated beam serves as partition among study cells, the wide window sill can be used as book self. The one step height difference between corridor and the reading area can be used as rest seating area.

Experience of the Building

The project related to my thesis is an elementary school. There was a time when people experience architecture without thinking about it, the time lies in the people’s childhood. Children have the different views from adults, they look the world in a more promising way. By using rich materials and tectonic details, the building is more of a touchable engaging places for the children. Since children have different views and the elemental students have different ages. The deployment of the materials and details of the building will particular design for different age stages to give them full spectrum rich memory spaces. The form of the building started from the cross section. The small building is trying to express wood and steel structure in a contrasting way. The building is divided into the bookshelf and reading two areas which covered with two different structure types. The book shelf area is covered with a sloped roof supported by the steel frame. The reading area is enclosed with the wood frame structure. The steel frame structure represents an open public character, and the waved like roof further celebrated the tectonic of the steel structure. The glue laminated structure reminiscent the half of ancient angular vault. The wood frame structure is wrapped with two layers of skins. The outside of the skin is patina Cooper that gives the building a chameleon character responding to the ambient light. In Peter Zumthor’s article, he believes that a good building must be capable of absorbing the traces of human life. The patina of age on the metals, will remain a consciousness of time passing and an awareness of the human lives that have been acted out in these places and rooms and charged them with a special aura. That is architecture is exposed to life. The interior surface is wood slats which give people a warm and palpable reading atmosphere. The window punctured through the two surface composed the fenestration of the exterior elevation. The steel frame the wood frame intersect between under the sloped roof so that the intermediate space between the ribs and columns forms the main corridor circulation and give the building a hint of cloister atmosphere. When the sunlight illuminate the vault, the abundant muted light climbing up to the surface of vault, this time of the moods carries the building to the ancient cloister. While the interfering of the steel frame pull back the building to modern age. The complicated roof structure grow from the steel frame. The clerestory made a dynamic impression, simulation the movement of the sunlight from north to south, closing gradually from north transitioned to south direction. The movement both meet the function of light of the library and the exploring of tectonic expression.

In the end, by understanding both the technical and philosopher meanings of detail, it helps us not to get lost in mundane work and theoretical assumptions. It helps us not to lose the track of concrete qualities of architecture.  

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