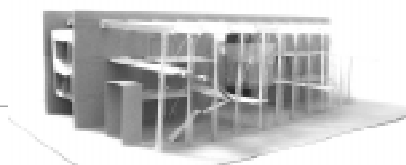
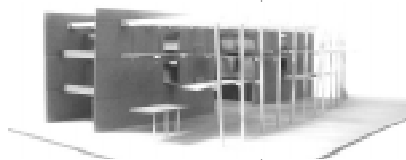
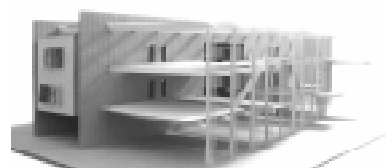


In process ...



In process...

Xin Li

May, 2000

Thesis submitted to the Faculty of Virginia Polytechnic
Institute and State University in partial fulfillment of the
requirements for the degree of
MASTER OF ARCHITECTURE

William Galloway, Chairman

William Brown

Jim Jones

Michael O'Brien

Heiner Schnödt

Architecture is a wonderful world. As a student of Architecture, time and time again I am impressed by its powerful images. The more I study and learn, however, the more I question.

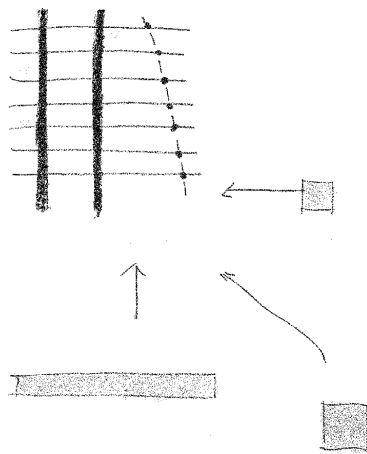
What is the truth beyond those fantastic images?

What is the nature of Architecture?

Is there any basic way or process to approach the work of Architecture?

With these questions, I begin my thesis project and the process of looking for answers.

Beginning...



SITE

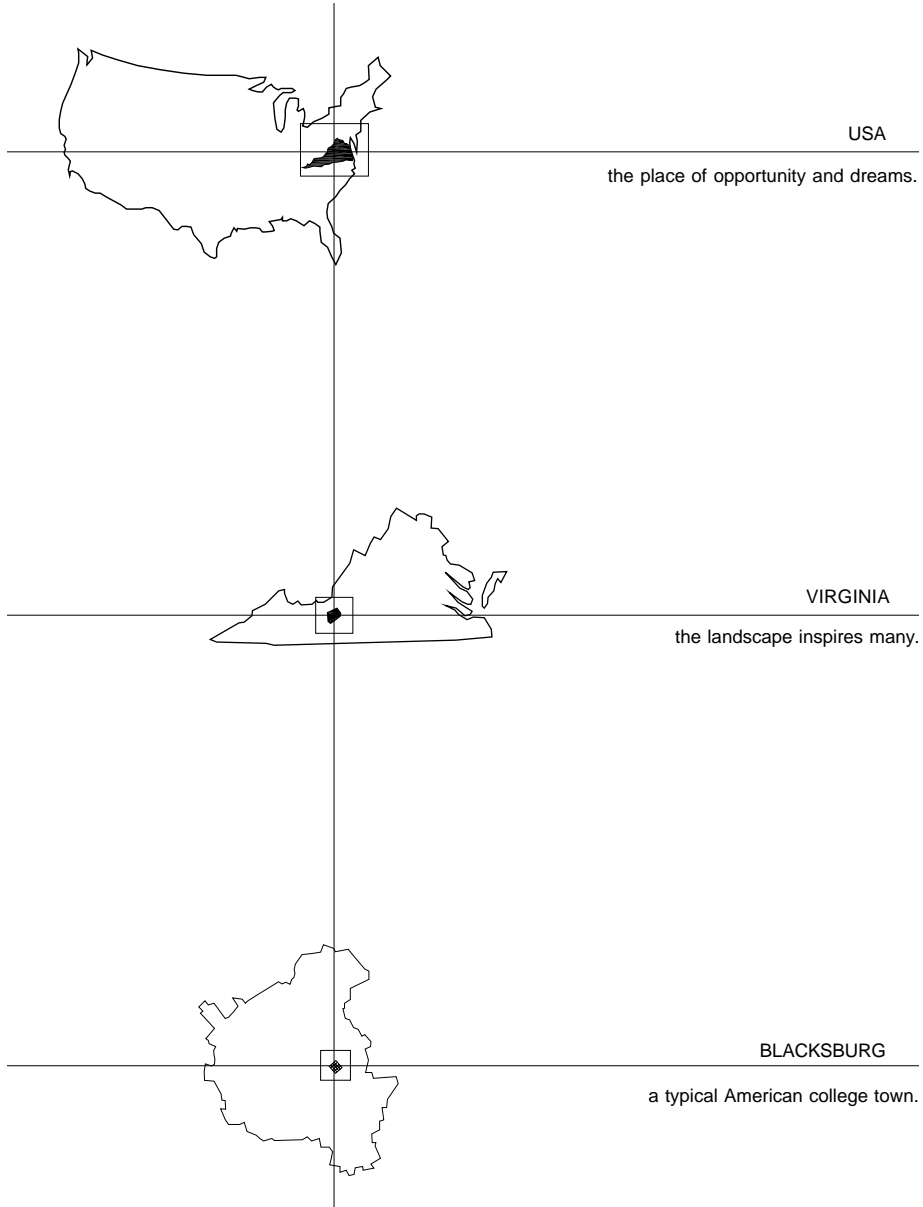
Beginning

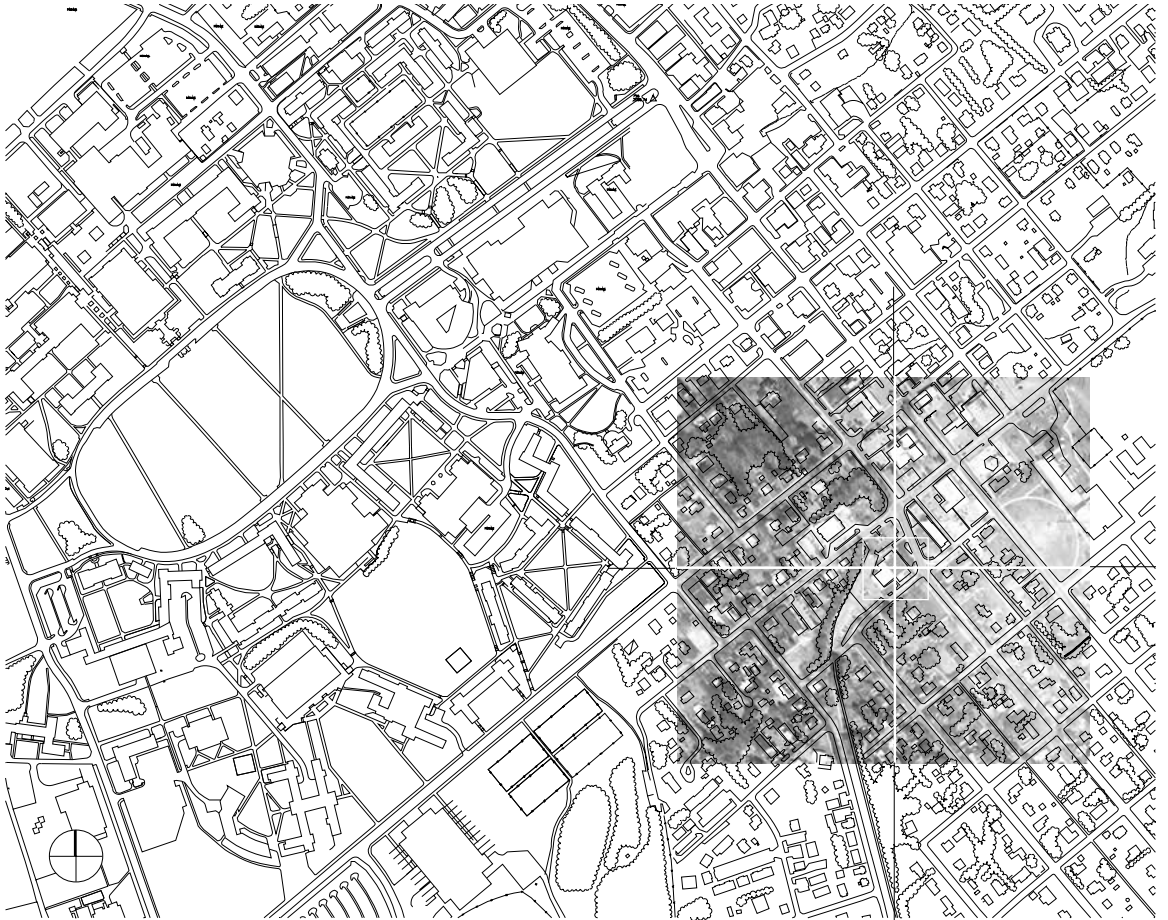
site
program

Process

structure
light
place

Conclusion





COMMUNITY
LIBRARY

my thesis project

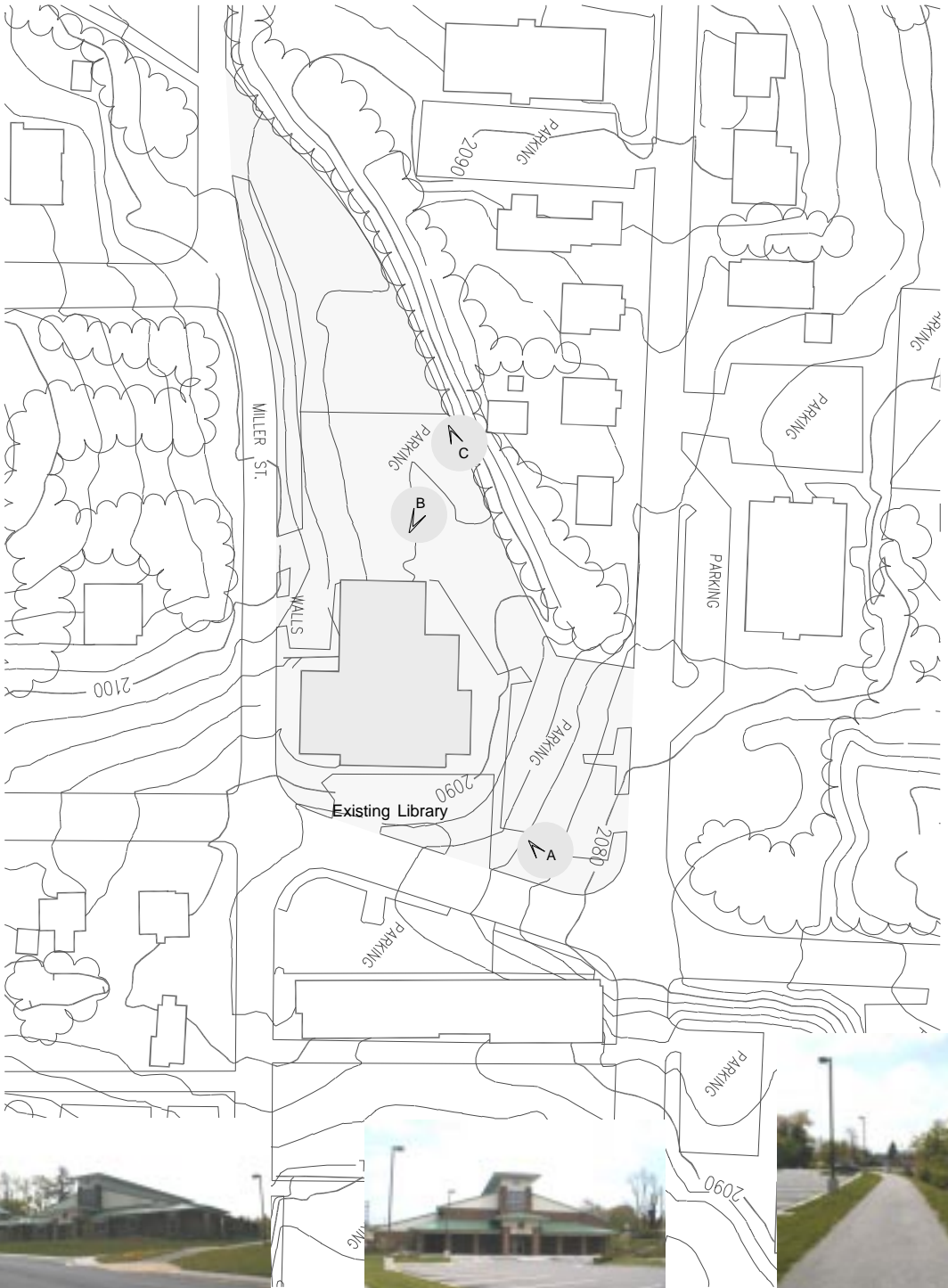
SITE

Beginning

site
program

Process
structure
light
place

Conclusion



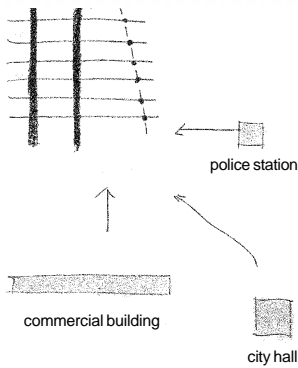
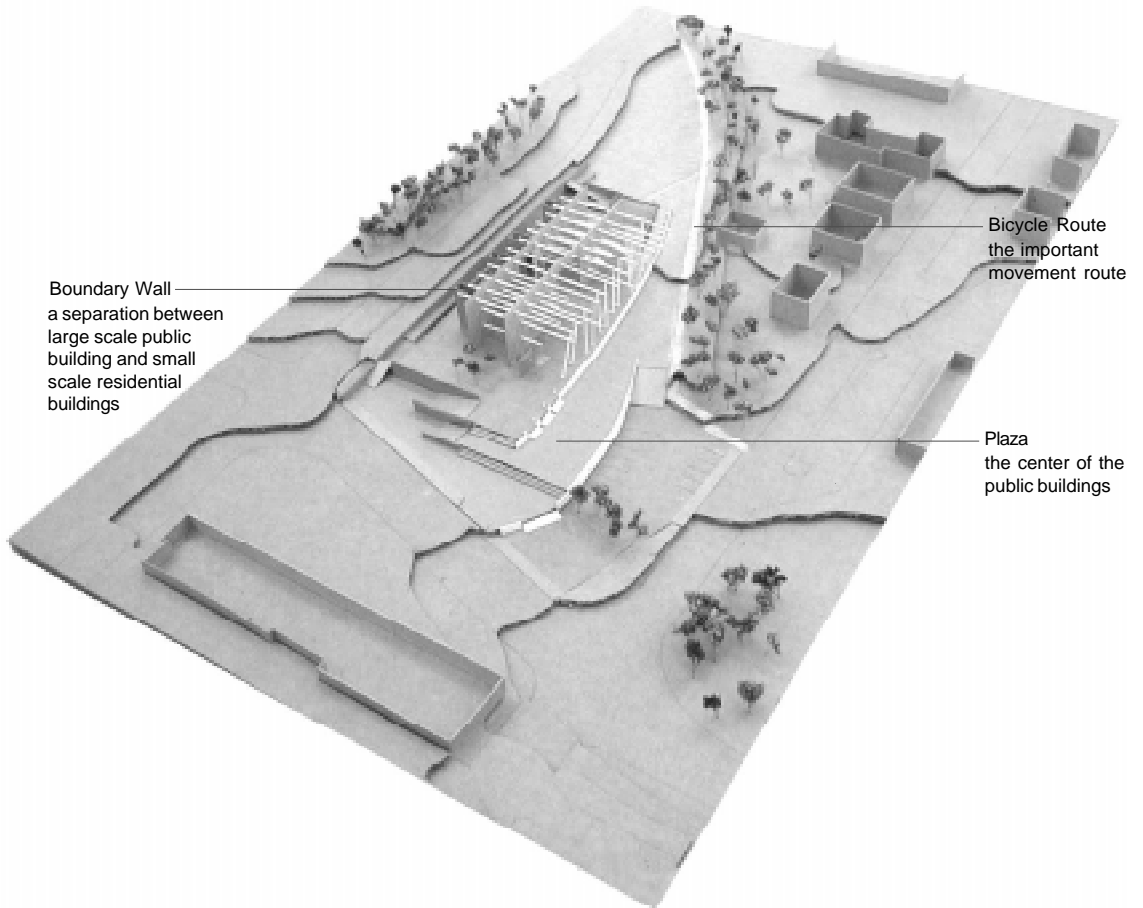
A. Front entrance (closed)



B. Back entrance (in use)



C. Bicycle route



early sketch

read the site

Beginning

site
program

TRANSLATE THE PROGRAM

Process

structure
light
place

Conclusion

" You should not be forced to put people through the library. It should be just something in its structure which says, ' what a wonderful place to go,' and of course, the location has much to do with it, and its convenience has much to do with it, but essentially, it is its nature which you are after to convey. Glare is bad in the library; wall space is important. Little spaces where you can adjourn with a book are tremendously important. So you might say that the world is put before you through the books."

Louis I. Kahn

Times are changing, people are changing, the community library has new meaning. It is not only a building for the storage of information, but also provides opportunities for social interaction and informal exchange of ideas.

As new technology develops, the traditional library is evolving into a non-print resources library, which integrates library services into the community activities. The program of a community library should therefore be more comprehensive to meet people's desires.

" I really look for the nature of something. Your program alone would not mean anything, because you are dealing with spaces."

Louis I. Kahn

In my understanding, to design a library is to deal with the relationship between people and books. Knowing the desire of people with a book and the needs of books helped me understand the space, where it should be flexible, where it should be inflexible, where it should be dark, where it should be light...

PRECEDENT

Exeter Library

In the Exeter Library, Kahn was concerned with how the book and the person come together.



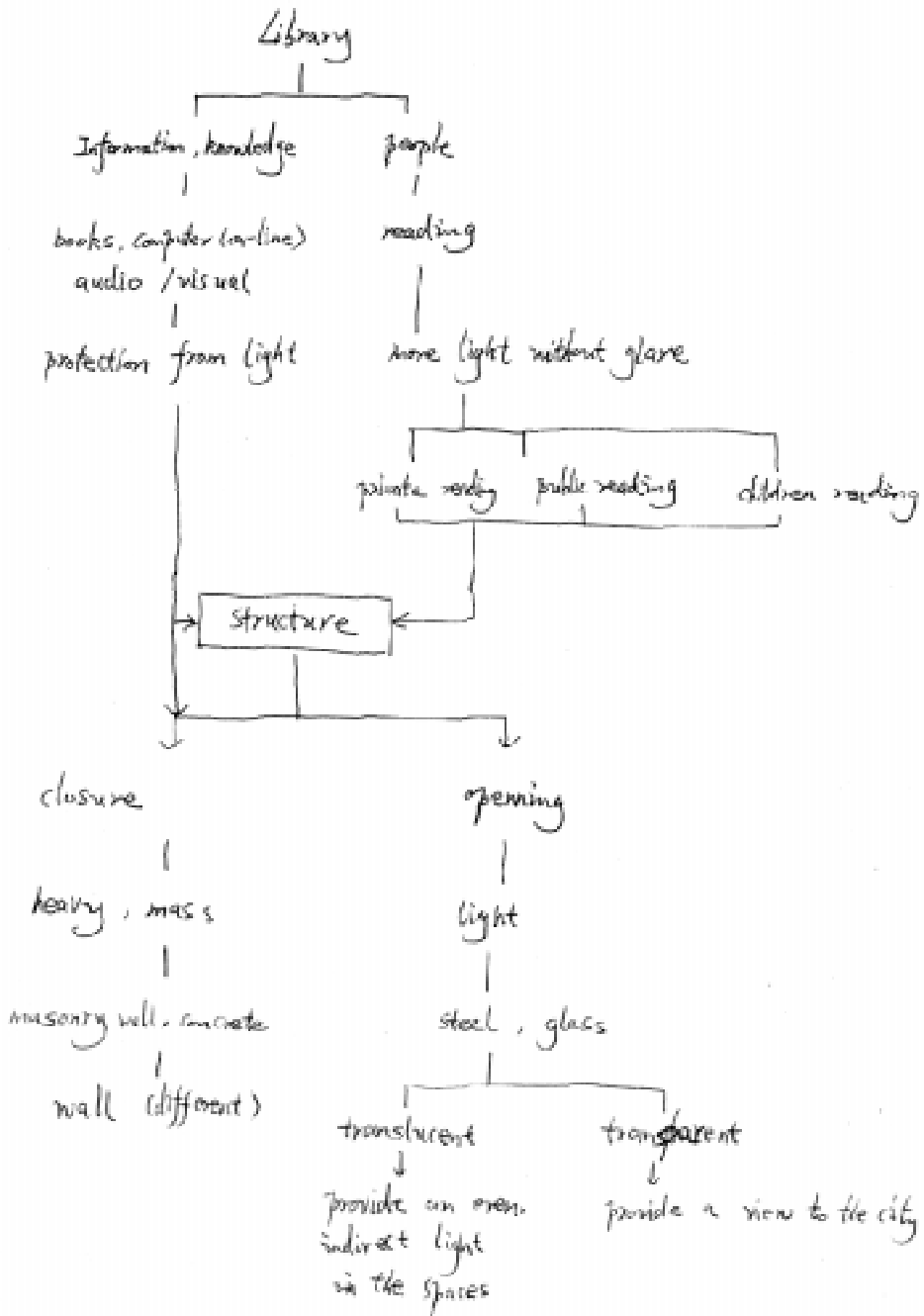
the double-story edge zone of the reading area in brick



the area of the stacks in concrete



concrete central hall



early library program analysis

Process...



Beginning

site
program

STRUCTURAL ORDER

Referring to the understanding of the site and program, an initial structural order was decided.

Process

structure
light
place

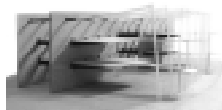
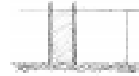
● Rigid & Gentle

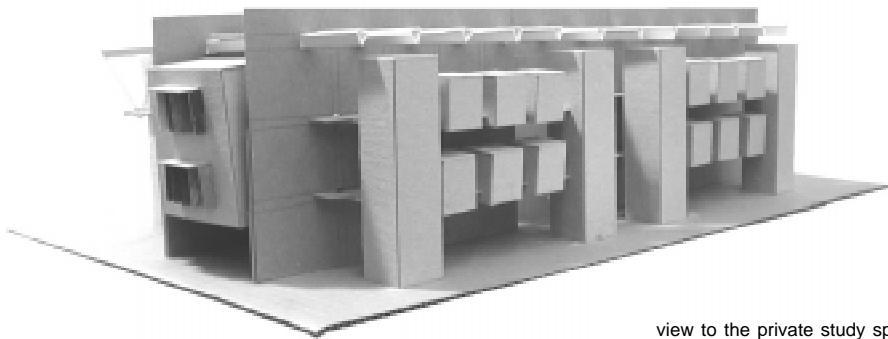
- Straight wall parallel to the straight road
- Gentle curve for the bicycle route



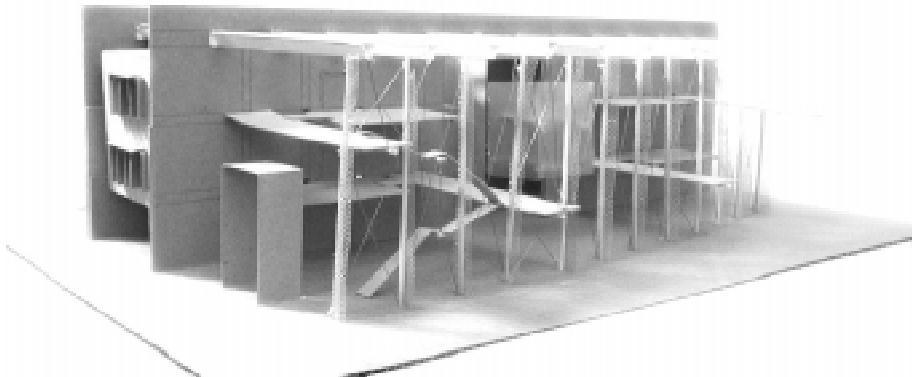
● Closed & Open

- Closed space for the book and computer
- Open space for people





view to the private study space



view to the public reading space

After many studies, the structural order is decided.

Beginning

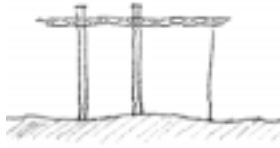
site
program

STRUCTURAL ORDER

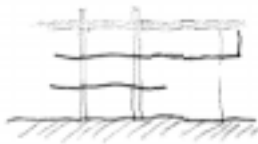
Process

structure
light
place

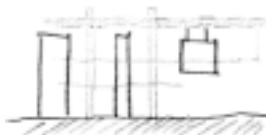
Conclusion



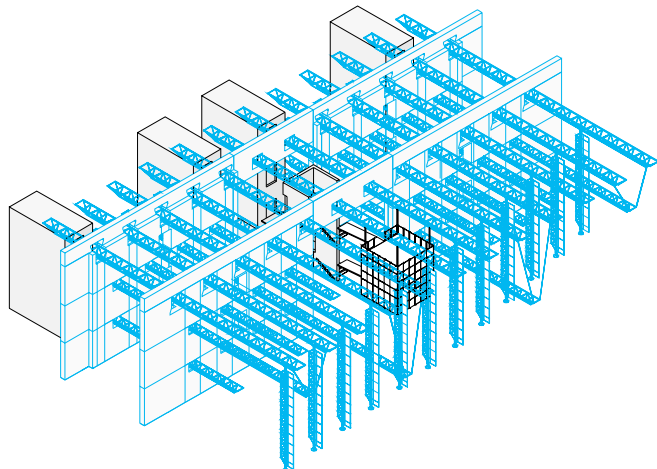
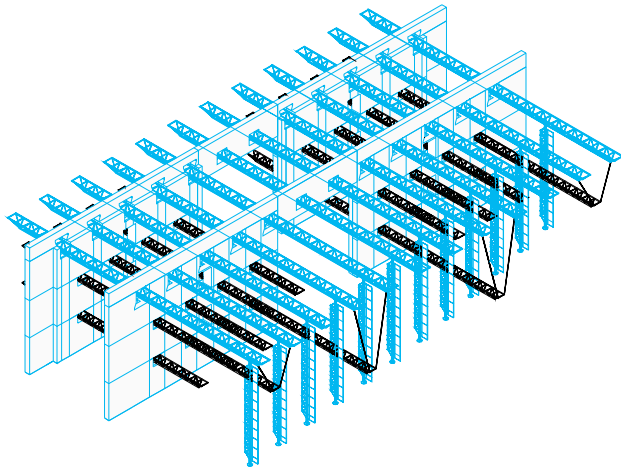
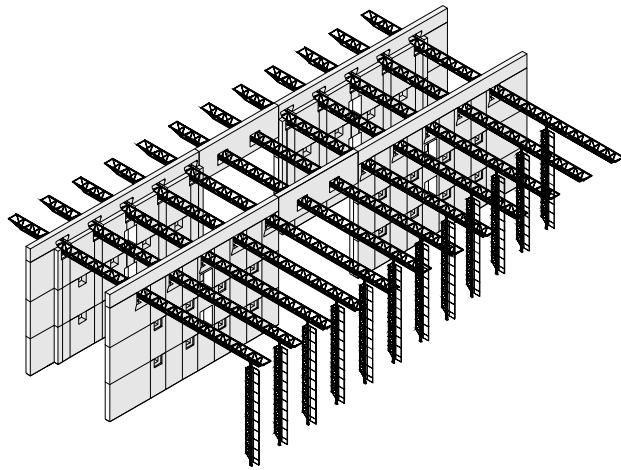
Main Structure
is composed of load bearing wall, column and truss.



Secondary Structure
is composed of cantilevered and suspended floor trusses.



Independent Element
includes children's story room, elevator & stair tower and service towers.



Beginning

site
program

STUDY OF STRUCTURAL CLARITY

A relationship between main structure and secondary structure has been studied and altered to increase structural clarity.

Process

structure
light
place

Conclusion



Study Model 1

The main structure and the secondary structure are interlocked.



Study Model 2

The secondary structure is suspended from the main structure at random points.



Study Model 3

Following the structural order, the secondary structure is suspended from the main structure.



Beginning

site
program

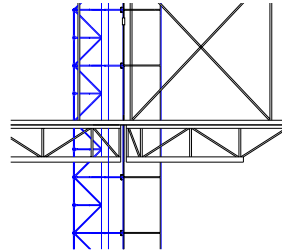
STUDY OF STRUCTURAL CLARITY

Process
structure

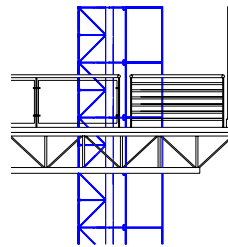
light
place

Conclusion

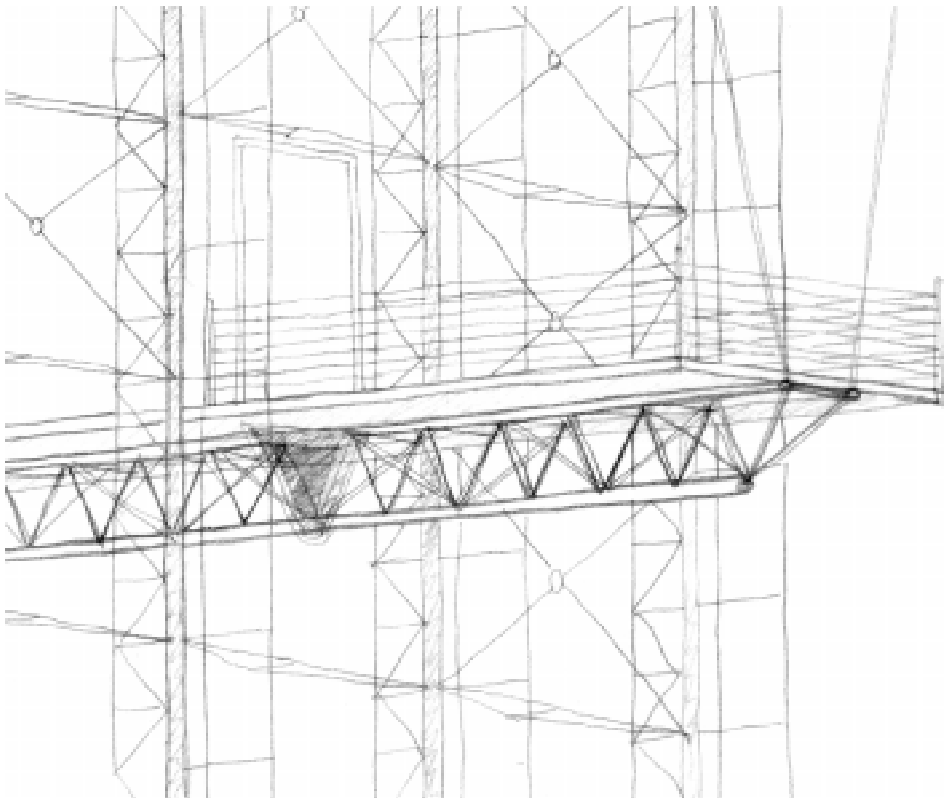
Study Condition:
secondary structure and glazing



Thought 1
Truss is separated into two parts at the glazing.
Advantage: avoid thermal transmission.



Thought 2
Truss penetrates glazing through cover plate.
Advantage: keep structural continuity.



study condition: truss penetrates glazing



Kansai International Airport Terminal

where bottom chord of truss penetrates glazing, cover plate allows for 1.2 metres of movement.

Beginning

site
program

MAIN STRUCTURE: THE WALL

Process

structure
light
place

Conclusion

My library begins with the wall.

- The wall is structure which supports the whole building.
- The wall is a boundary which divides the library into three different spaces: book stacks, public reading and individual study.
- The wall itself contains mechanical systems.

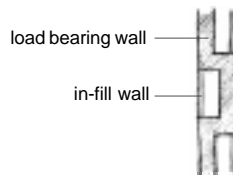
From far away, the wall seems strong, solid and cold. Close up, one realizes that the wall is different from segment to segment. The wall offers a range of tactical conditions.



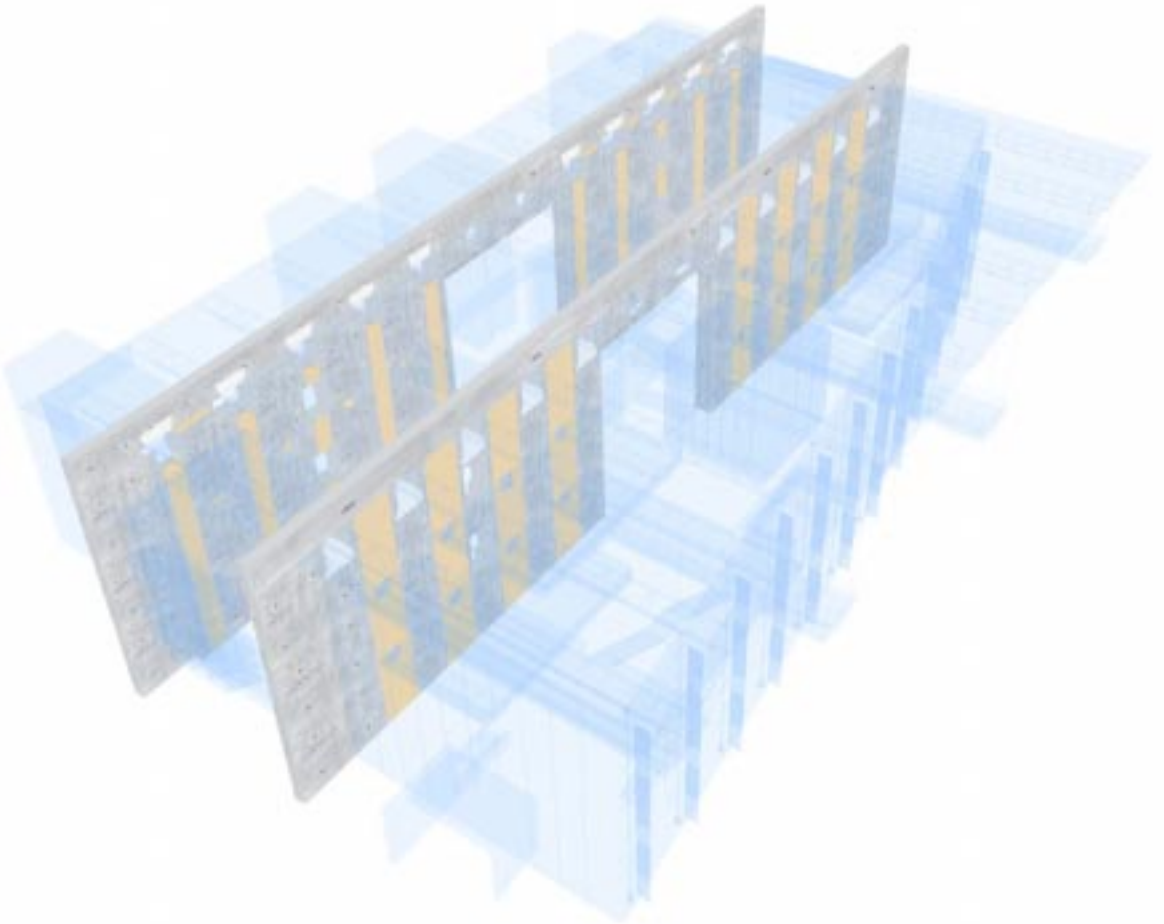
Development 1.
Single Wall : structural element



Development 2.
Layered Wall : combine structure and mechanical space



Development 3.
Articulated Wall : define load bearing wall and in-fill wall



two load bearing walls

Beginning

site
program

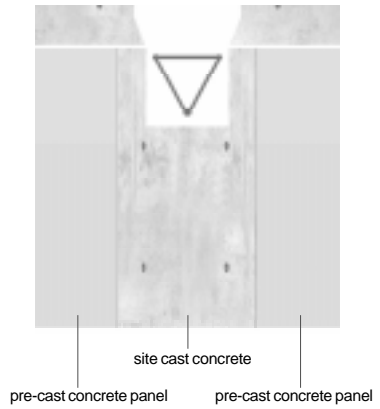
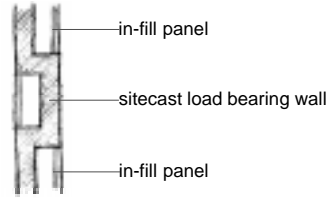
Process

structure
light
place

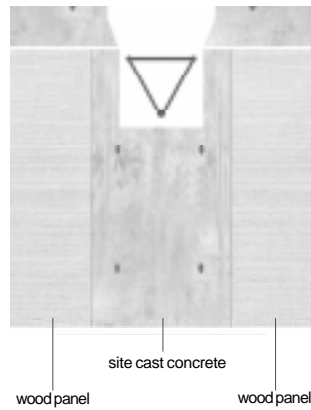
Conclusion

MAIN STRUCTURE: THE WALL

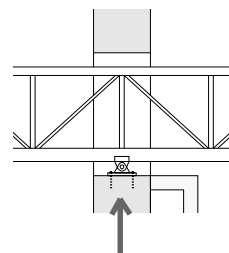
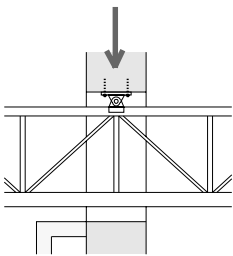
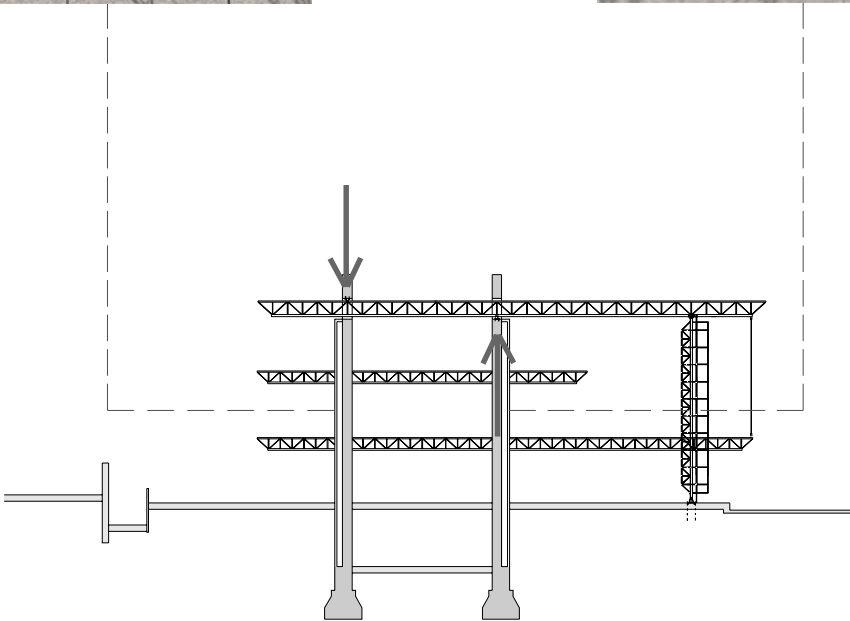
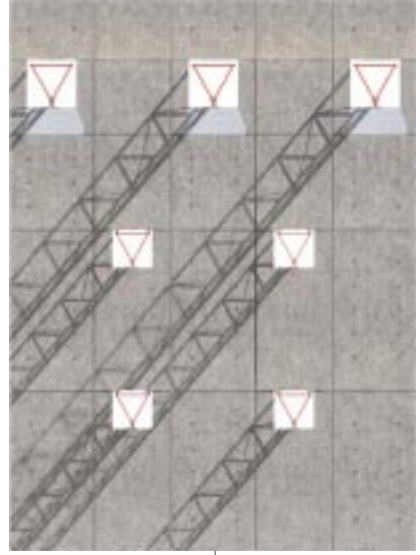
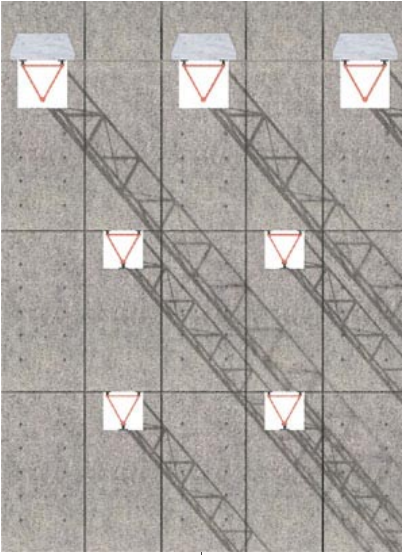
Different materials are used to define the different load bearing conditions on the wall.



thought 1



thought 2



Depending on the load bearing condition, the wall and the connection to the truss differ.

Beginning

site
program

MAIN STRUCTURE: THE WALL

The space between the two walls defines the book stacks, auditorium and bookstore. The space is protected from the direct light.

Process

structure
light
place

Conclusion



the space between the two walls: book stacks

Beginning

site
program

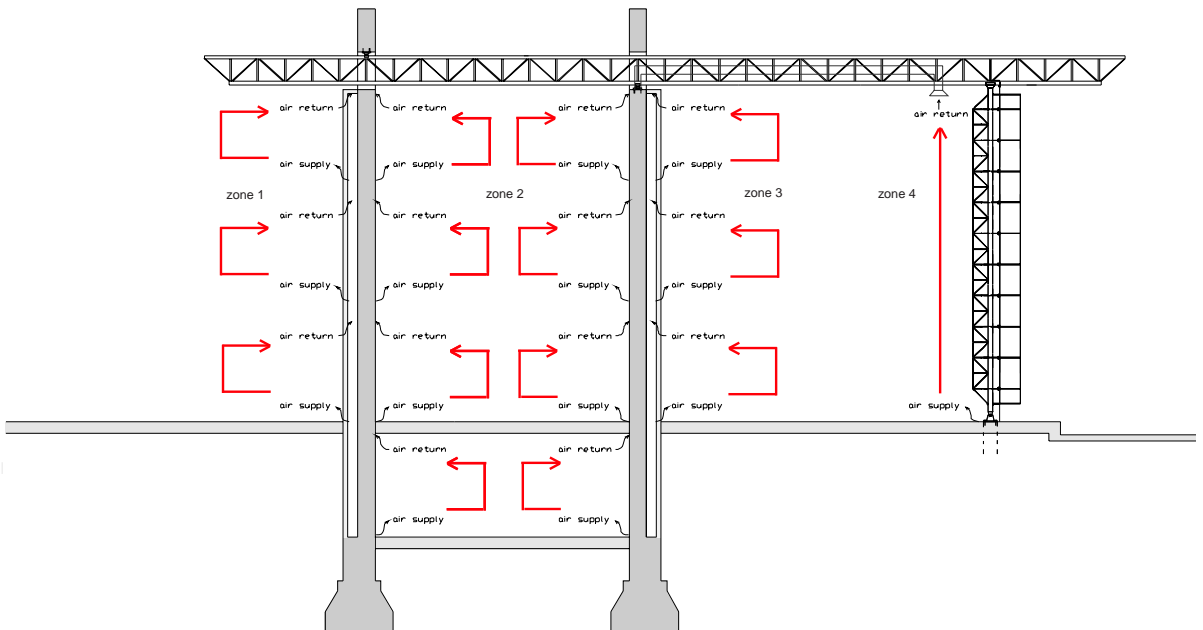
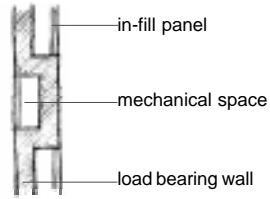
Process

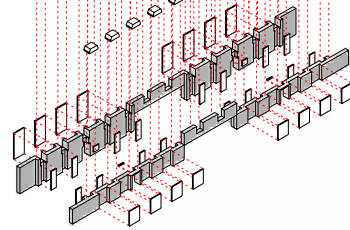
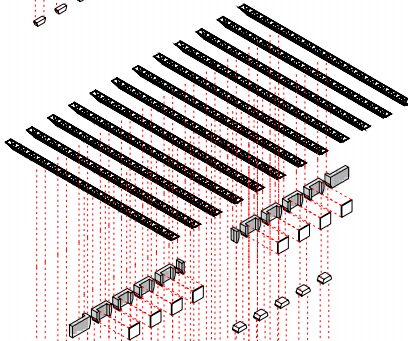
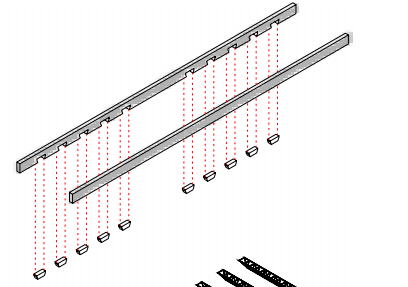
structure
light
place

Conclusion

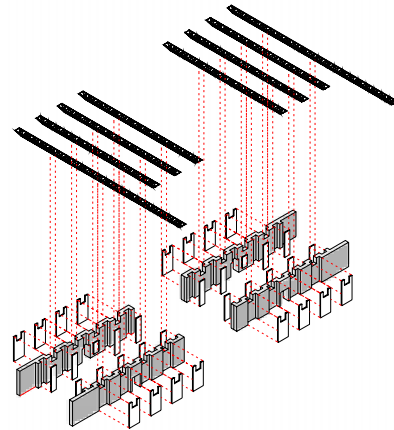
The space inside the wall is mechanical space,
which goes through the three floors.

MAIN STRUCTURE: THE WALL

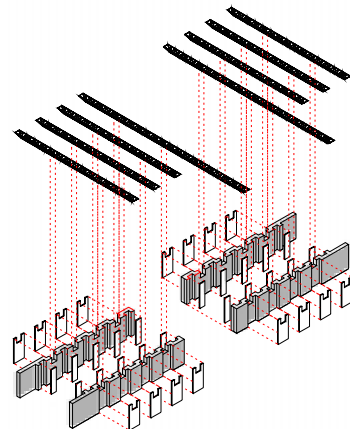




third level



second level



first level

Beginning

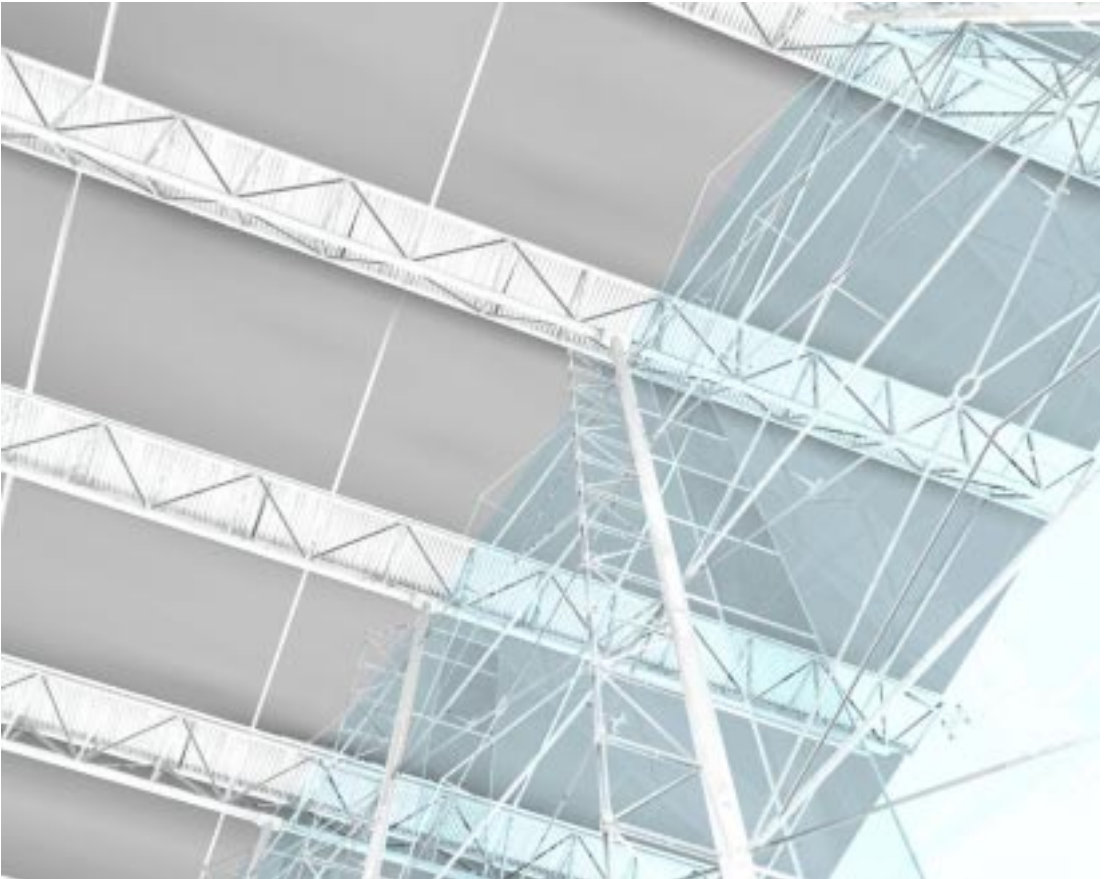
site
program

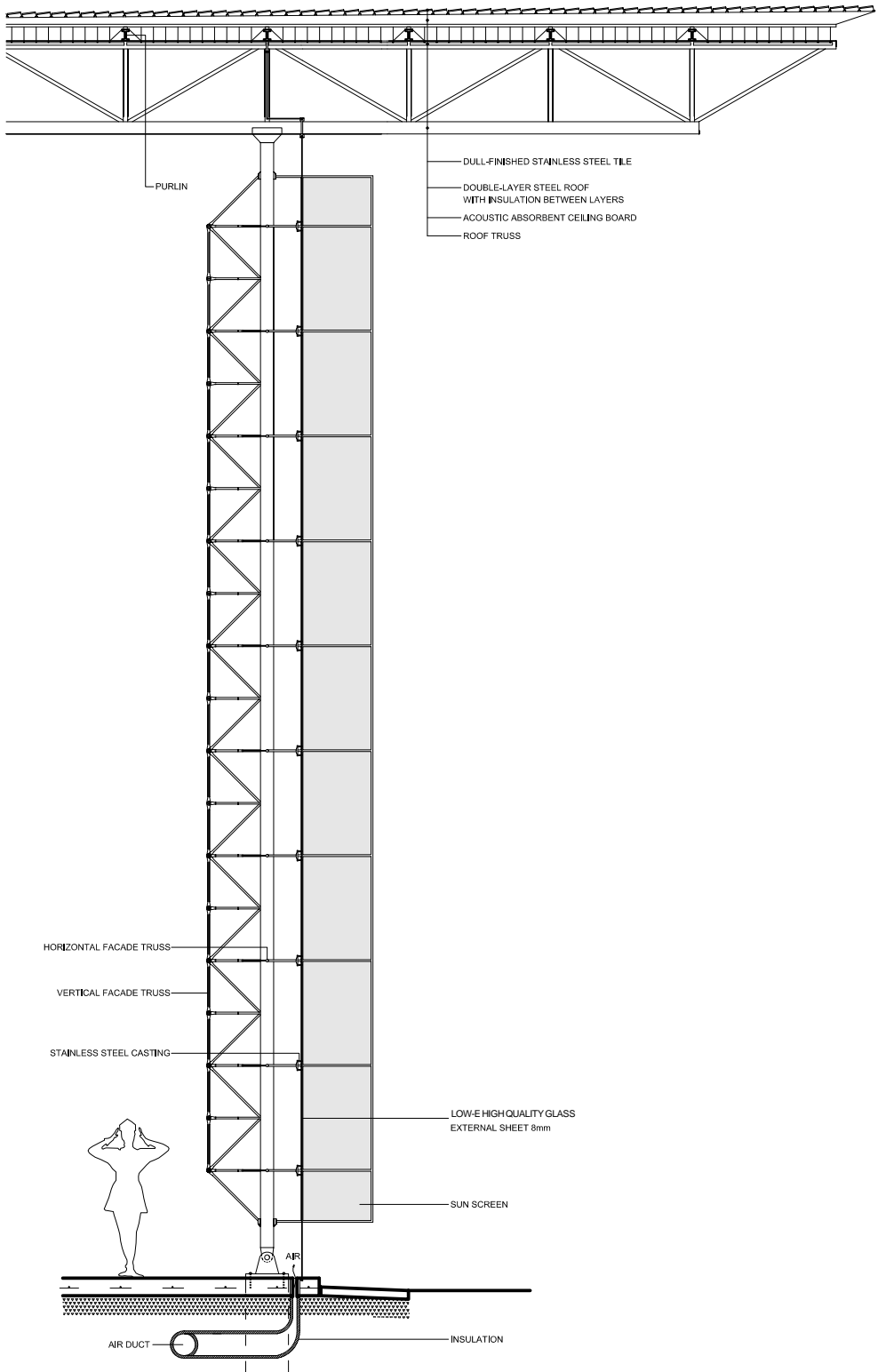
MAIN STRUCTURE: COLUMN

Process

structure
light
place

Conclusion





Beginning

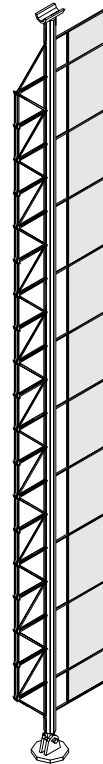
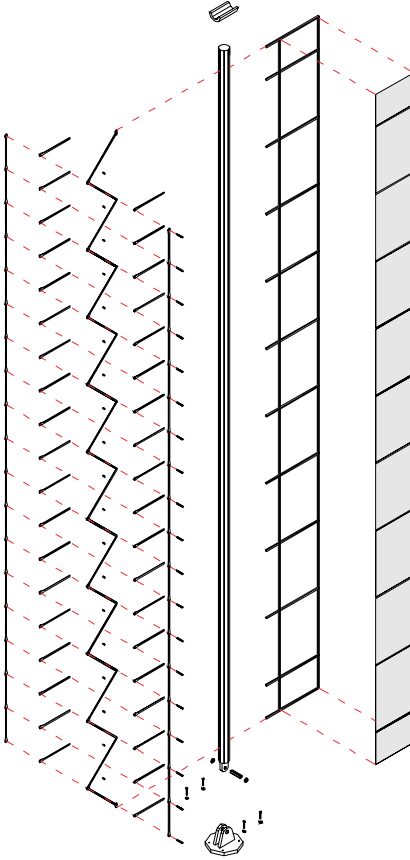
site
program

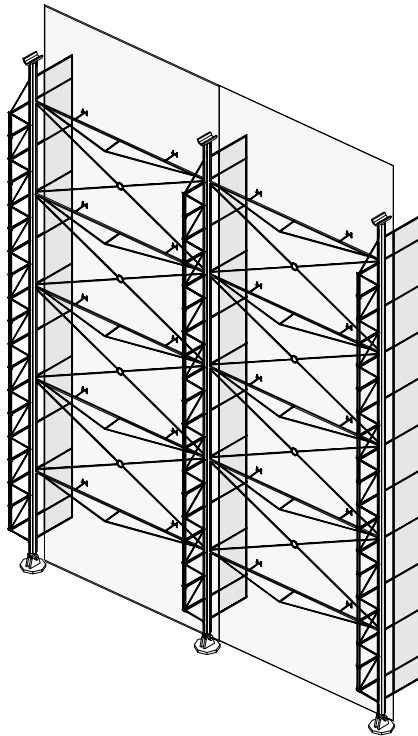
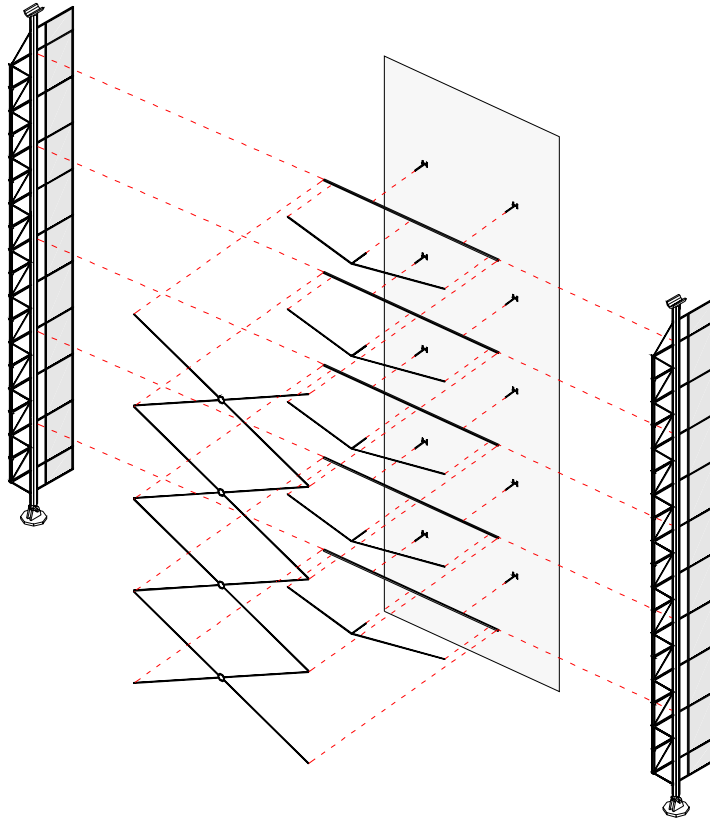
MAIN STRUCTURE: COLUMN

Process

structure
light
place

Conclusion





assembly - from a column to the facade

Beginning

site
program

Process

structure
light
place

Conclusion

Similarity & Variety

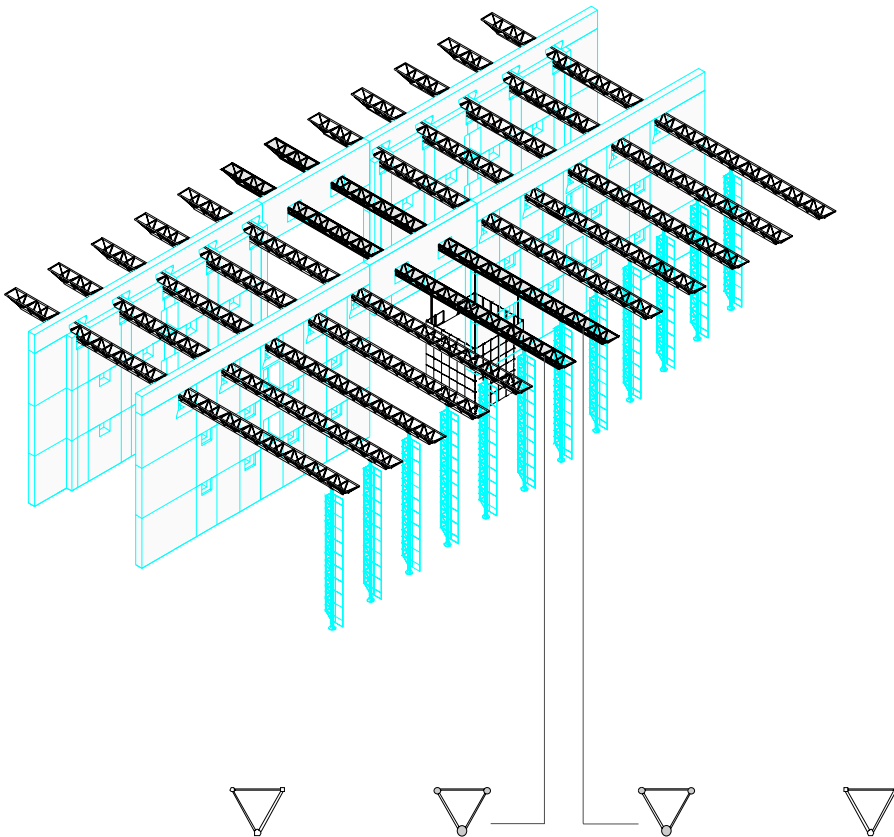
In my understanding, no two conditions are exactly the same in the world. When we realize the variation, how should we deal with it?

Based on my understanding about the order in design, there are two major types of variation:

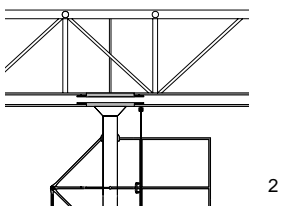
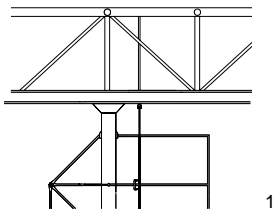
1. subtle / invisible variation
2. apparent / obvious variation

How to deal with the relationship between similarity and variety remains a question for me.

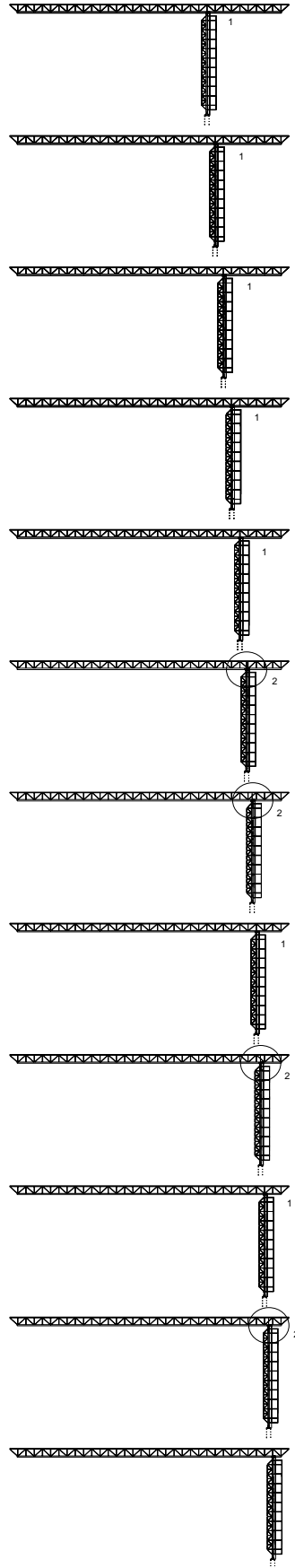
MAIN STRUCTURE: TRUSS



Apparent / obvious variation: Different chord diameters reflect the different load bearing condition.



Subtle / invisible variation:
The thickness of the steel chord differs with span
and load.
1. column below the truss's vertical member
2. column offset from the truss's vertical
member



Beginning

site
program

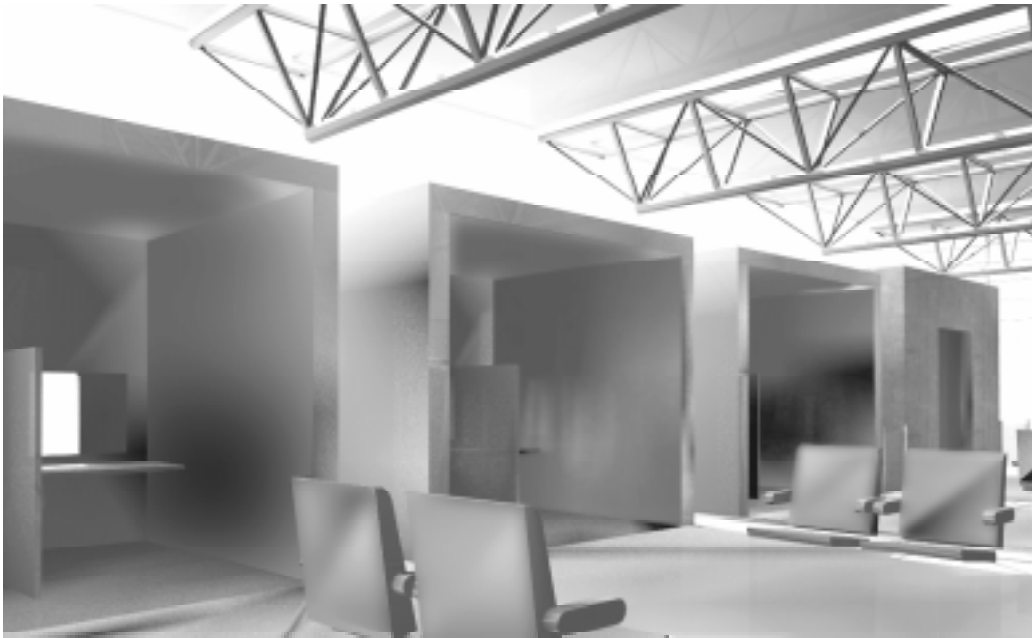
SECONDARY STRUCTURE

Secondary structure is designed to accommodate reading. When people have a book, they should have choices where to read the book: alone, in a small group or in a large group. Secondary structure defines those spaces.

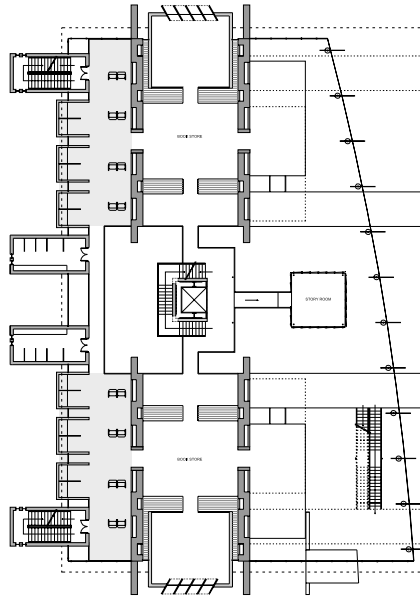
Process

structure
light
place

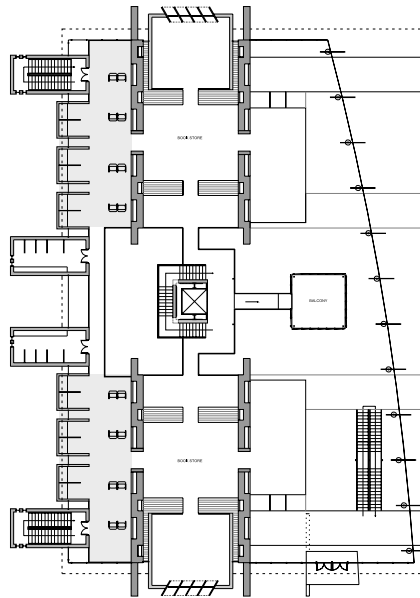
Conclusion



In the individual study area, concrete boxes denote small intimate spaces separated from the large public space to create privacy.



second floor



third floor

Beginning

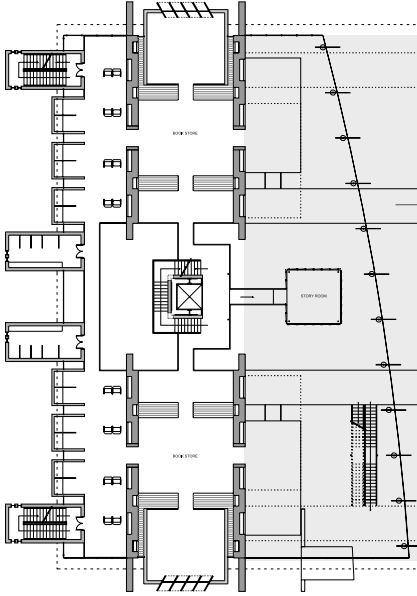
site
program

Process

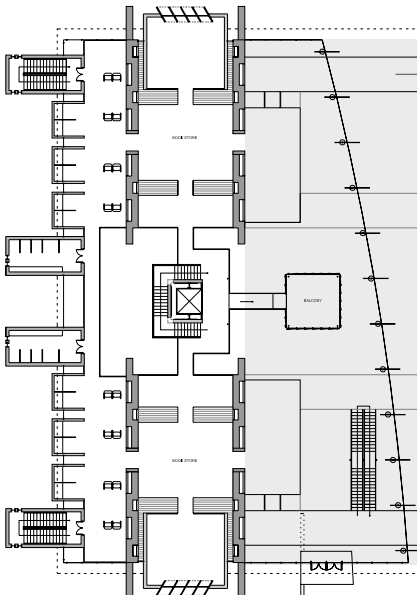
structure
light
place

Conclusion

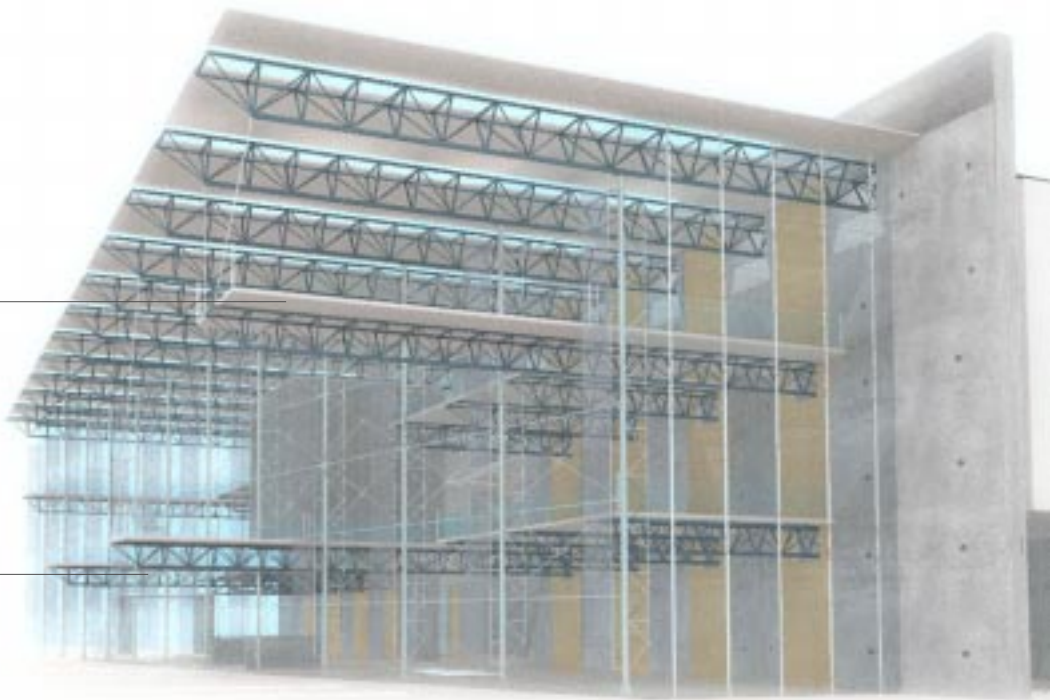
SECONDARY STRUCTURE



second floor



third floor



In the public reading area, the slabs are varied in size and direction, which creates a visually and functionally dynamic space.

Beginning

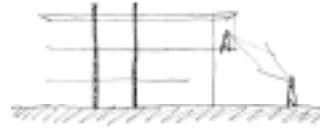
site
program

SECONDARY STRUCTURE

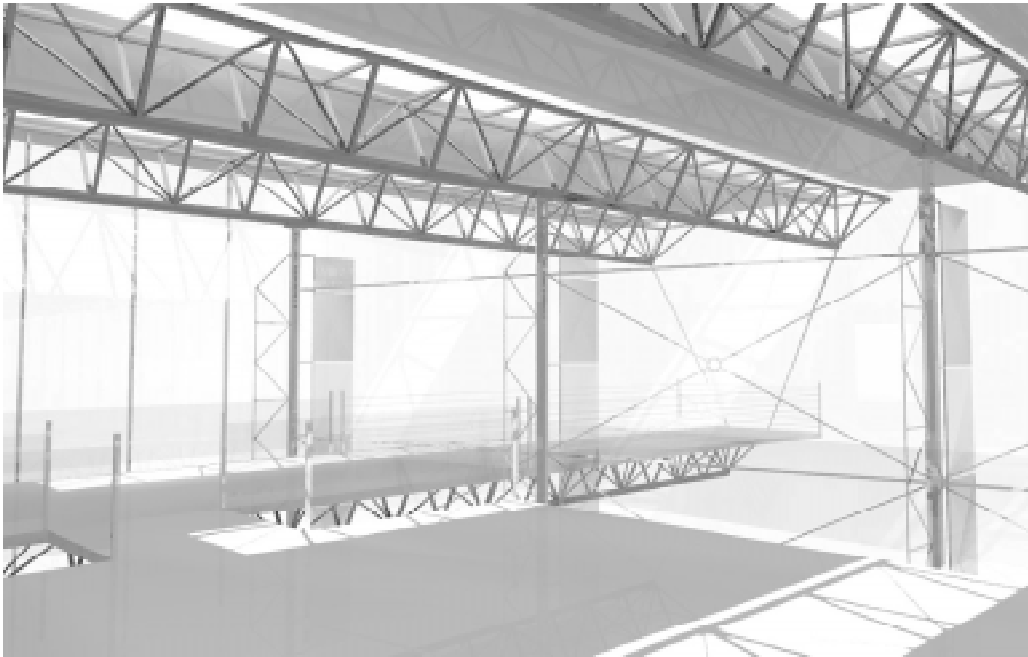
The secondary structure is also a connection between interior and exterior. The space underneath the large roof is "in-between" space. It provides the continuity between the inside and outside spaces.

Process

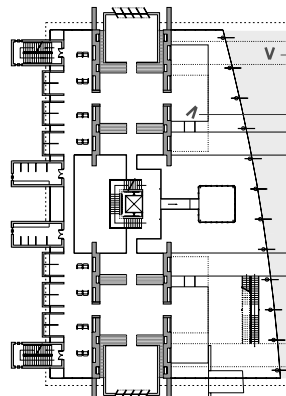
structure
light
place

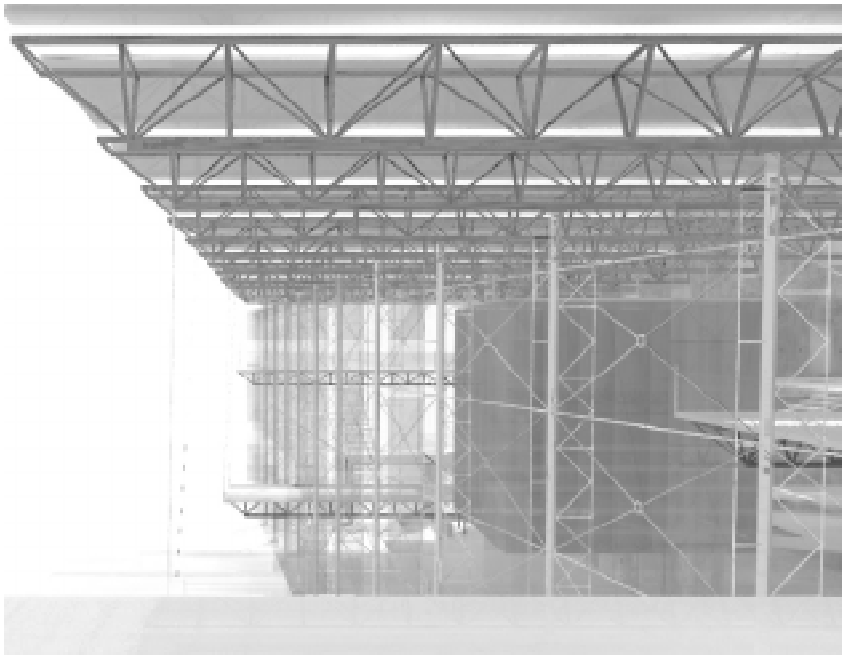


Conclusion



A





B

— B. view from exterior to exterior

— A. view from interior to exterior

Beginning

site
program

INDEPENDENT ELEMENT

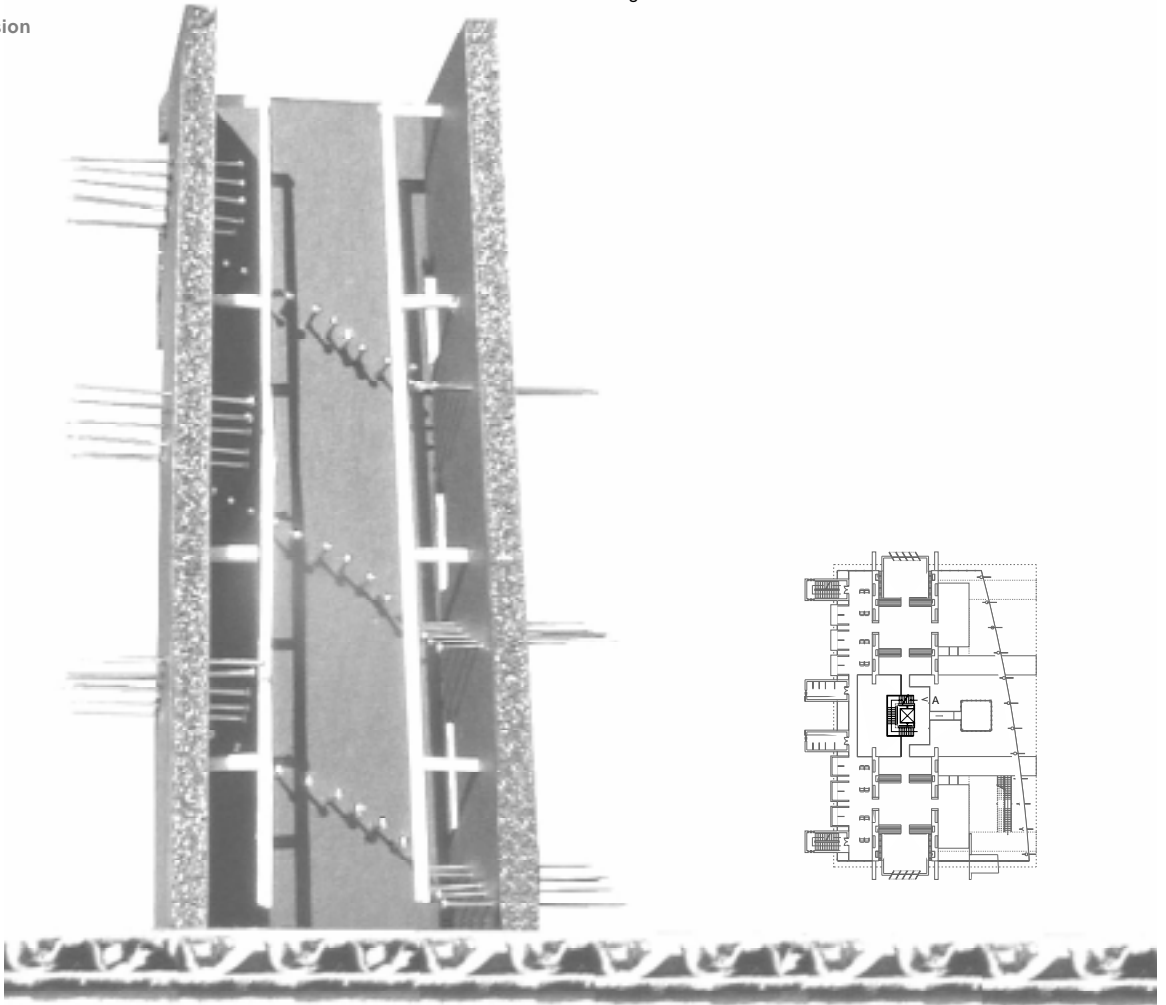
Process

structure
light
place

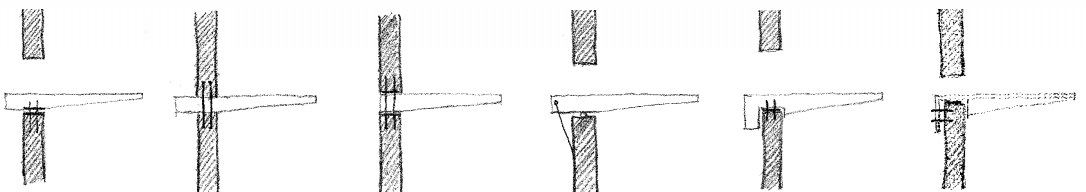
Conclusion

Elevator and Stair Core

Contrary to the typical dark box moving up and down, this elevator core opens to a skylight. Simultaneously, the steps of the surrounding stair penetrate the wall of the elevator core. At the point of penetration, there is a 10cm opening. In the glass elevator cab, one can see a spiral light path from the first floor to the third floor. This elevator offers a piece of sky and natural light.



early model



detail study



A. view to the stair

Beginning

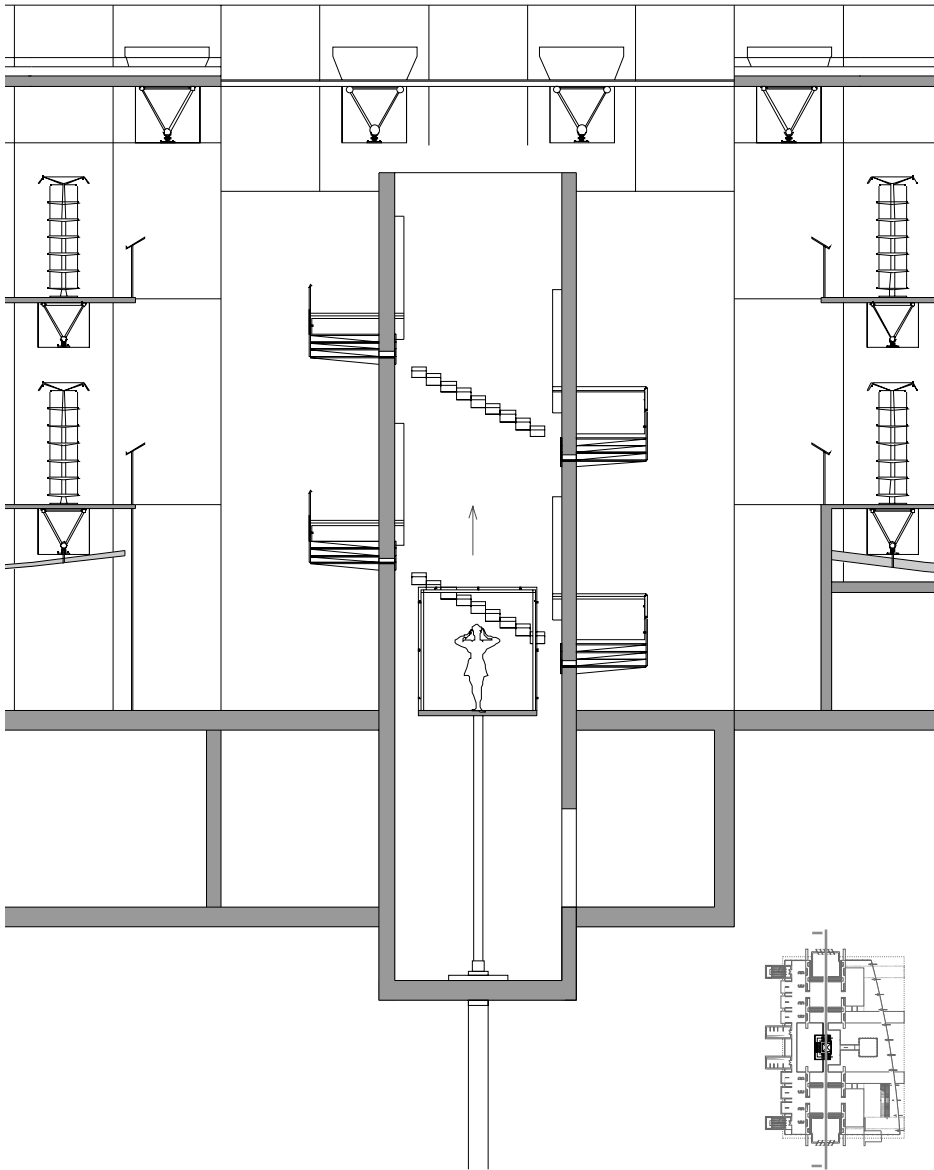
site
program

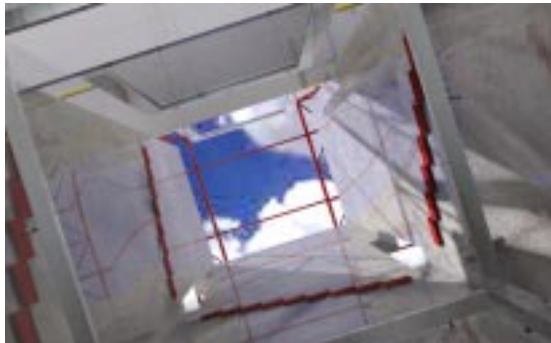
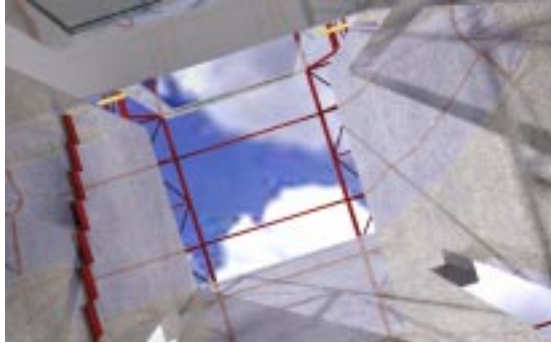
INDEPENDENT ELEMENT

Process

structure
light
place

Conclusion





view from the elevator cab to the skylight

Beginning

site
program

INDEPENDENT ELEMENT

Process

structure
light
place

Conclusion

Children's Story room

The children's story room, constructed with translucent glass and steel, is suspended from the main structure. On the top of the story room is a balcony, where you can observe the public reading area and the entrance.

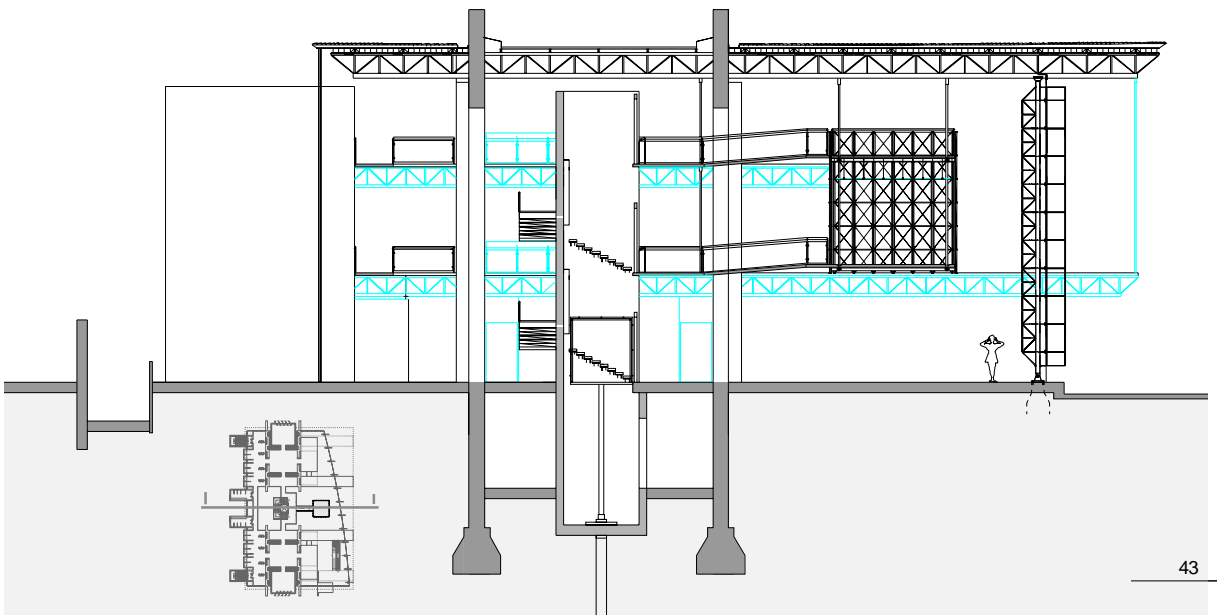
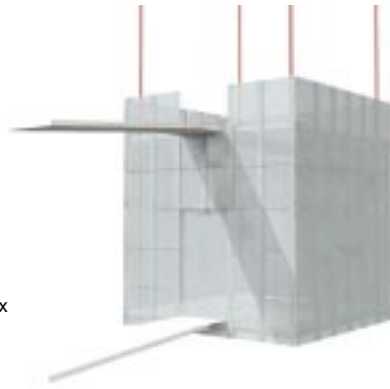


The translucent glass gives the story room a special character, hopefully a place for imagination.

steel frame



translucent box



Beginning

site
program

STRUCTURE DEFINES SPACE

"A space order for a library which encompasses the many possible relationships of book, people and services could possess a universal quality of adjusting to changing human needs, translatable into an architecture."

Louis I Kahn

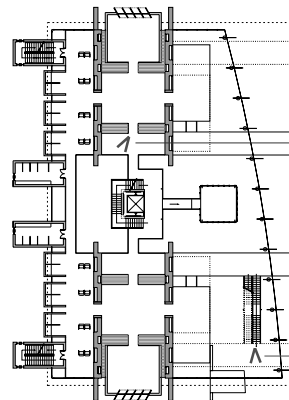
Process

structure
light
place

Conclusion



A





B

A. view to the exhibition and public reading space

B. view to the book stacks

Beginning

site
program

STRUCTURE DEFINES SPACE

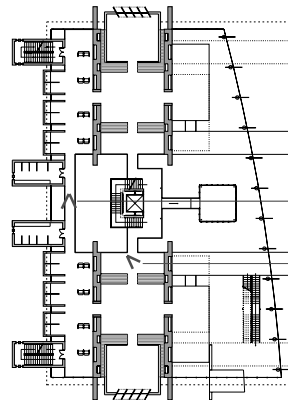
Process

structure
light
place

Conclusion



C





D

C. view from the bridge to individual reading space

D. view from book stacks to individual reading space

Beginning
site
program

LIGHT

"A man with a book goes to the light.

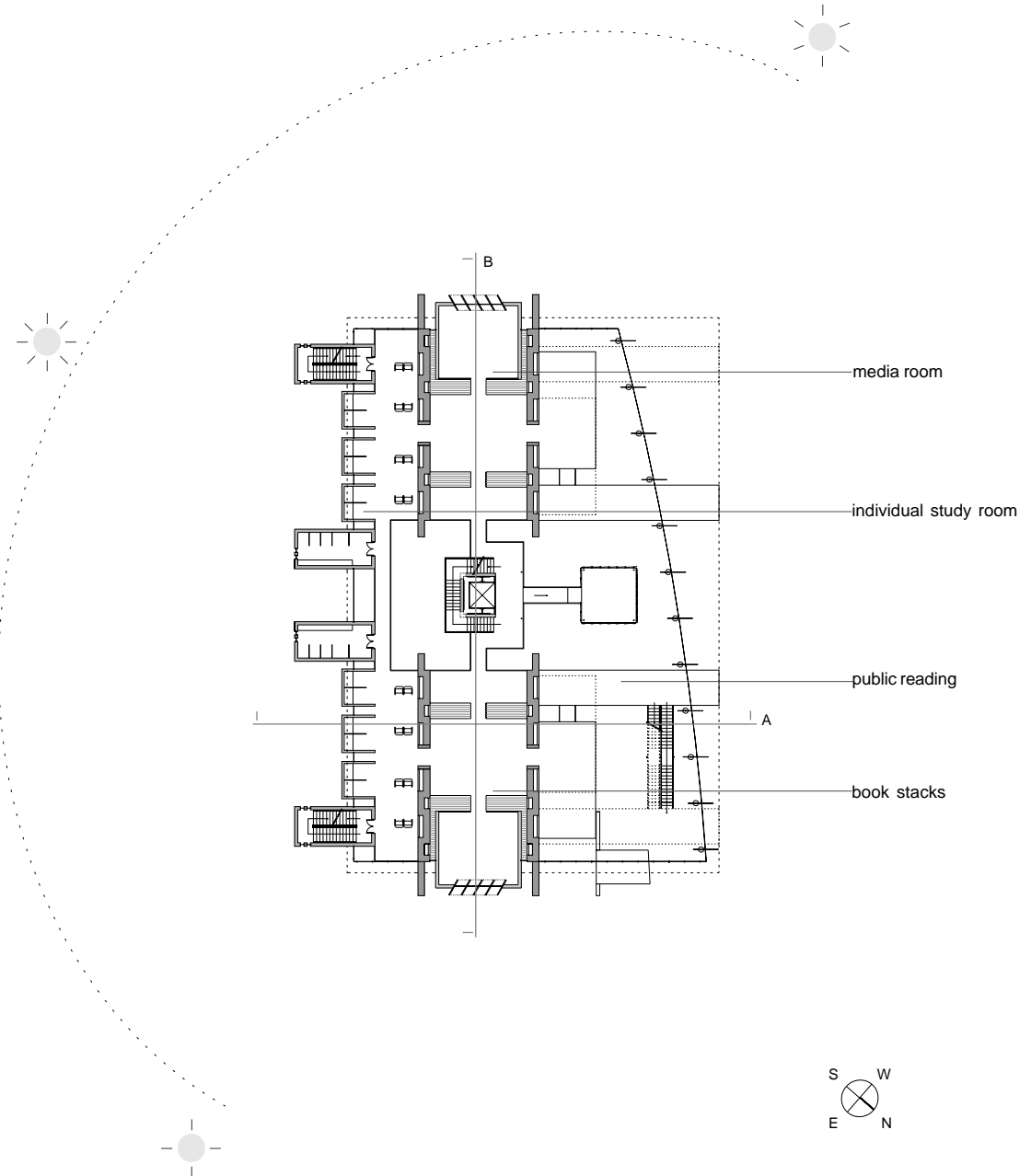
A library begins that way."

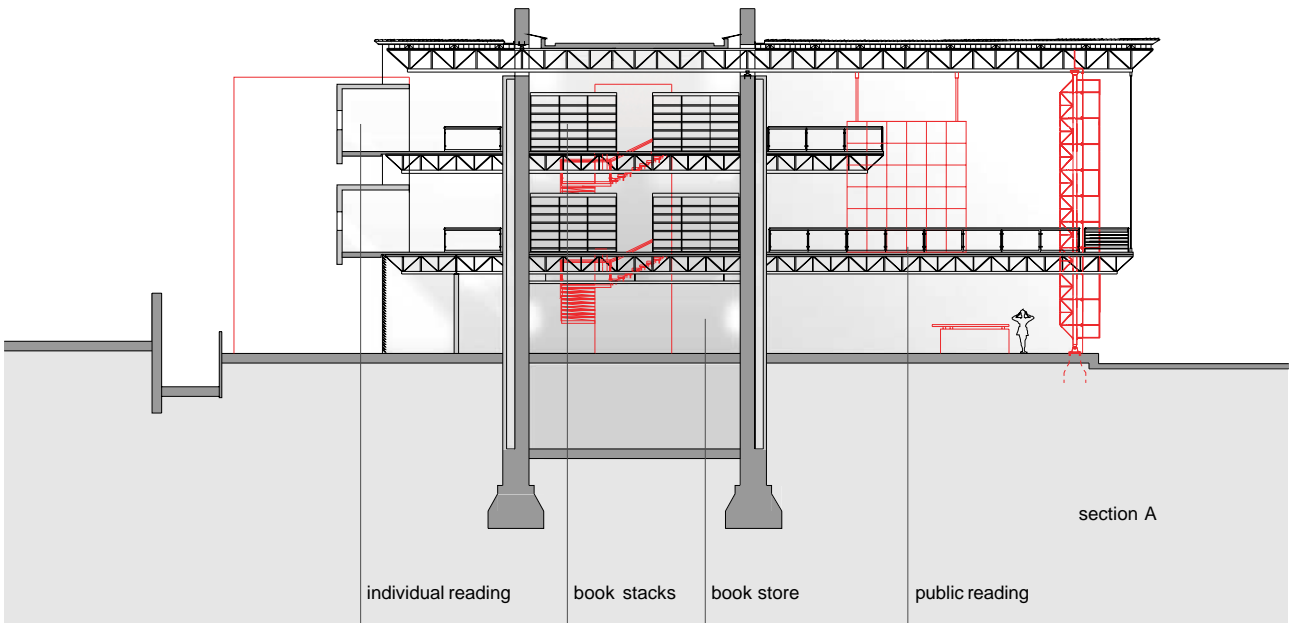
Louis I Kahn

Process
structure
light
place

Responding to the function and orientation,
different lighting strategies are employed.

Conclusion





Beginning

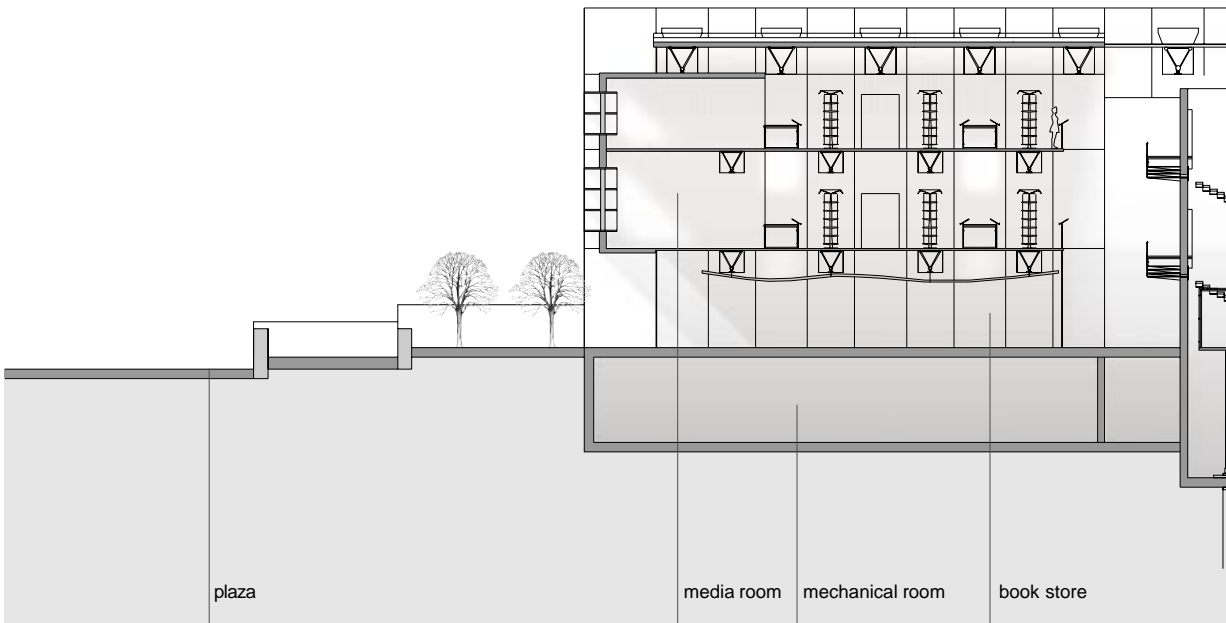
site
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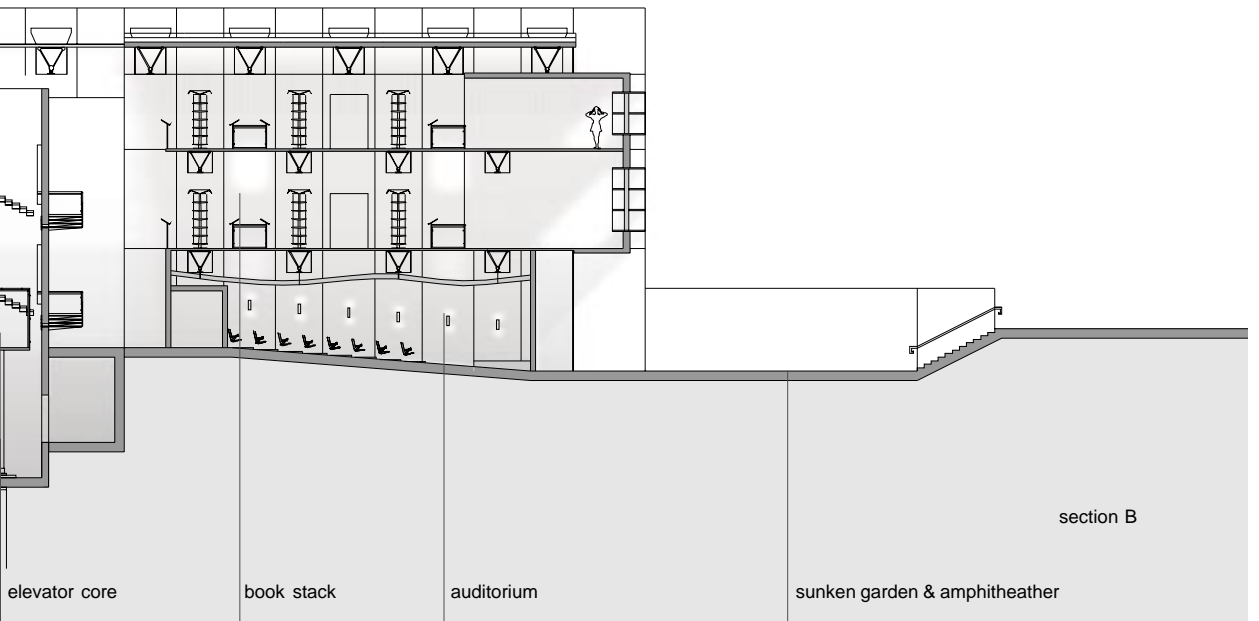
LIGHT

Process

structure
light
place

Conclusion





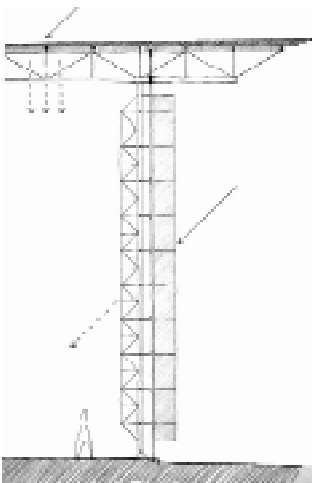
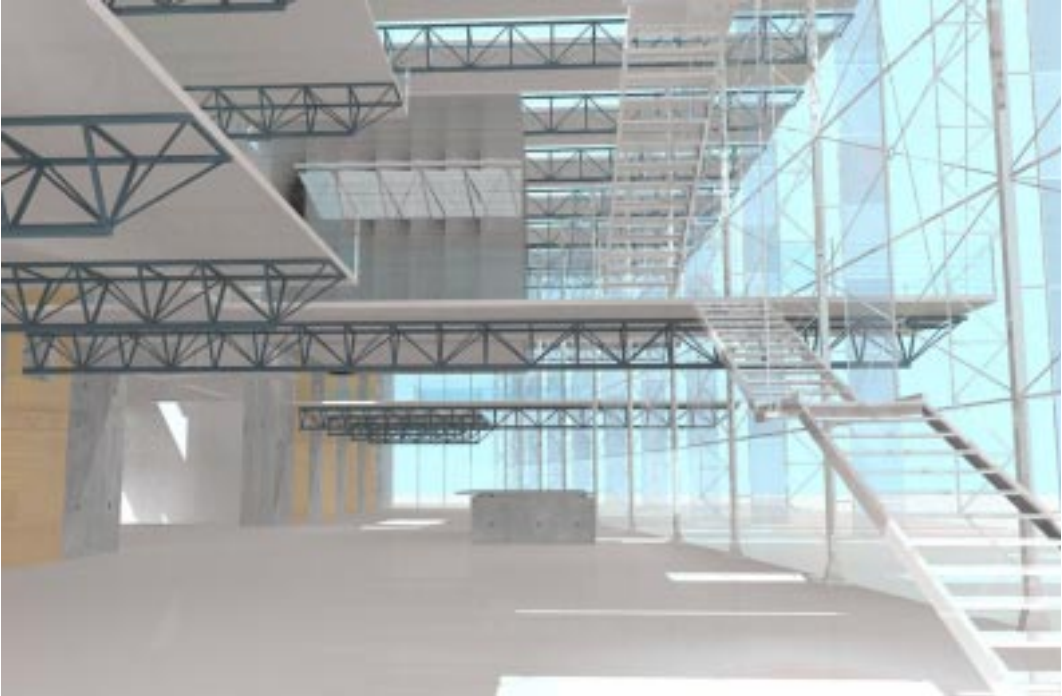
Beginning
site
program

Public Reading

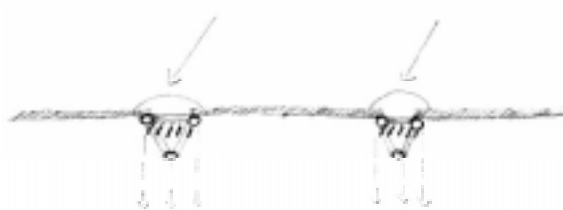
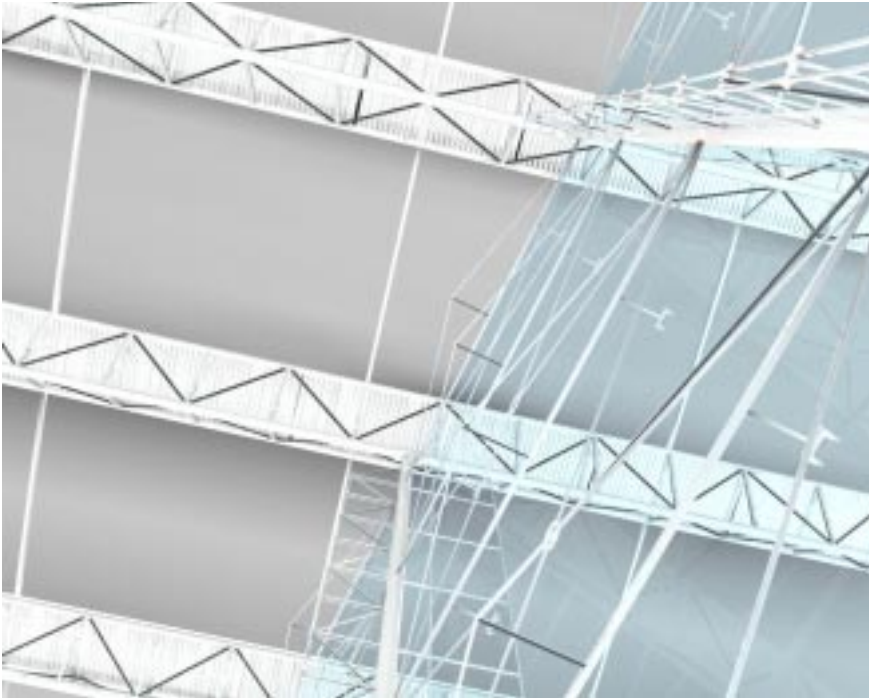
LIGHT

Process
structure
light
place

Conclusion



The public reading room faces northwest. Along the facade is transparent glazing, which provides a view to outside. Vertical shading is used to evenly distribute light for the reading area. High quality low-e glass can reduce heat transmission.



The truss is illuminated by the linear skylight. Underneath the skylight, a sun reflector is attached to the truss.

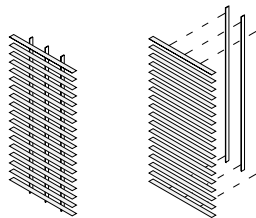
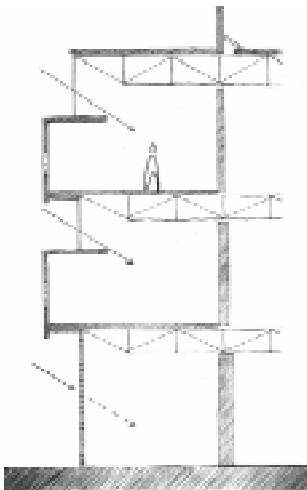
Beginning
site
program

Individual Study

LIGHT

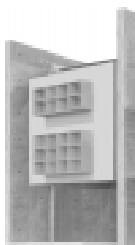
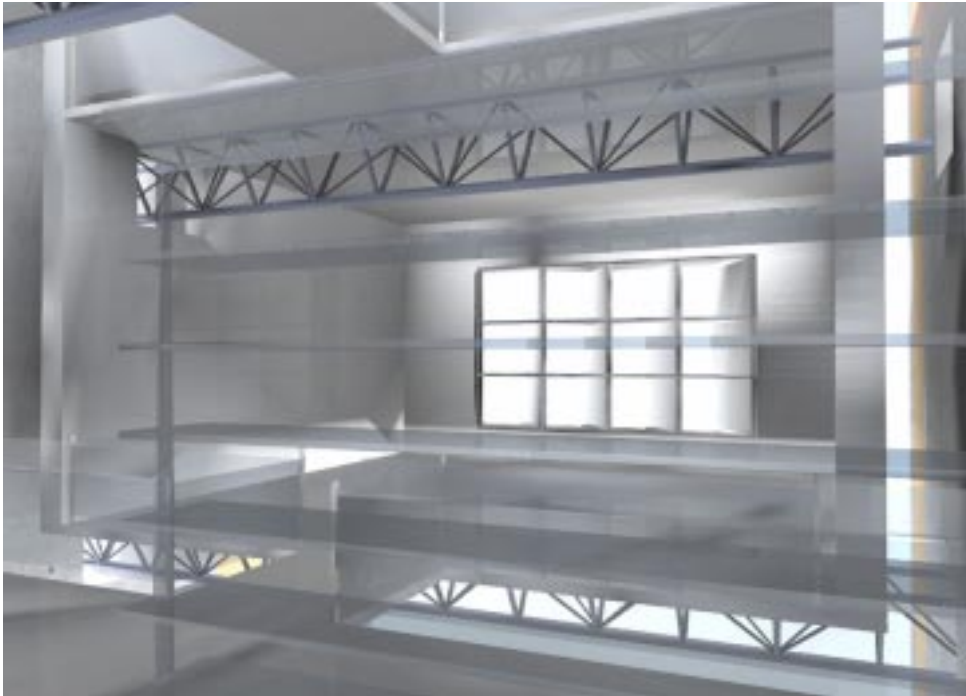
Process
structure
light
place

Conclusion



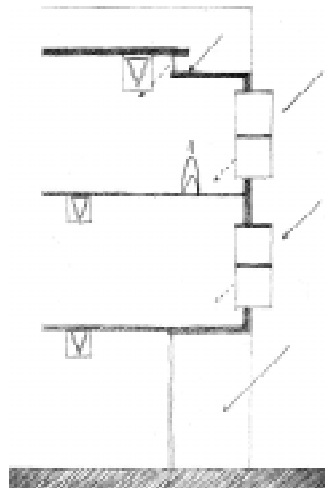
Vertical mullions and horizontal sun shading work together to prevent problems with glare on southwest facade.

The individual reading areas are illuminated by glazing, starting at a level above the head of the reader. Each individual study room has eye-level windows for two readers, which can be closed for privacy and concentration, or opened to permit a view of outside.



egg crate - exterior

The media room faces southwest. Double direction egg crate shading is used to prevent glare.



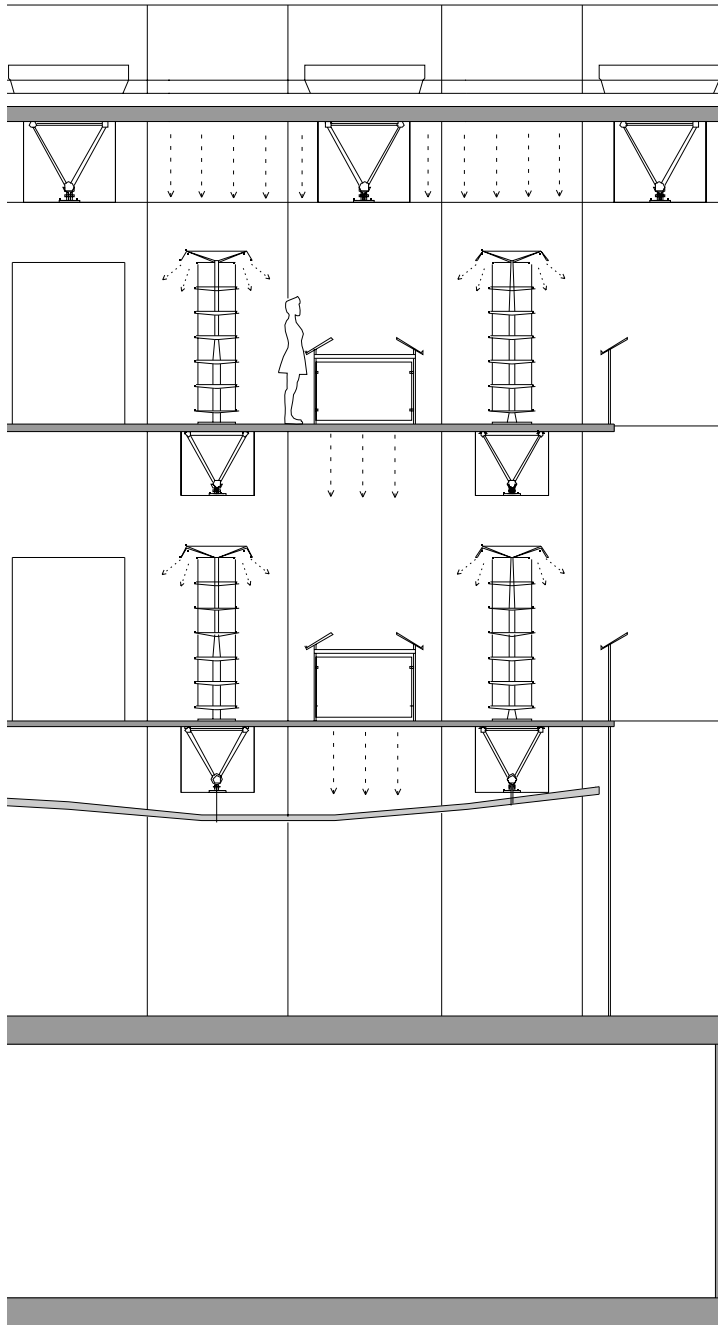
Beginning
site
program

Book Stacks

LIGHT

Process
structure
light
place

Conclusion





The book stacks are illuminated with light from an indirect source. The light comes into the space through slots along the wall, hitting the wall then reflecting back into the space. The electric light attached to the book stacks is the second light source for the space. The opening through the floor allows the light to penetrate the lower level.

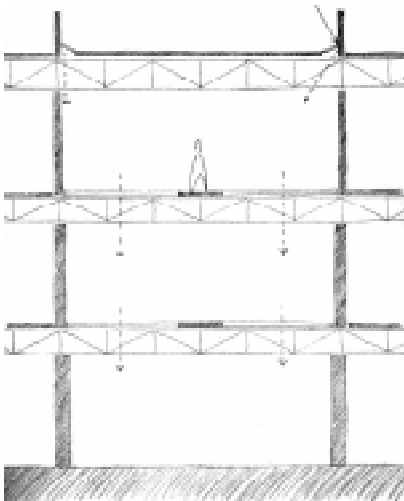
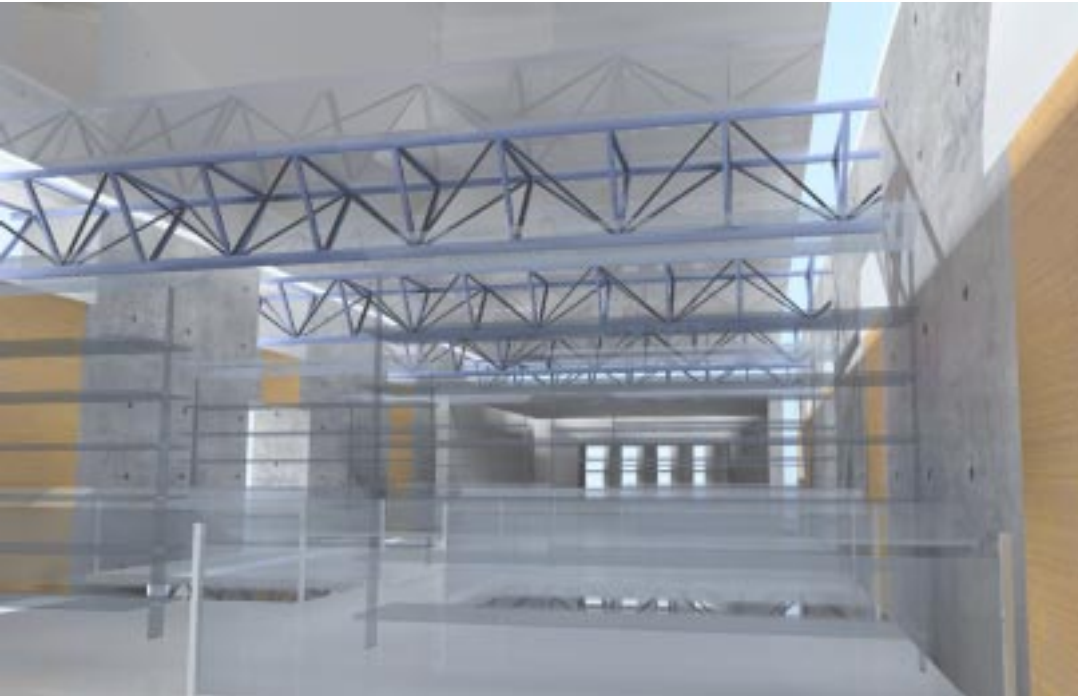
Beginning
site
program

Book Stack

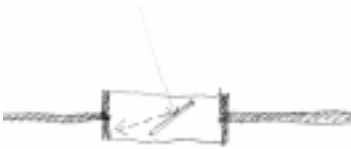
LIGHT

Process
structure
light
place

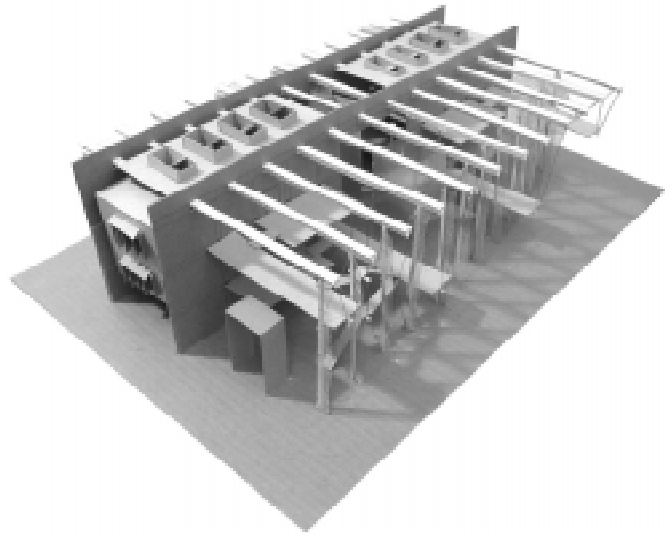
Conclusion



Study of the skylight
Different skylights are examined in the space to get indirect
light and provide a connection between inside and outside.



Rectangular skylight with reflective panel



Cylindrical skylight



Beginning

site
program

PLACE

Process

structure
light
place

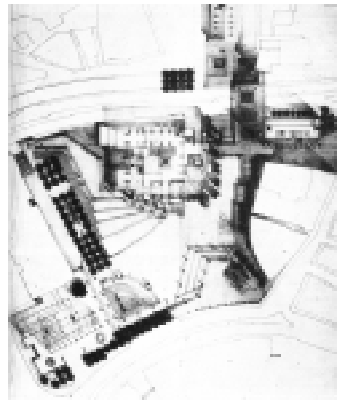
Conclusion

The community library needs a base. The base needs to be developed as a place for people to relax, for flowers to grow, and as an event for the city. How best to design a place for the building, people and city is quite a challenge.

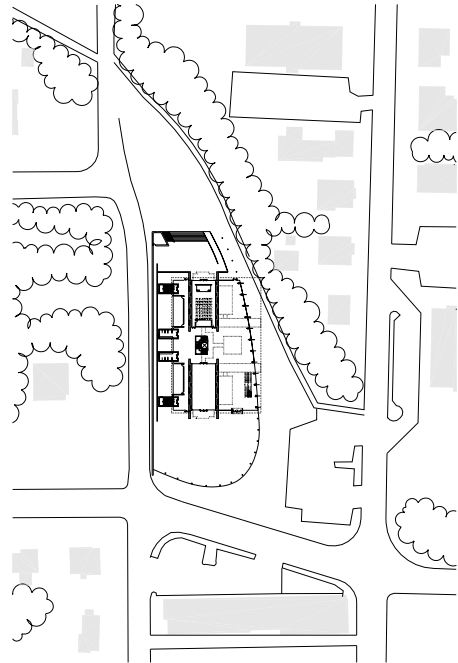
PRECEDENT

Boston City Hall

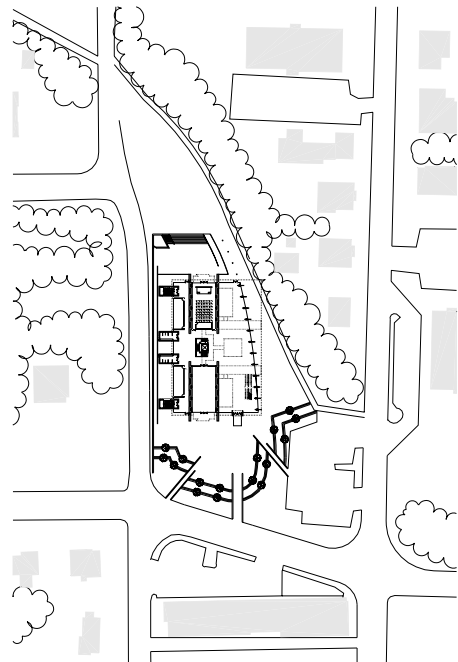
Boston city hall plaza is clearly designed to fulfill architectural needs. It ties the regulated structure of the building with the irregular site.



Development 1.
The building's curve is
continued to the plaza.



Development 2.
The boundary of the
plaza parallel to the
road and the ramp
point to the entrance.



Beginning

site
program

Process

structure
light
place

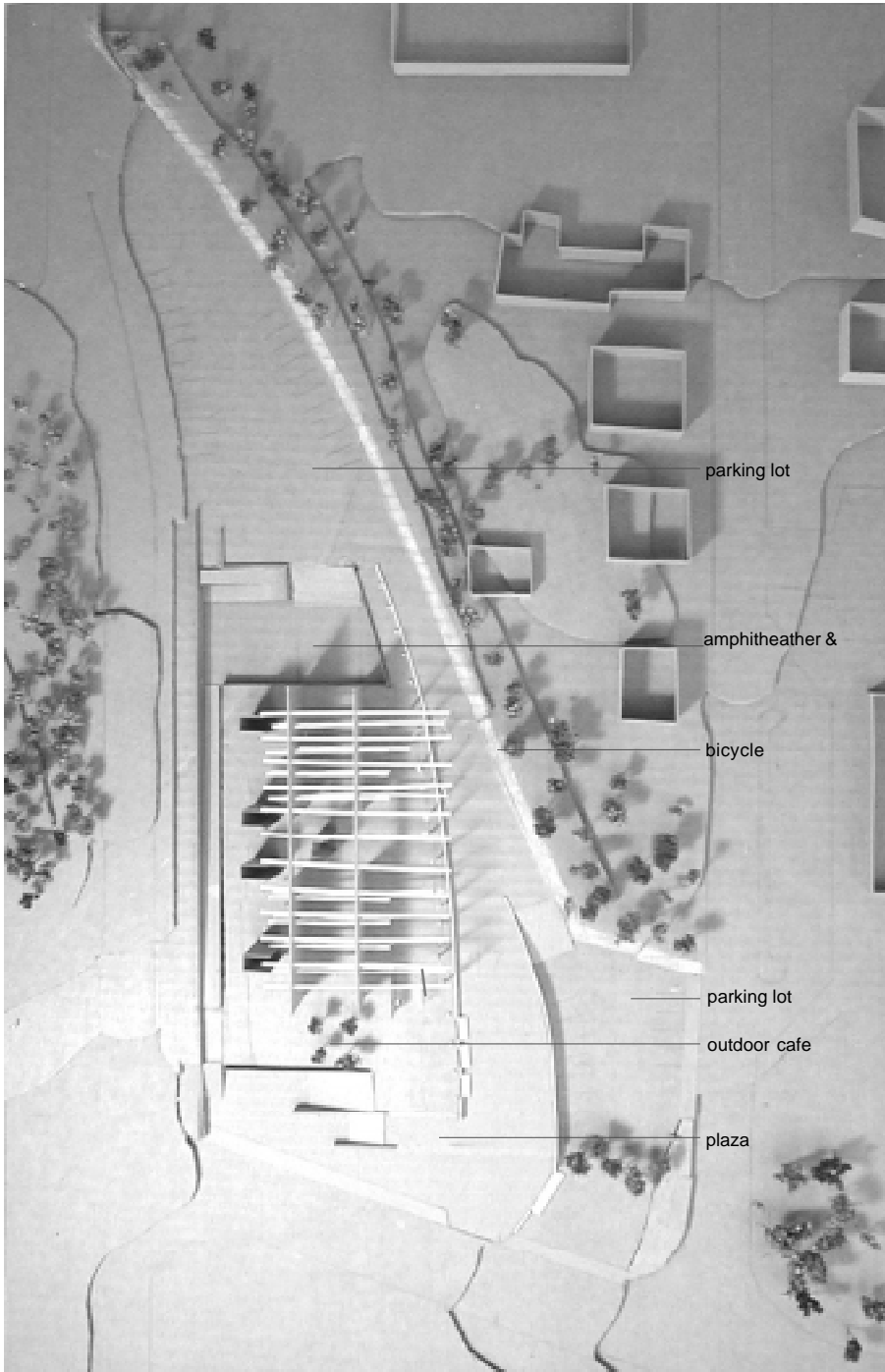
Conclusion

PLACE

Development 3.

Short walls provide places for people to sit.
A straight short wall follows the structural order
of the building.

A curved short wall follows the natural contour
and directs people to the entrance.





terrazo - interior floor



exposed aggregate - exterior floor

Similar patterns and colors of ground materials are used to create continuity from exterior to interior.

Beginning

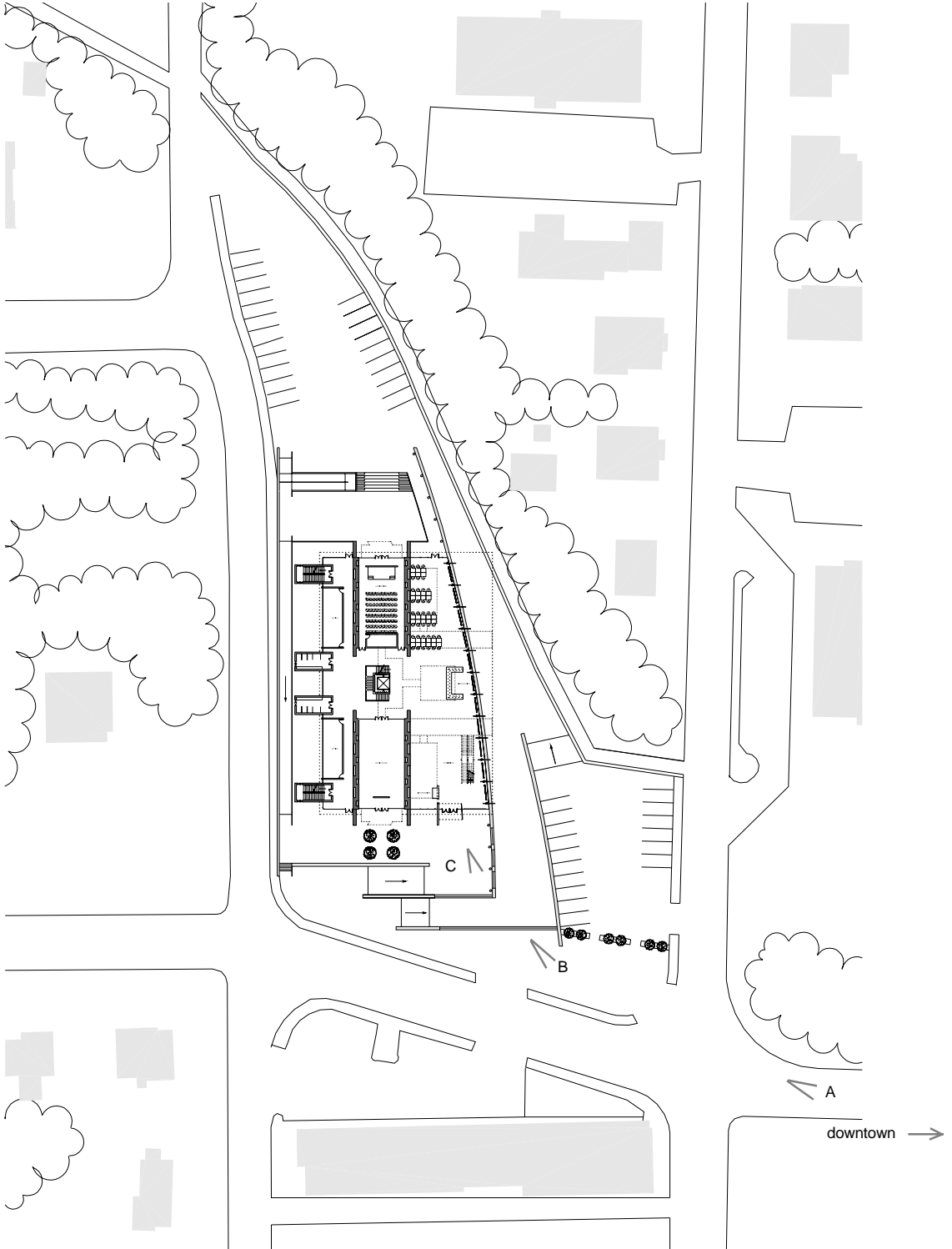
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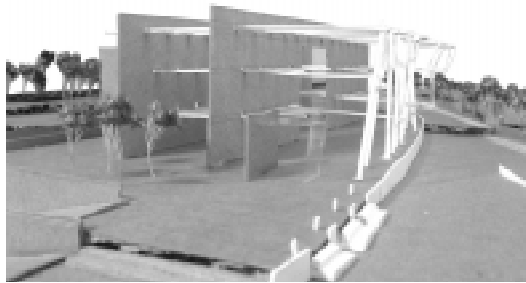
PLACE

Process

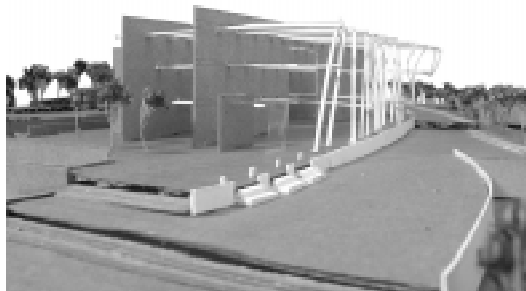
structure
light
place

Conclusion





C



B



A

Approach to the library from downtown

Beginning

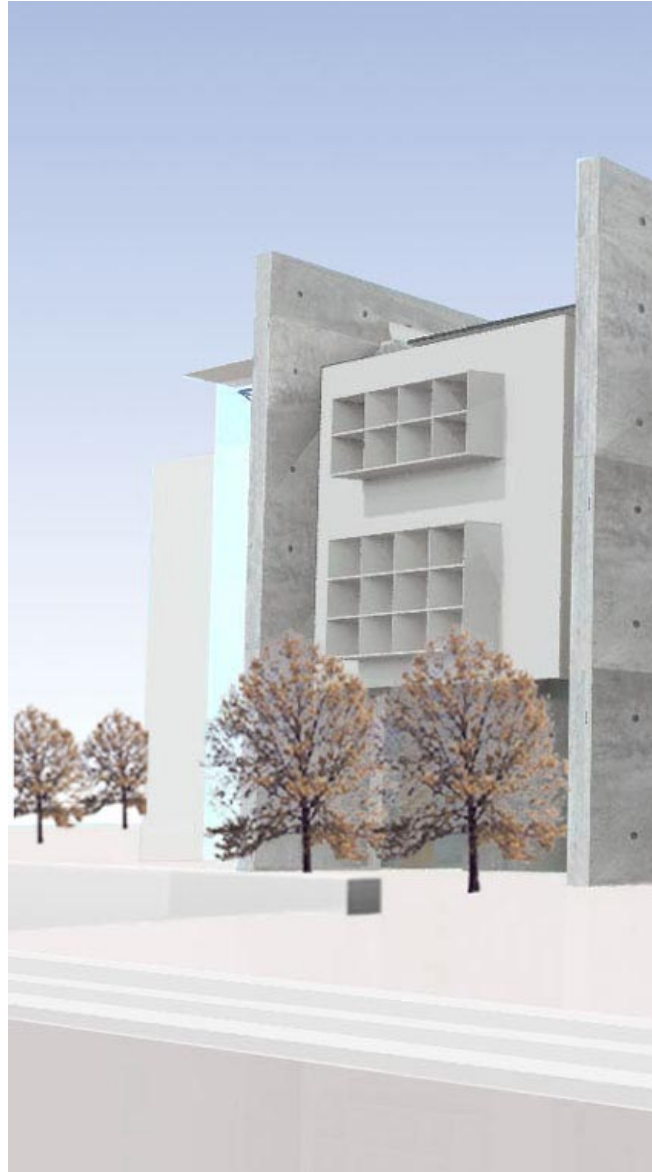
site
program

PLACE

Process

structure
light
place

Conclusion



Daytime: the library is a place for people to receive and exchange information.



Beginning

site
program

PLACE

Process

structure
light
place

Conclusion



Nighttime: the library is a glowing icon for the town.



Conclusion...



Beginning

site
program

Process

structure
light
place

Conclusion

CONCLUSION

The process of producing a thesis project is much more important than the project itself. The process is research and investigation. It is also an opportunity to refine my position in architecture.

With many questions, I started my thesis project. Through the process, I obtained some solutions concerning structural order, light strategies, and materials. I attempted to make architectural spaces by controlling the light, material, and structure. At the same time, however, new questions arose which deserve more attention.

My thesis project recorded solutions to questions which I found to be important. I also recognize now on the basis of my ability and understanding that the proposed solutions are the best I could conceive, while I recognized their limits at the same time. My understanding about the truth in architecture is still youthful. I realize the more I learn, the more I need to learn.

The process has been a deep experience for me. It has changed my way of thinking about design and architecture. The desires of people, the desires of site, and the desires of material form my principal questions. Although I still have a long way to go in my quest for the truth in architecture, this process is my beginning.

Photography Credits

- p.5 Aerial Photograph, Donna Dunay, Town Architecture: Blacksburg, Penn Washington, 1986 (p.154)
- p.5 1999 Topographic & Base Maps, Capital Design and Construction Department, Virginia Polytechnic Institute and State University. <http://cdcd.vt.edu>
- p.8 Phillips Exeter Academy Library, Urs Buttiker, Louis I. Kahn: Light and Space, Waston-Gutpill Publishers, New York, 1994 (p.128, p.129 & p.131)
- GA, A.D.A.Edita, Tokyo, v. 35 (p.36)
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- p.58 Boston City Hall, Landscape Design, Institute of Landscape Architects, London, v.101 May 1973 (p.8-10)

Unless otherwise noted, images are produced by the student.

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7. Colin Davies, Architecture in Detail: British Pavilion, Seville Exposition 1992, Nicholas Grimshaw and Partners, Phaidon Press Ltd, 1992

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I feel so lucky for the opportunity to study in Virginia Tech. Here, I have learned so much from both professors and friends. All of this knowledge and friendship will benefit me in my life.

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