Construction Technology 1 (ARCH 35301)

Basic Materials:

WOOD + MASONRY

INTRODUCTION

Construction Technology 1 (ARCH 24501)

= LECTURE + SEMINAR

(LECTURE TIME: 12:30 AM – 1:50 PM)

SECTION	PROF.	TIME	ROOM #
SM1	**MT CHANG**	**W 2:10 – 3:30**	**2M23**
SM2	**KASAPI**	**W 2:10 – 3:30**	**3M11A**
SM3	**TAMTON**	**W 2:10 – 3:20**	**3M23**
SM4	**JOHNSTON**	**W 2:10 – 3:30**	**#127**

EMAIL INFO FOR ACCESS TO DROPBOX:

TODAY!!!
YOUR SEMINAR PROFESSOR HAS TO GET YOUR EMAIL ADDRESS OF THE FOLLOWING TYPE:

Joe.Doe57@login.cuny.edu

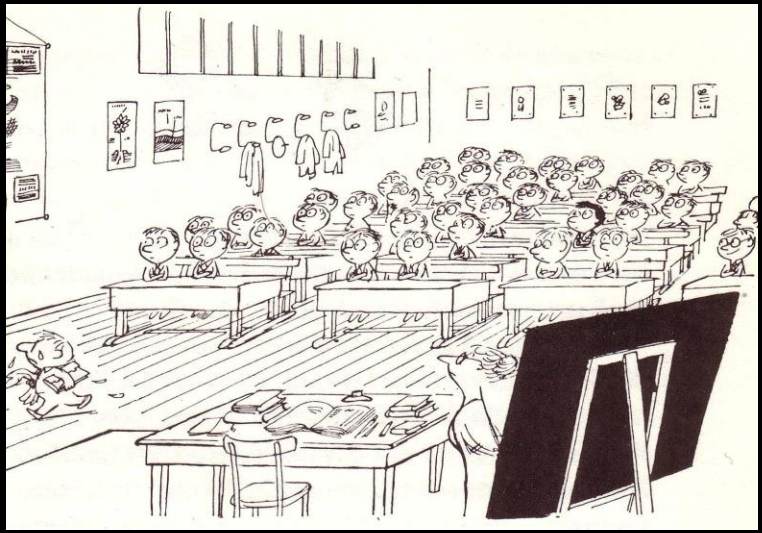
(… NOT: citymail.cuny.edu)

GRADING :

- ATTENDANCE,
  PARTICIPATION + QUIZZES: 25 %
- TERM PROJECT (TEAM) 25 %
- MIDTERM EXAM 25 %
- FINAL EXAM: 25 %

(If you perform inferior i.e. at the mid-term exam, you might lose considerable points for a satisfactory grade already.

All parts listed above must be successfully completed to receive a passing grade in the course.)



ATTENDANCE POLICY

Attendance is mandatory at all lectures + seminars:

More than 2 lecture absences, or 2 seminar absences may result in a failing grade, or a student may be dropped at the discretion of the professor.

In cases of illness or family emergencies, you must email *explanation of absence* the day before class starts; if you fail to do so the absence is counted against you! In case of illness you must submit a doctor's note.

YOU MUST SIGN THE CORRECT ATTENDANCE SHEET EVERY WEEK !

½ HOUR LECTURE LATENESS:
IS COUNTED AS ABSENCE.

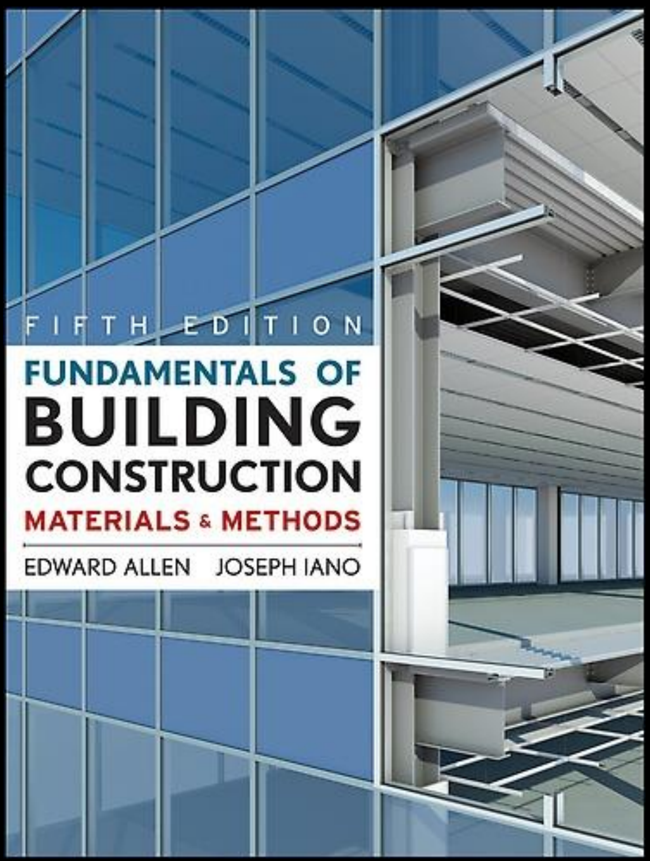
ATTENDANCE IS RELATIVE:

→ ASK QUESTIONS !
→ REVIEW COMPLEX TOPICS IN SEMINARS !
→ **NEVER FALL ASLEEP !**

LITERATURE :

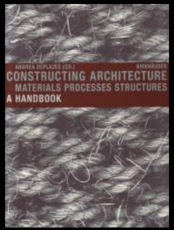
TEXT BOOK (REQUIRED!):

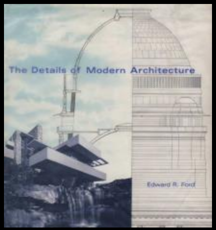
- Allen, Edward: "Fundamentals of Building Construction", Wiley 2006

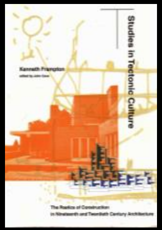


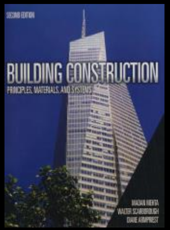
OTHER BOOKS (SUGGESTED):

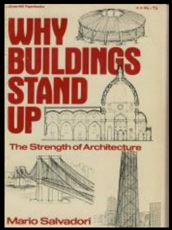
- Ching, Francis: "Building Construction Illustrated", van Nostrand Reinhold 2004
- Deplazes, Andrea: "Constructing Archi-tecture", Birkhäuser 2005
- Elizabeth, L.: Alternative Construction - Natural Building Materials", Wiley 2005
- Ford, Edward: "The Details of Modern Architecture", MIT Press 1986
- Frampton, Kenneth: "Studies in Tectonic Culture", MIT Press 1995
- Mehta, Scarborough, Armpriest: "Building Construction", Pearson 2012
- Salvadori, Mario: "Why Buildings Stand Up", Norton & Co. Inc. 1980
- P. Silver, W. McLean: "Introduction to Architectural Technology", King Publ. 2008











WHY ?

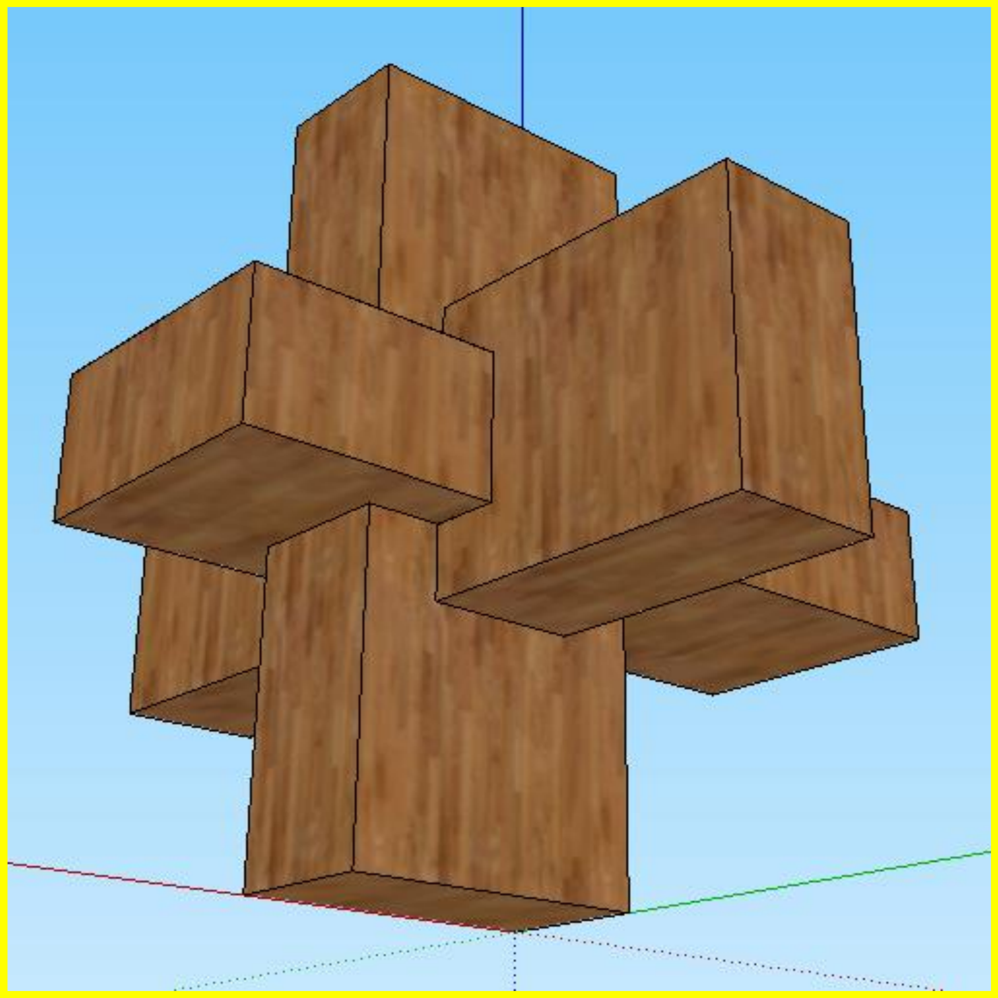
CONSTRUCTION TECHNOLOGY ?

DESIGN

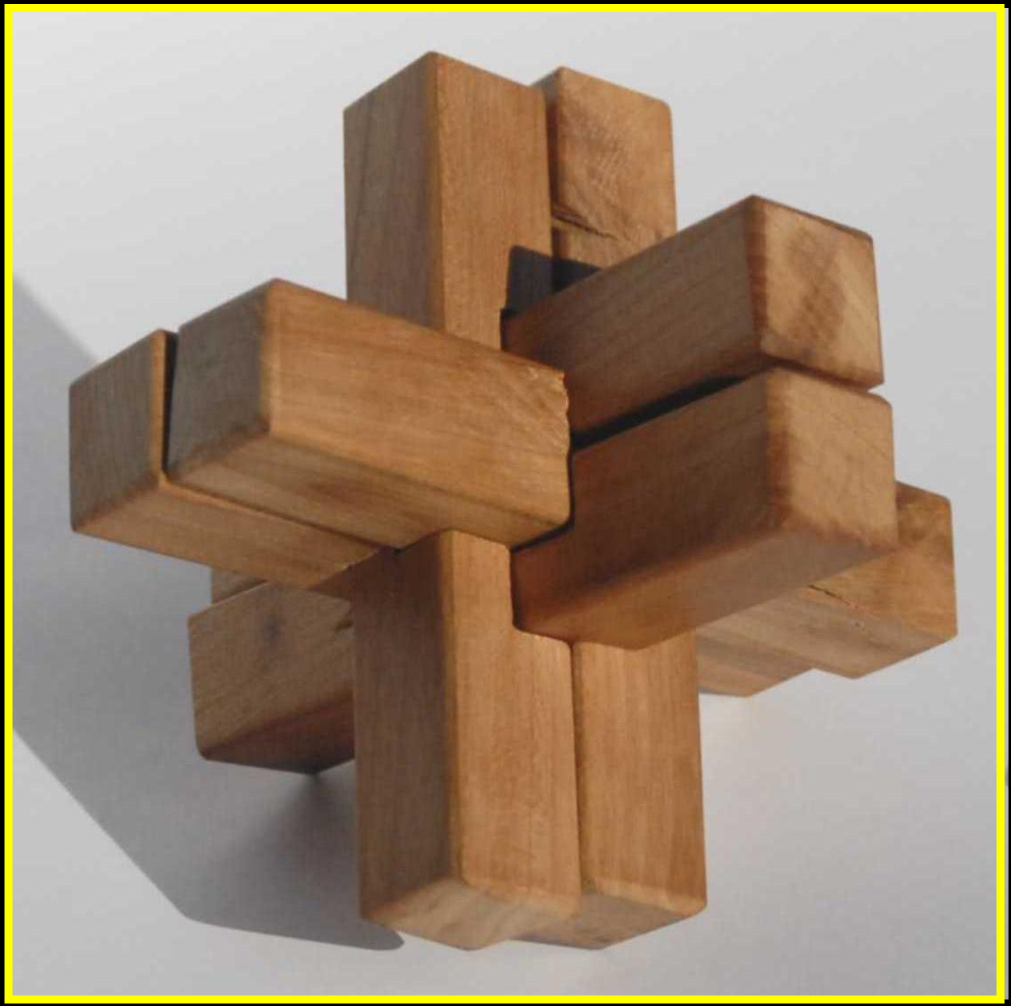
+

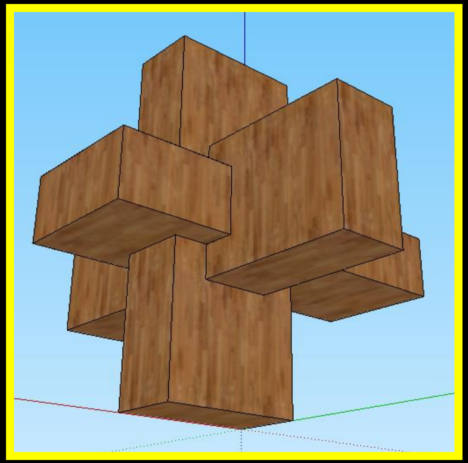
TECHNOLOGY

DESIGNING (SO FAR): FROM **'OUTSIDE – IN'"**



TANGIBILITY ?





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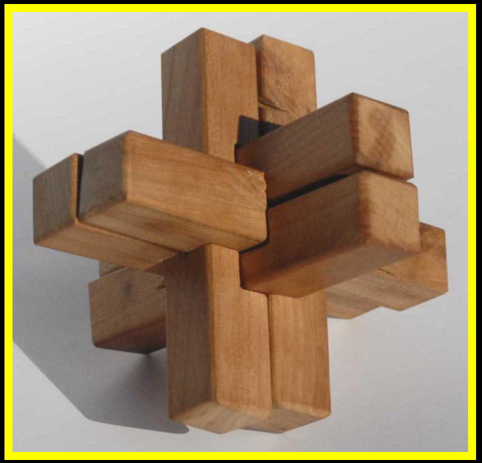

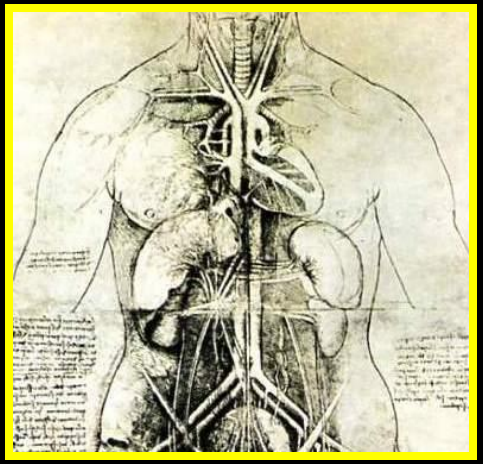

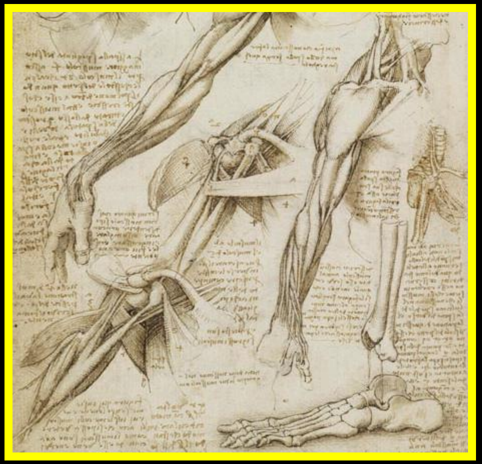

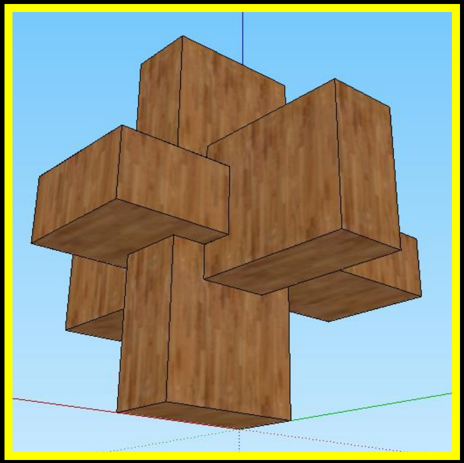

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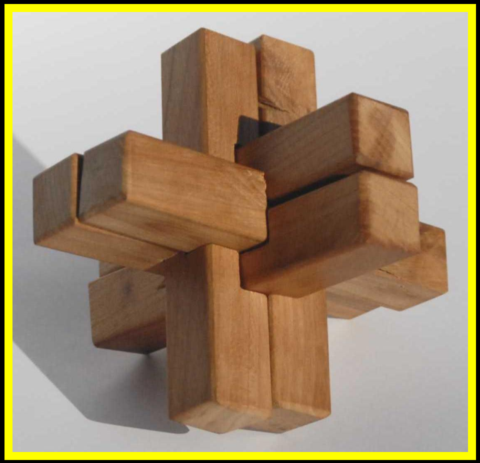
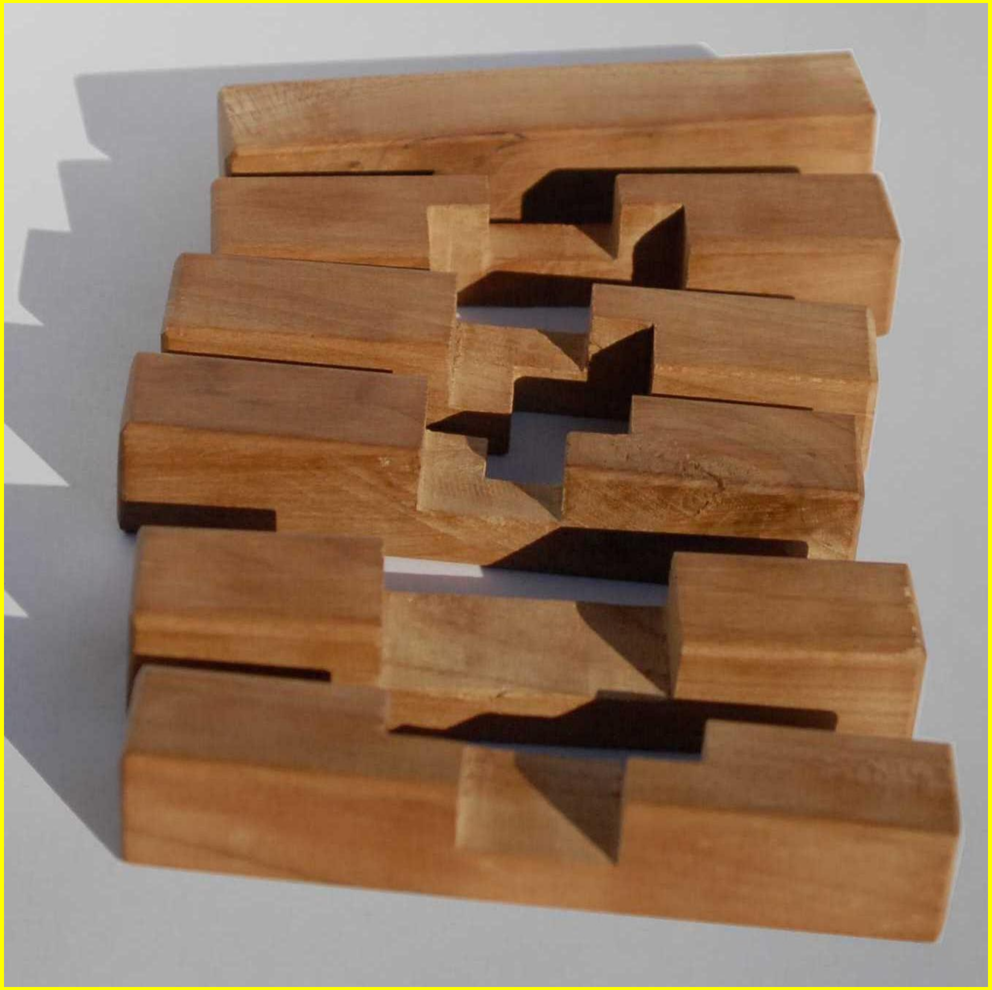
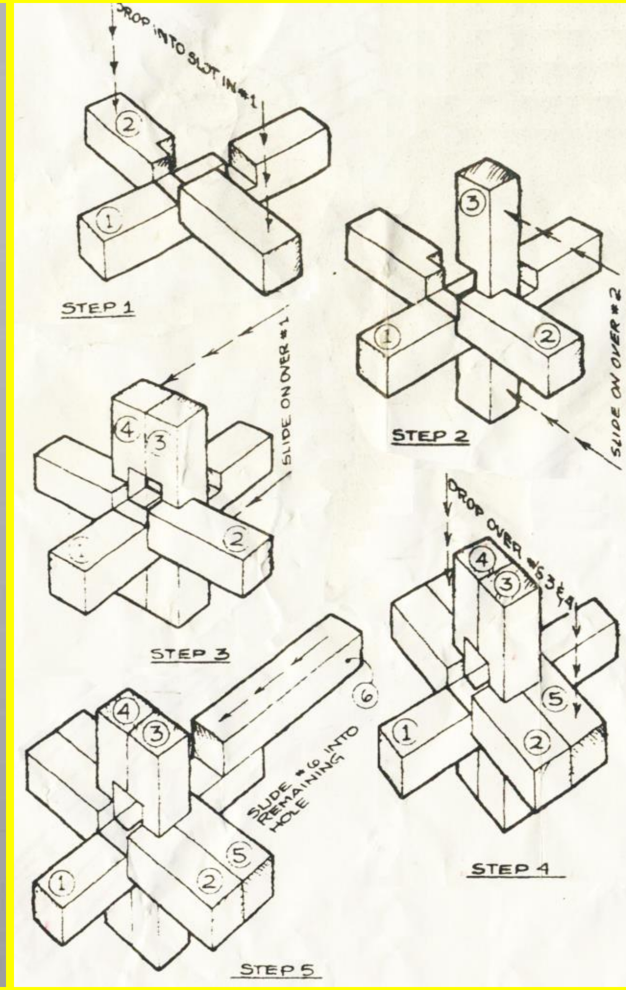
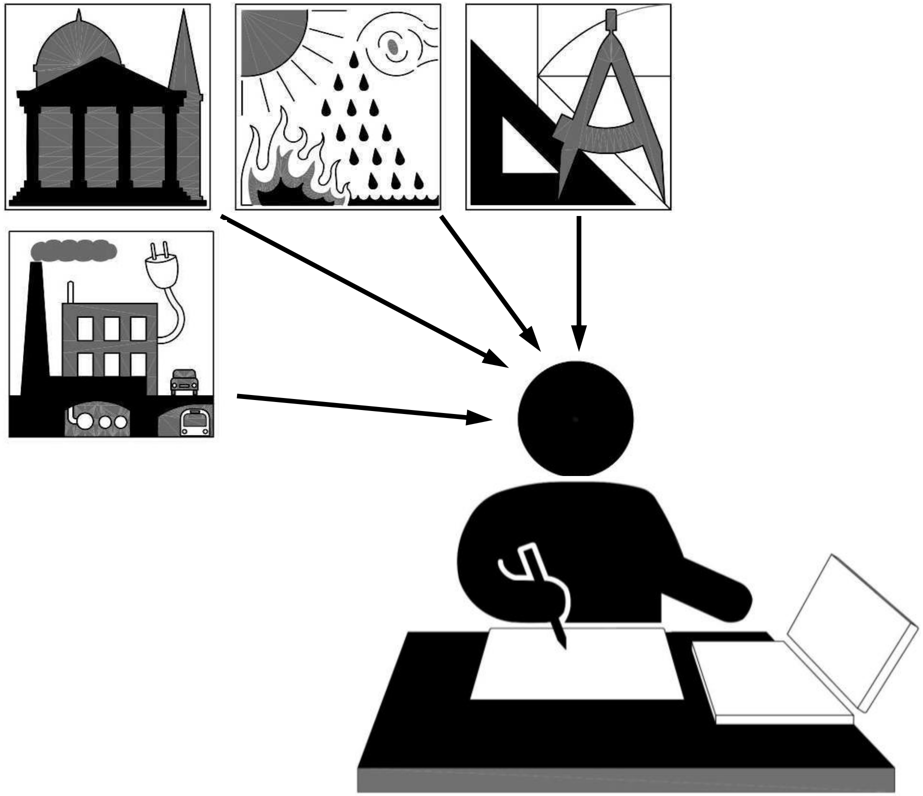
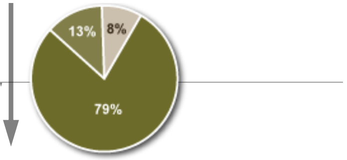


DESIGNING (NOW): FROM **'INSIDE – OUT'**





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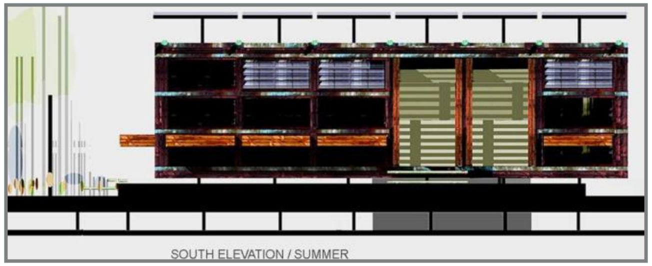
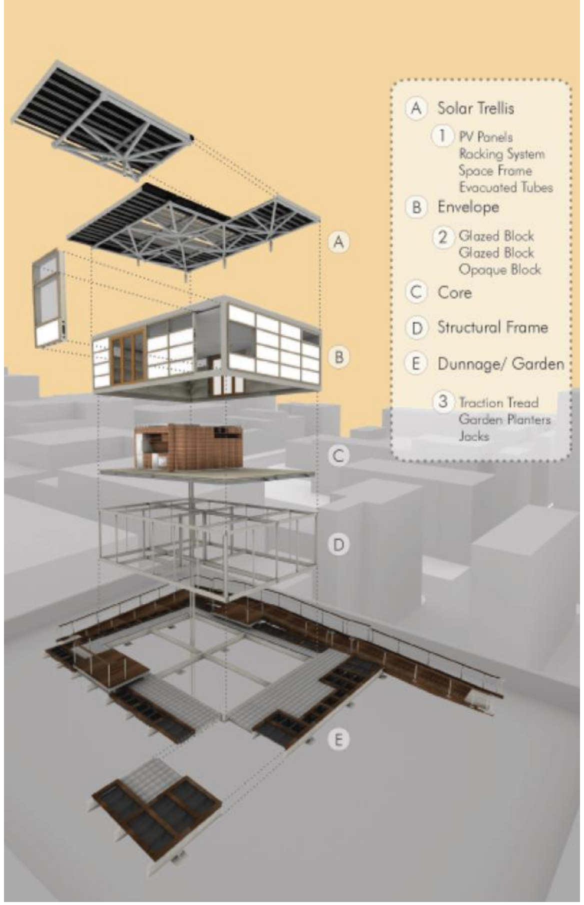
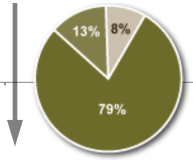
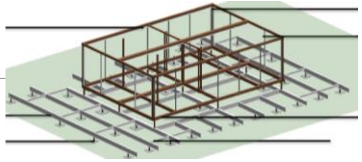
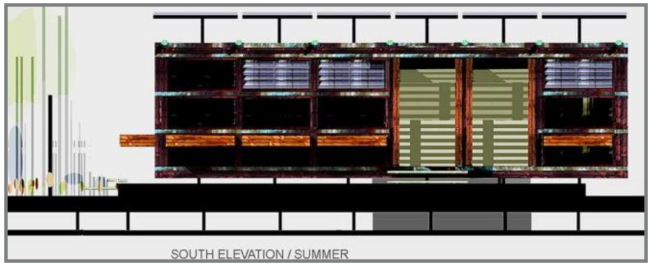
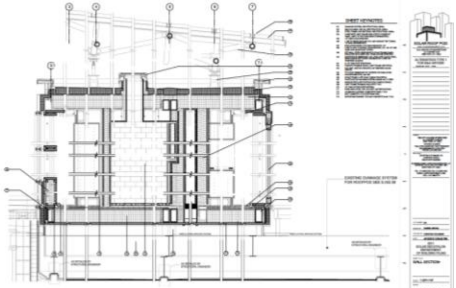

SOUTH ELEVATION / SUMMER

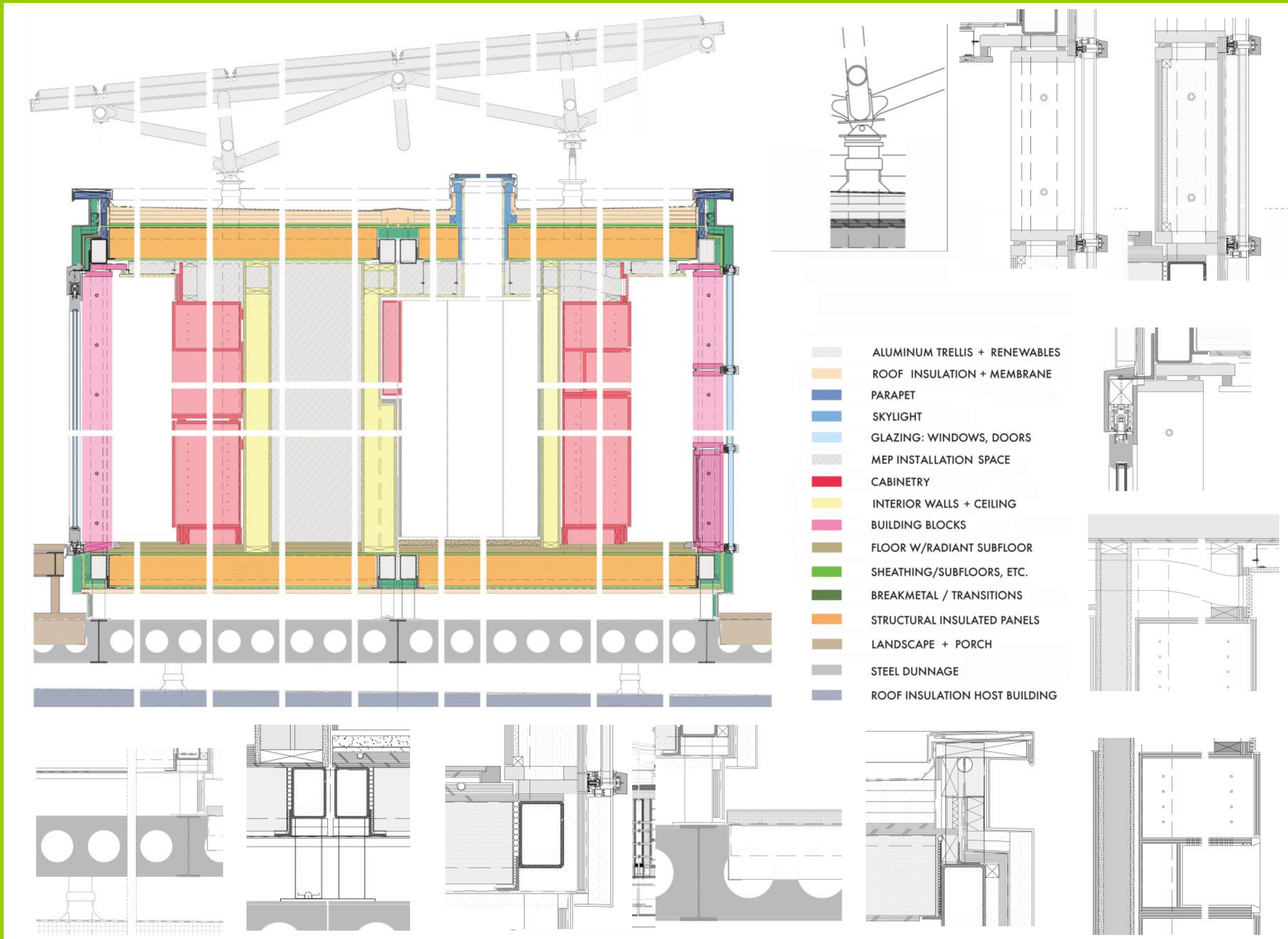


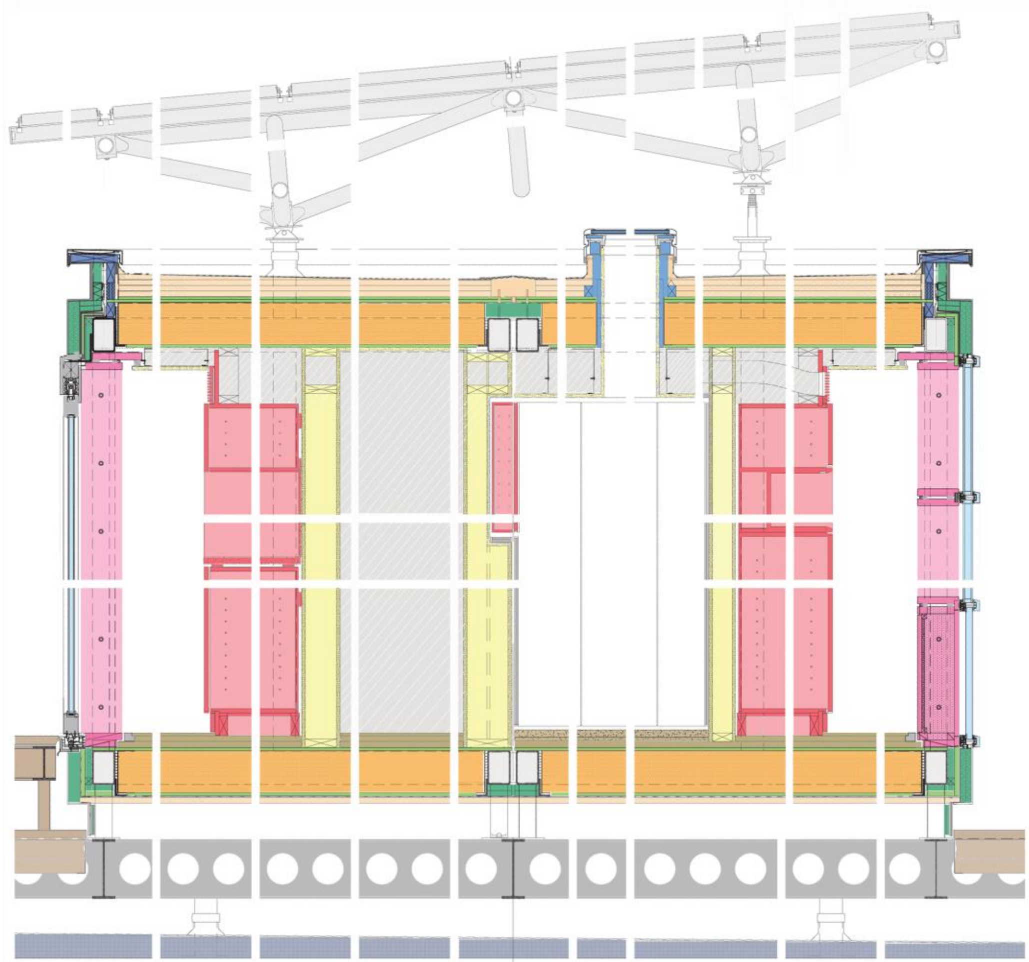


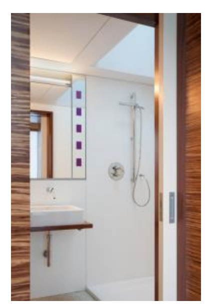



SOUTH ELEVATION / SUMMER




ALUMINUM TRELLIS + RENEWABLES
ROOF INSULATION + MEMBRANE
PARAPET
SKYLIGHT
GLAZING: WINDOWS, DOORS
MEP INSTALLATION SPACE
CABINETRY
INTERIOR WALLS + CEILING
BUILDING BLOCKS
FLOOR W/RADIANT SUBFLOOR
SHEATHING/SUBFLOORS, ETC.
BREAKMETAL / TRANSITIONS
STRUCTURAL INSULATED PANELS
LANDSCAPE + PORCH
STEEL DUNNAGE
ROOF INSULATION HOST BUILDING



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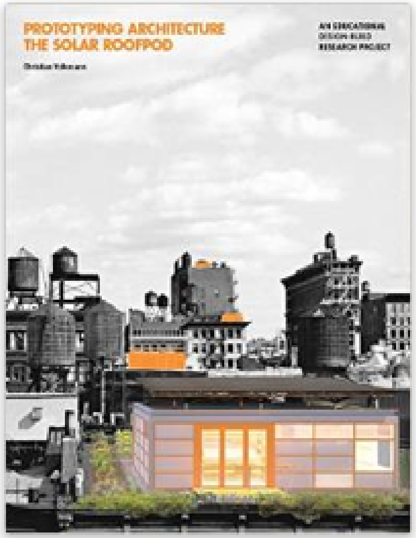

See all 15 images

Prototyping Architecture: The Solar Roofpod: An Educational Design-Build Research Project

Paperback – August 25, 2014

by Christian Volkmann (Author), Barry Bergdoll (Author)

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: TIME-LAPSE ROOFPOD

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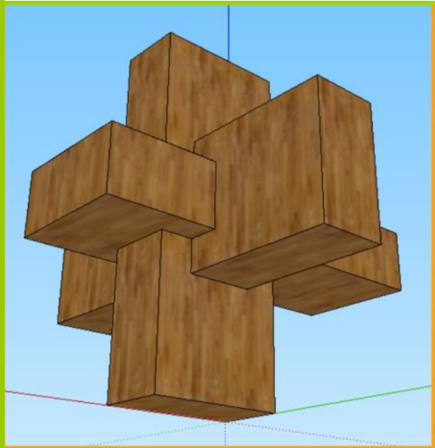
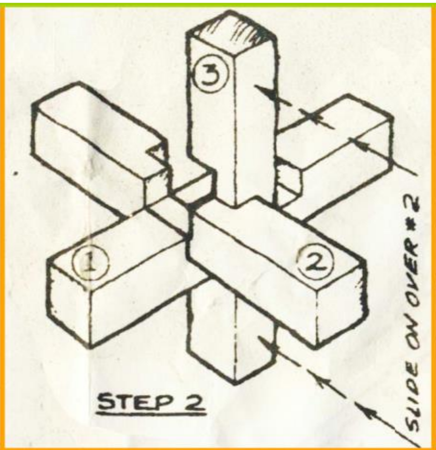
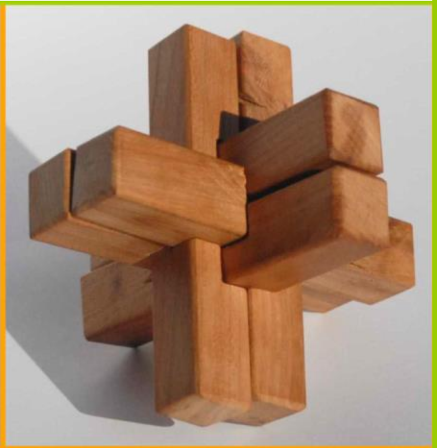
PROTOTYPING
=
INVENTING w/ material intention







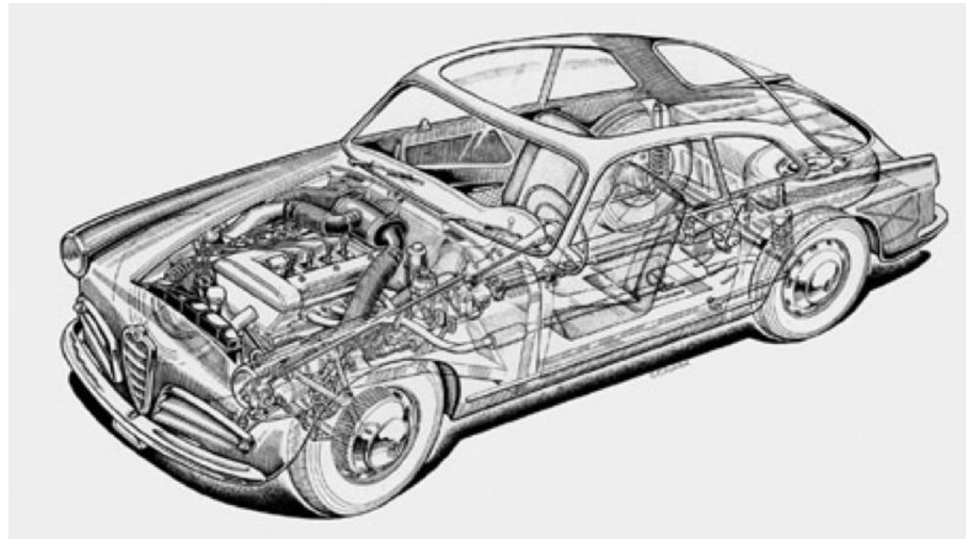
PROTOTYPING

COMPREHENSIVE

MATERIALIZATION

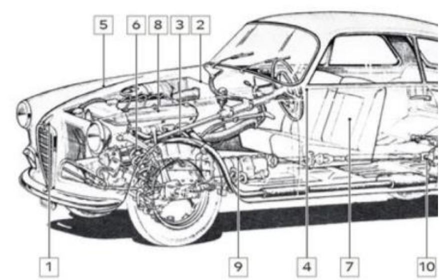
RESEARCH

PROTOTYPING



COMPREHENSIVE THINKING

DETAILING SKILLS



MATERIALIZATION RESEARCH

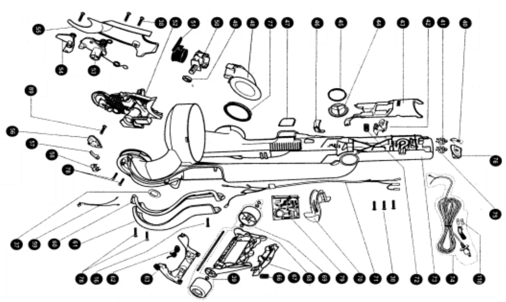
VACUUM CLEANER

PROTOTYPING





COMPREHENSIVE THINKING



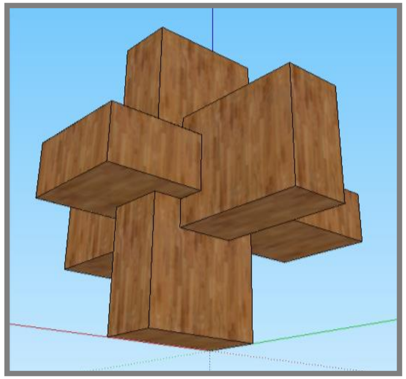

DETAILING SKILLS

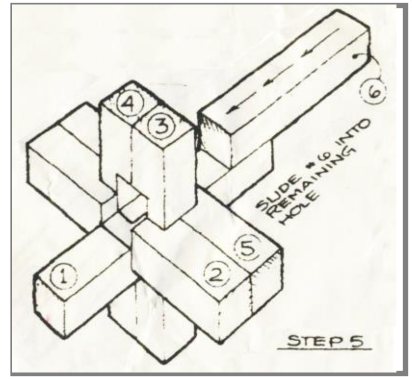


MATERIALIZATION RESEARCH

RENDERING

SHAPE/WHOLE
'ZOOM-IN'
SUBSTRACTIVE



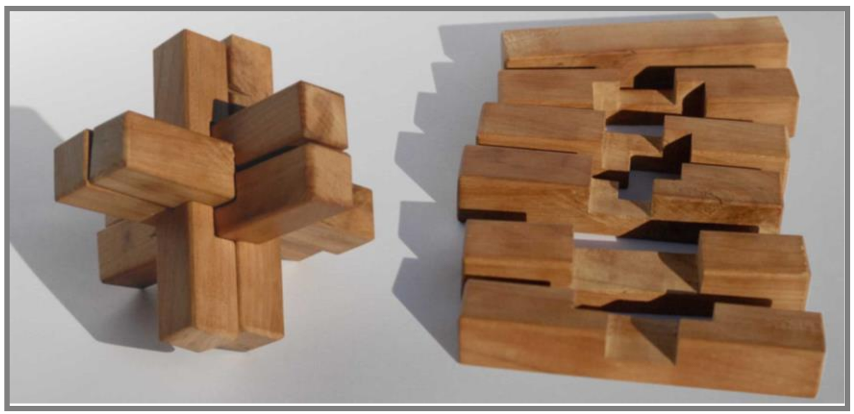


PROTOTYPING

STRUCTURE/PARTS
'ZOOM-OUT'
ADDITIVE

OUTSIDE-IN

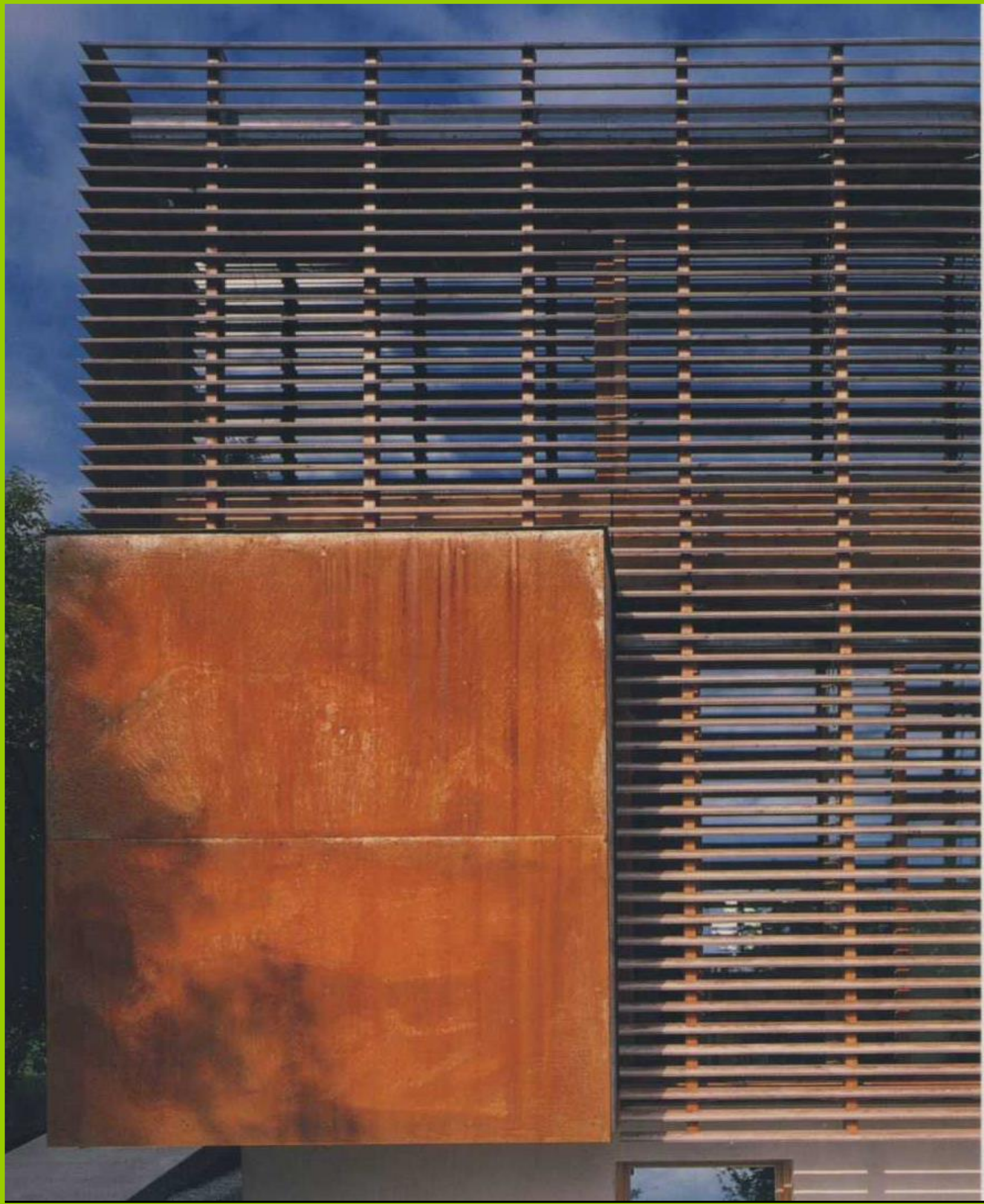
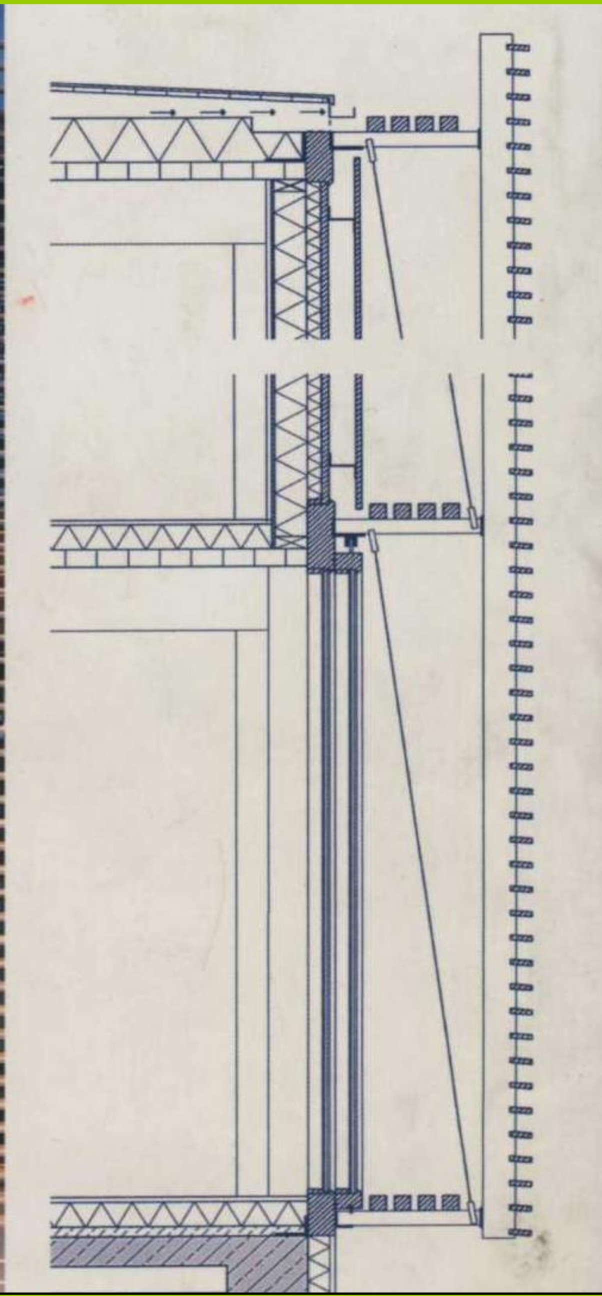
APPEARANCE

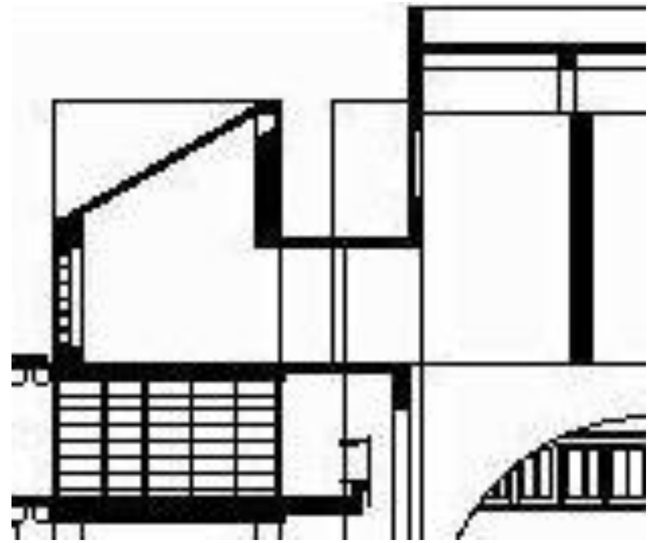


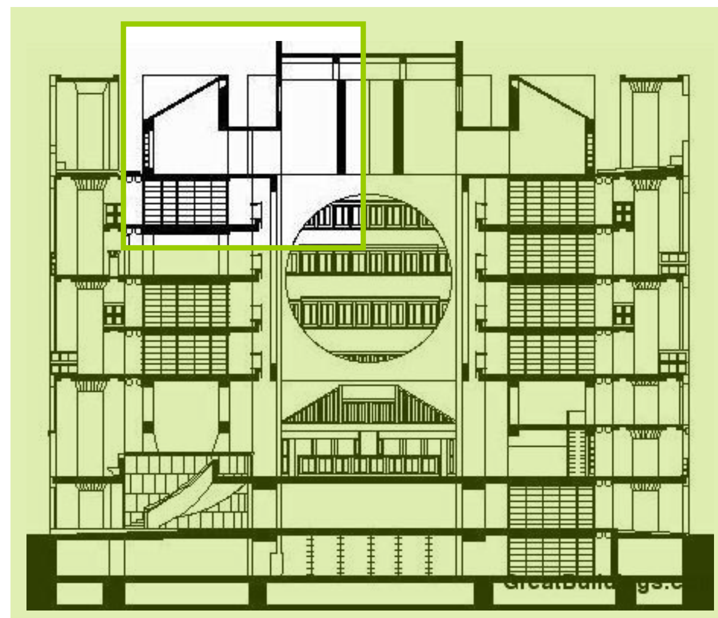
INSIDE-OUT

ASSEMBLY

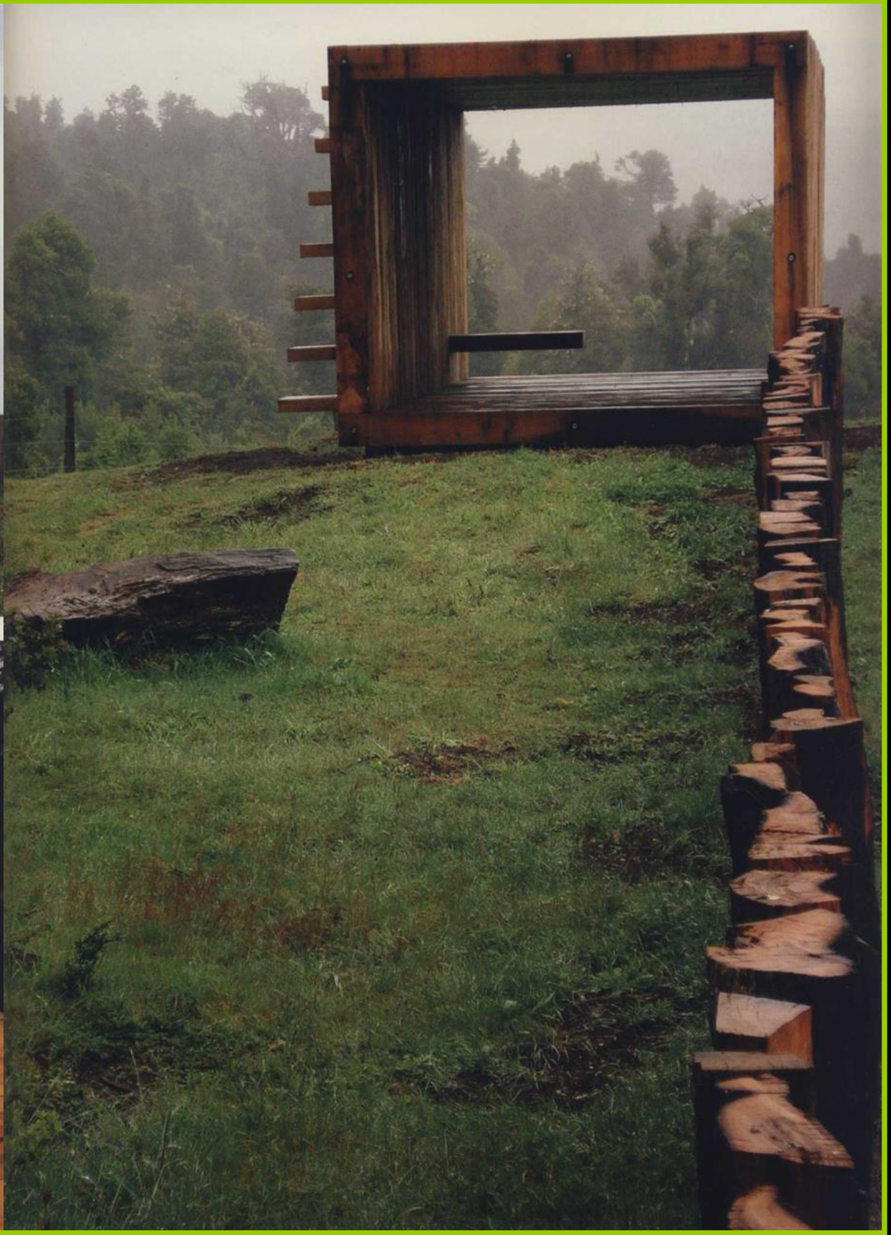
MORPHOLOGY ↔ TECHNOLOGY

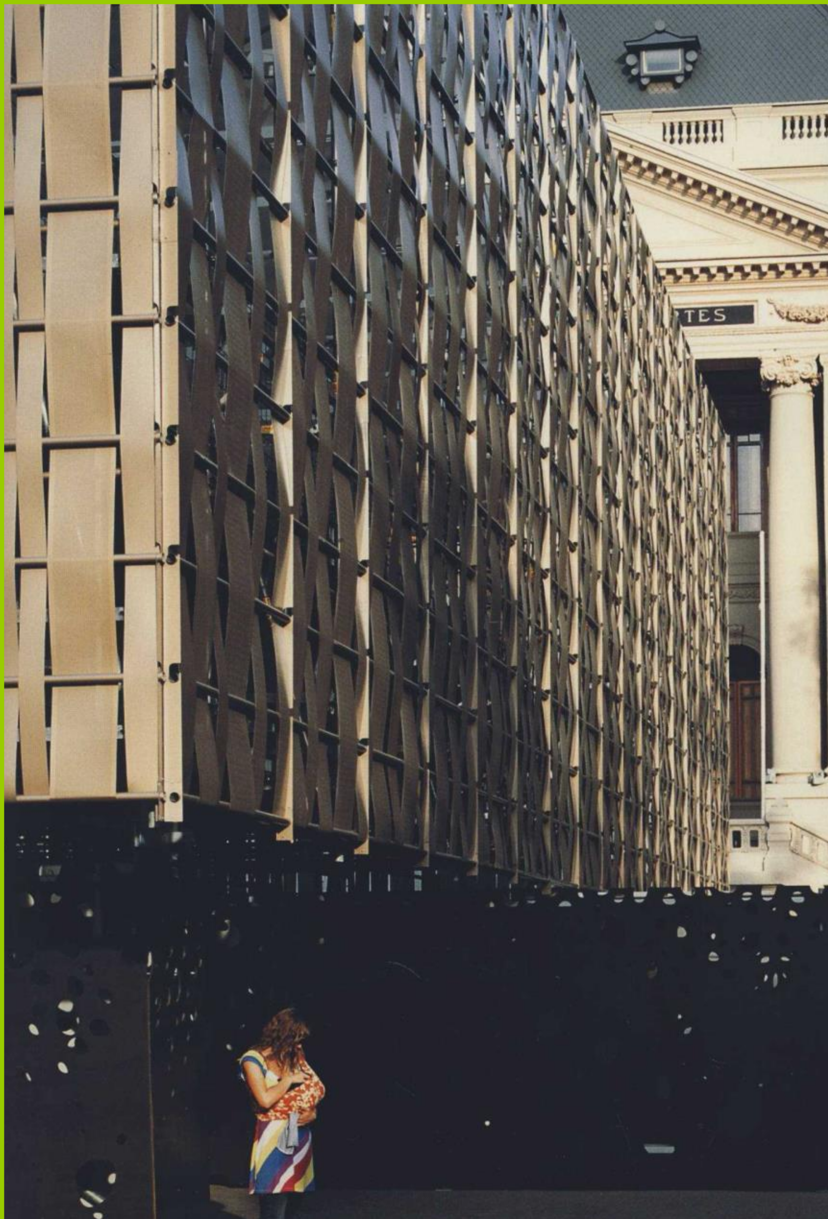



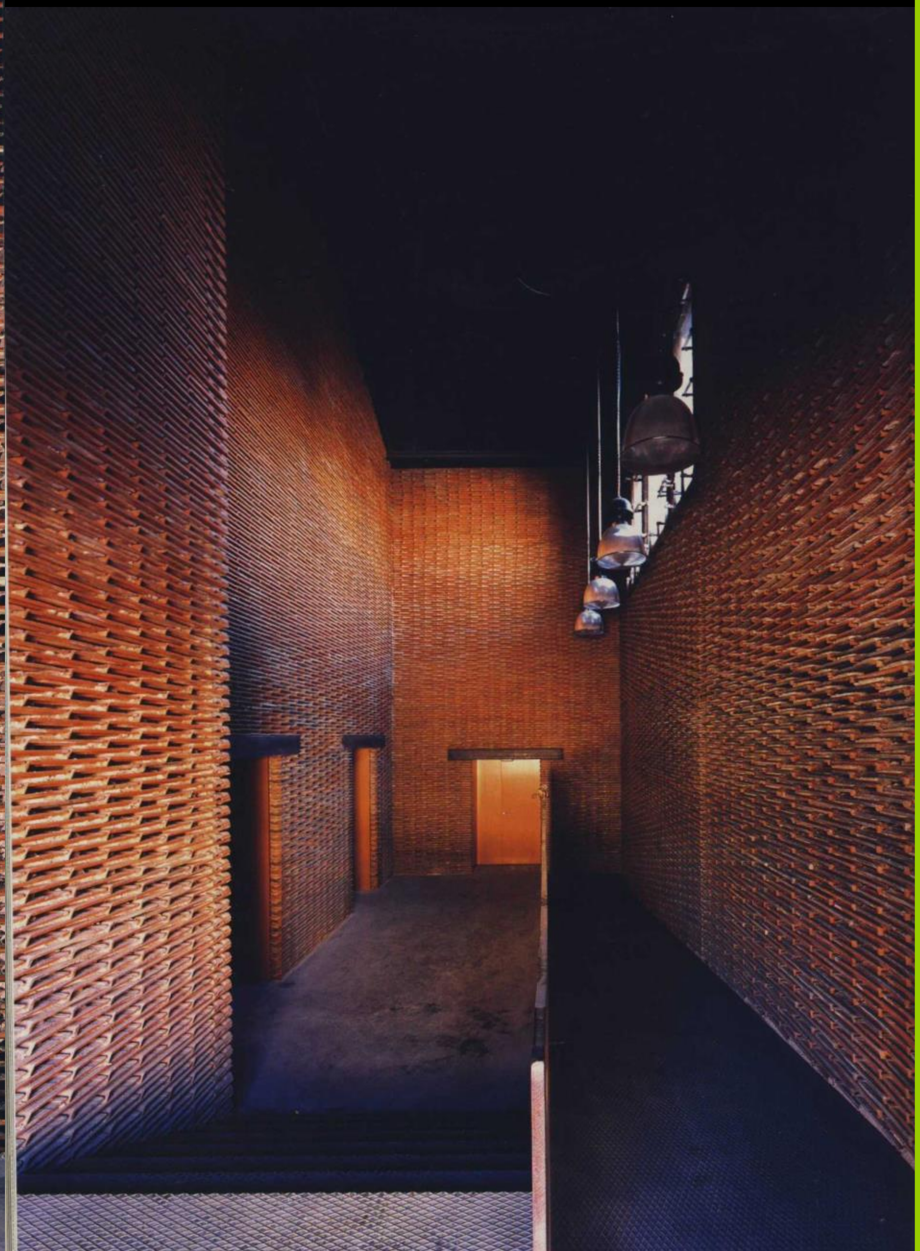




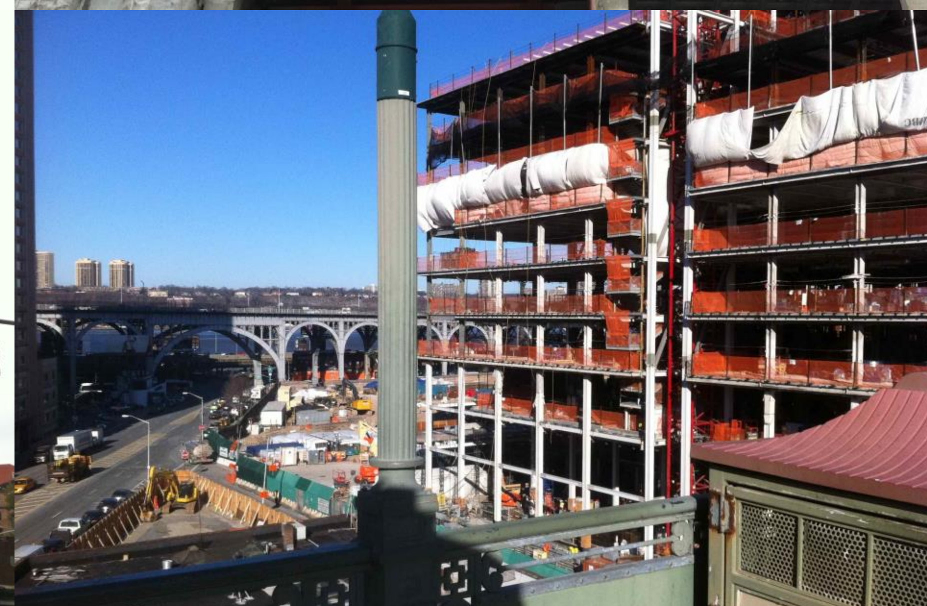





TES






Israel

Shadow and Light

RIGOROUS VOLUMES AND GARDEN VIEWS INTERSECT NEAR TEL AVIV

Architecture and Interior and Landscape Design by Pitsou Kedem
Text by Judith Thurman | Photography by Amit Geron/Arcaid

Pitsou Kedem is a prize-winning Israeli architect who likes to cut corners. Literally, that is. In his residence for a family in Herzeliya, an upscale coastal enclave 10 miles from Tel Aviv, he played with the geometry of two stacked boxes—an upper bedroom story of Italian stone, and a lower living story of glass and teak—and deftly perforated their mass. A buttressed wall between the main structure and the garden creates a stately "bridgeway" from the street to the front door. Wraparound windows take a bite from the corner of the master suite. Steel girders punctu transparent walls, and a floating al

Pitsou Kedem is a prize-winning Israeli architect who likes to cut corners. Literally, that is. In his residence for a family in Herzeliya, an upscale coastal enclave 10 miles from Tel Aviv, he played with the geometry of two stacked boxes—an upper bedroom story of Italian stone, and a lower living story of glass and teak—and deftly perforated their mass. A buttressed

LEFT: Israeli architect Pitsou Kedem chose an edited mix of materials–chiefly *pietra sierra*, teak and glass—for his clients' house near Tel Aviv. A tree, planted on the basement level, grows up between the cactus garden (which Kedem describes as "sculptural") and the pool.

"A mass on the second floor, on top of a glass first floor, creates a sense of a floating building," Kedem says of the stacked volumes that make up the 4,300-square-foot residence. Louvers shield the master bedroom from the intense Mediterranean sun. The first-floor living spaces look out on to the pool.

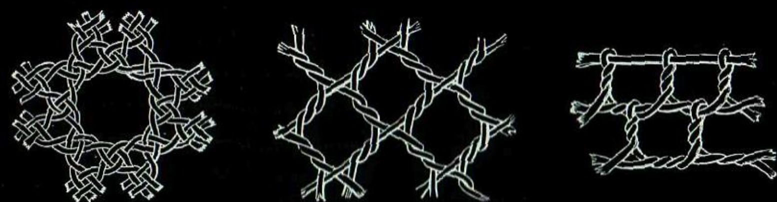
BUT, HOW IS IT MADE?

Magazine: Architectural Digest, August 2010

→ *TYPOLOGY OF HUMAN PRODUCTION METHODS:*

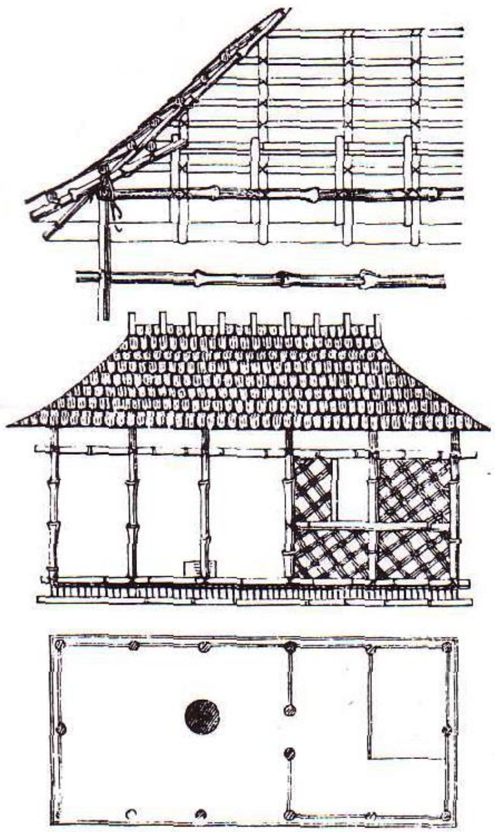
Gottfried Semper:
"Style in the Technical and Tectonic Arts -
or Practical Aesthetics" 1860-1863

<u>Four 'ORIGINAL' Methods of Production:</u>



-WEAVING
-POTTERY
-TECTONICS (TIMBER CONSTRUCTION)
-STEREOTOMY (STONE CONSTRUCTION + EARTH FILL)

*The 'KNOT' (as representation of a technical solution) is the oldest technical symbol and … the prime motif of human '**tekhne**' (craft,…roots of skill of building) because a structural necessity (the connection of two elements) becomes an aesthetic, meaningful image."*



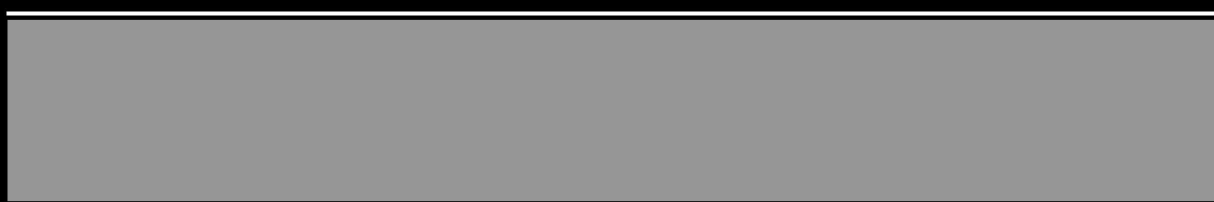
Gottfried Semper, illustration from *Der Stil in den technischen und tektonischen Künsten*, 1860–1863. The Caribbean hut in the Great Exhibition of 1851.

SURFACE

↕

STRUCTURE

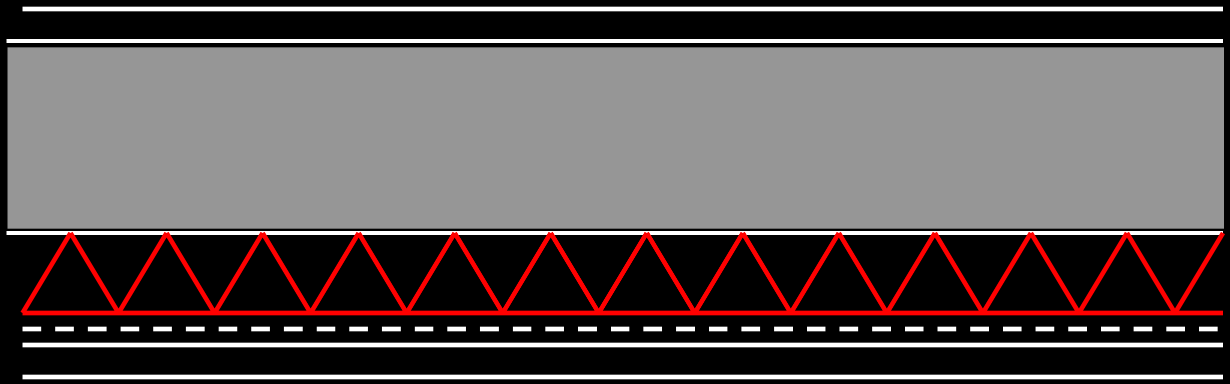
PERCEIVING ↔ CONSTRUCTING



“WALL” **?**

→ THE JOB OF THE ARCHITECT IS TO DEMARCATE A PIECE OF INFINITE SPACE AND PLACE IT IN AN ENCLOSURE CALLED A “ROOM”. THUS, THE “WALL” IS THE ARCHITECT’S MAIN TOOL, IN ITS *ABSTRACTION* AS IN ITS *CONCRETE APPLICATION* !

PERCEIVING ⟷ CONSTRUCTING



“WALL” **?**

→ IN CONTEMPORARY CONSTRUCTION WE OFTEN DESIGN WALL ASSEMBLIES THAT ARE NOT HOMOGENOUS (+SOLID), BUT HETEROGENEOUS **= COMPOSED OF LAYERS**

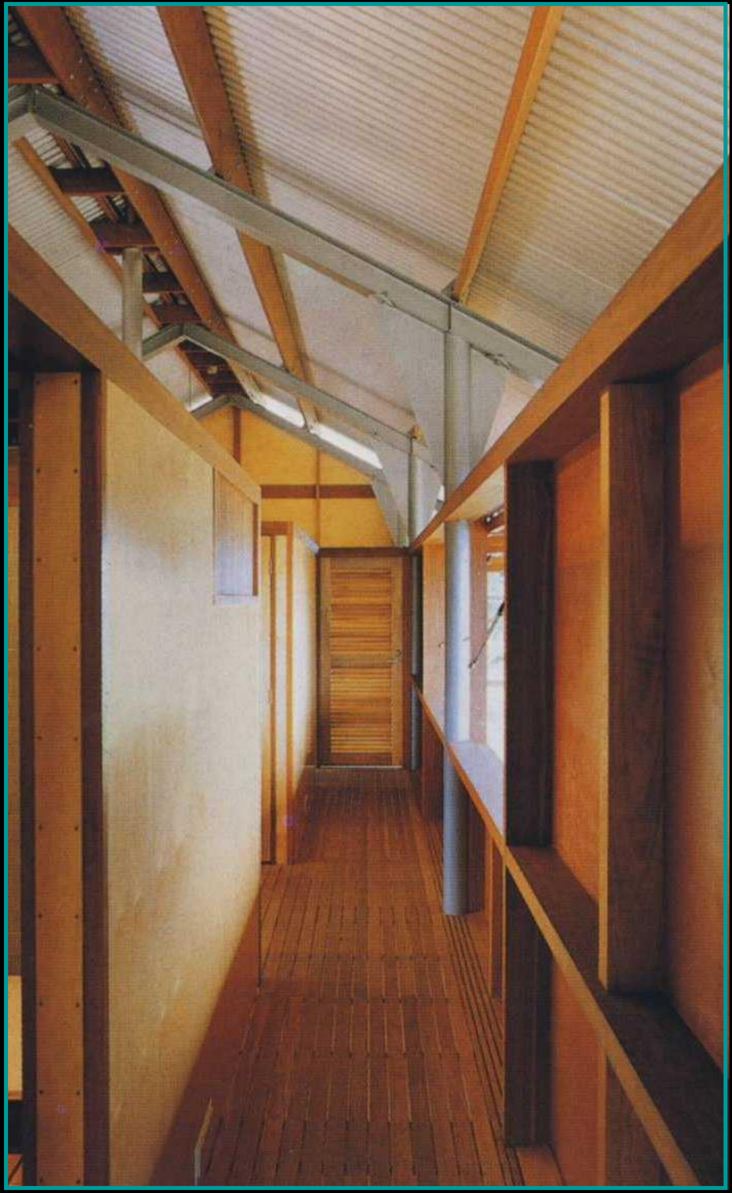
PERCEIVING ⟷ CONSTRUCTING

SURFACE → 'HIDDEN SECRET → STRUCTURE
← 'REVELATION' ←

→ IN ARCHITECTURE, THE LINE AND THE 2-DIMENSIONAL AREA <u>DO NOT EXIST</u>, -THEY ARE MATHEMATICAL ABSTRACTIONS.

ARCHITECTURE IS ALWAYS 3-DIMENSIONAL, -EVEN IN A MICRO-THIN LAYER OF PAINT- AND THUS **SCULPTURAL AND MATERIAL**!

→ REVELATION BY 'HANGING A PICTURE' → DRIVE A NAIL INTO A WALL !

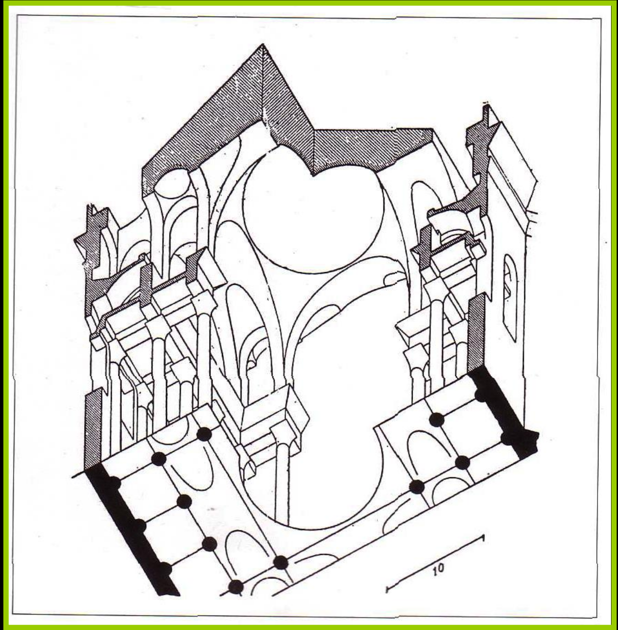


→ ‘HIDDEN SECRET’ →
→ ‘REVELATION’ →

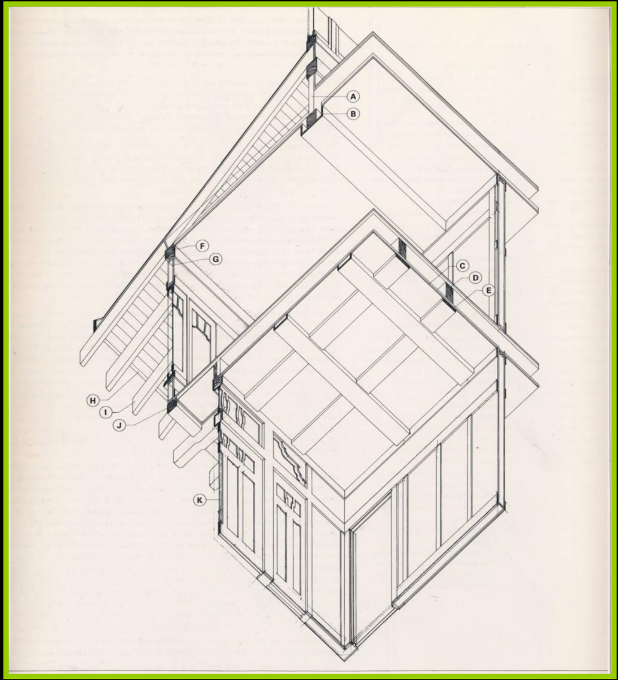
→ ***ARCHITECTURE as SYNTHESIS:***

(MORPHOLOGY + TECHNOLOGY)

Auguste Choissy: "Histoire de l'architecture", 1899

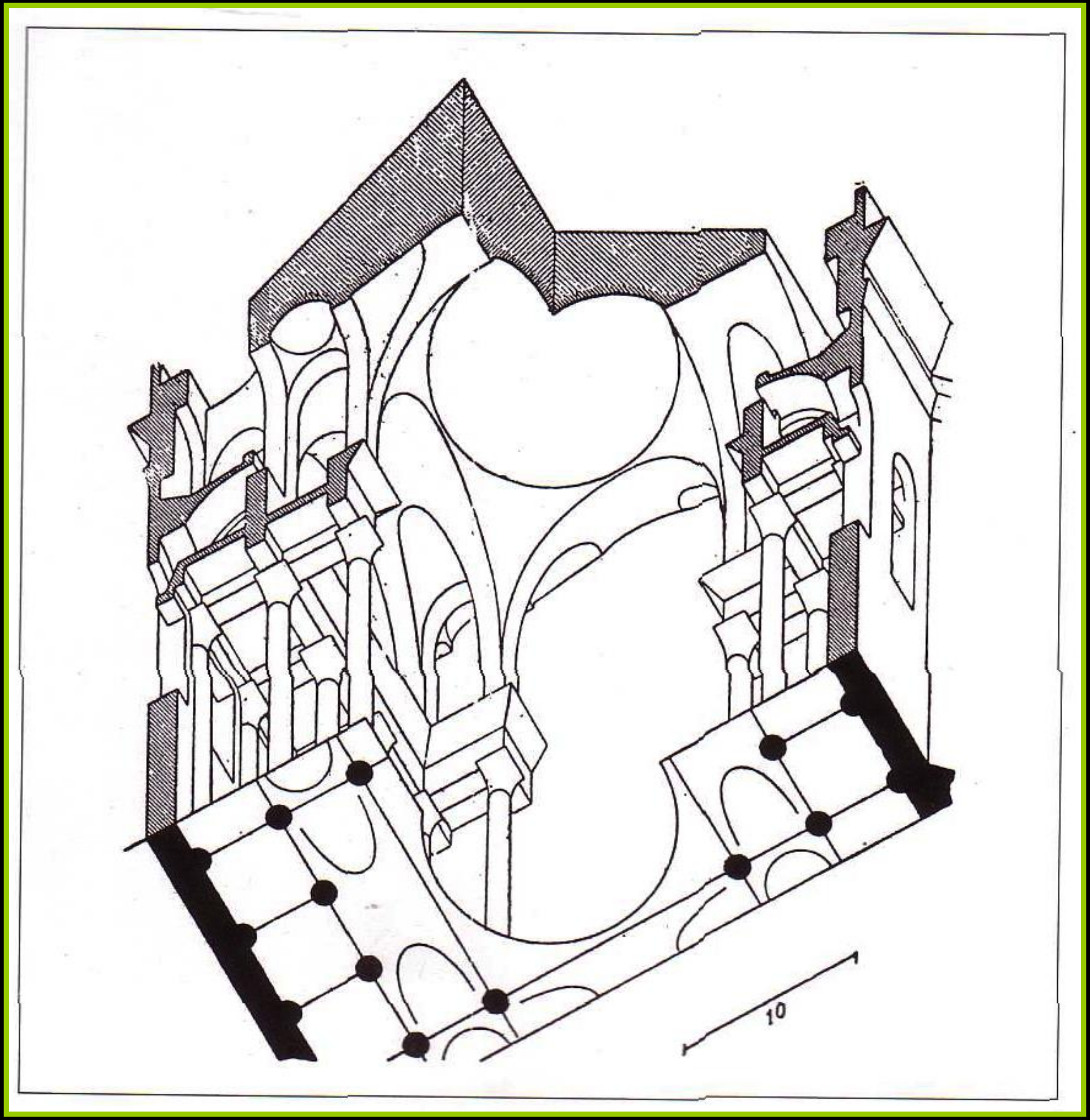


Edward Ford: "The Details of Modern Architecture", 1990

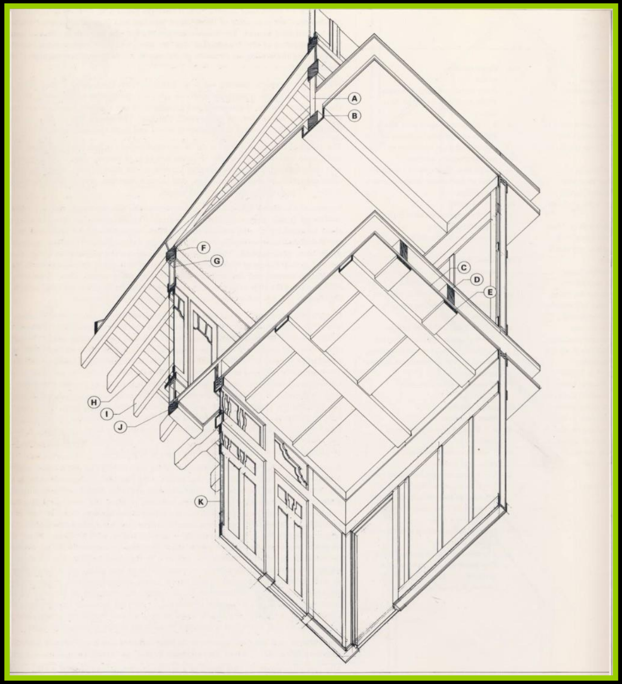


→ ***ARCHITECTURE as SYNTHESIS:***

(MORPHOLOGY + TECHNOLOGY)

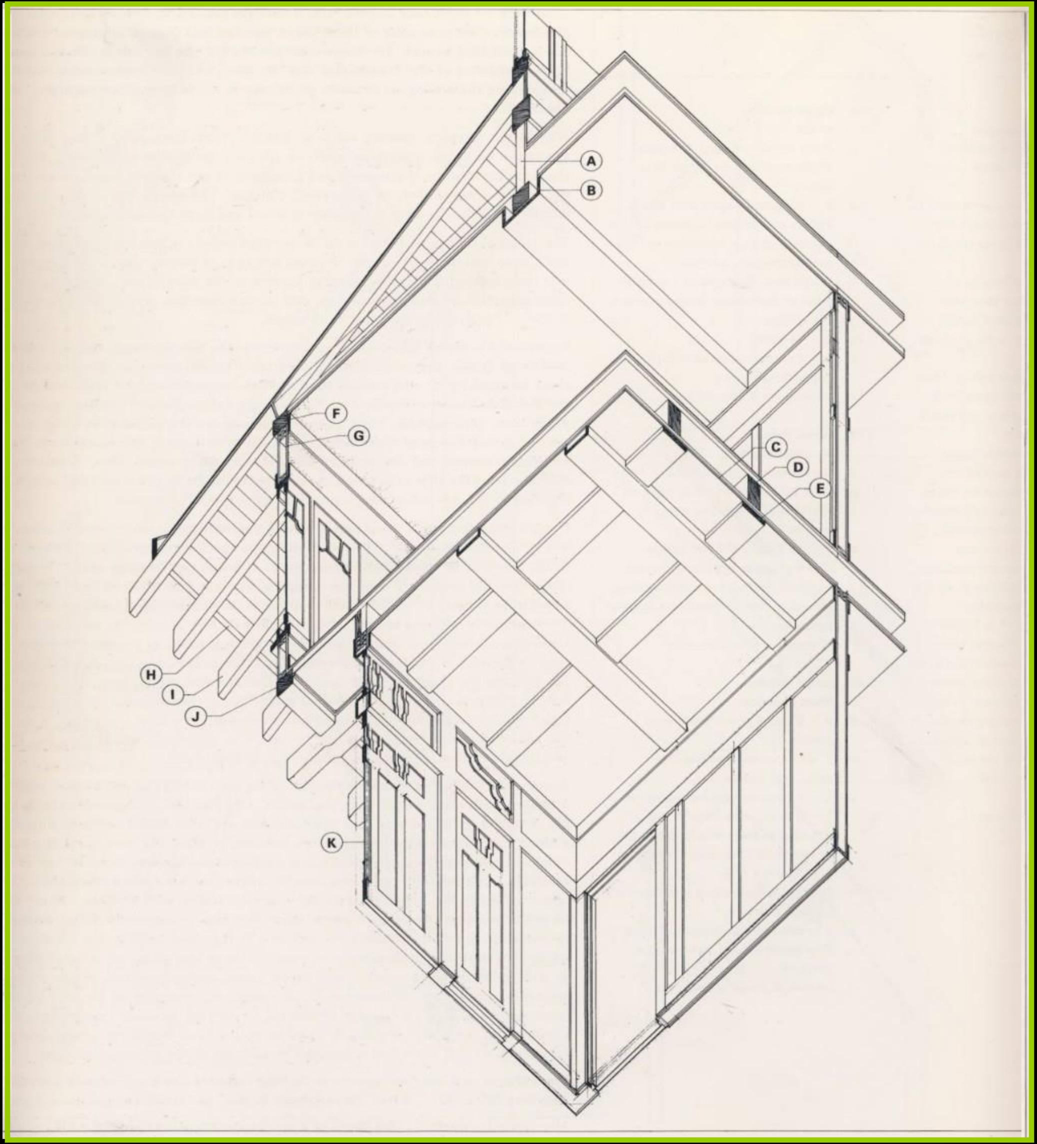


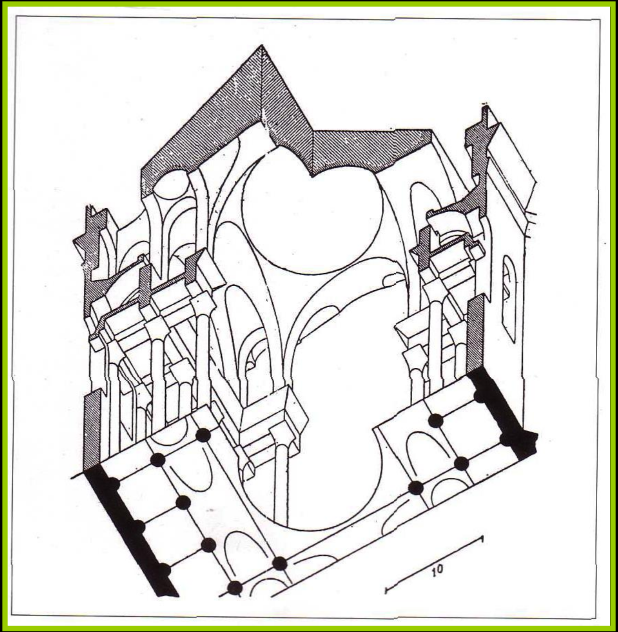
Auguste Choissy:
“Histoire de
l’architecture”,
1899



→ ***ARCHITECTURE as SYNTHESIS:***

(MORPHOLOGY + TECHNOLOGY)





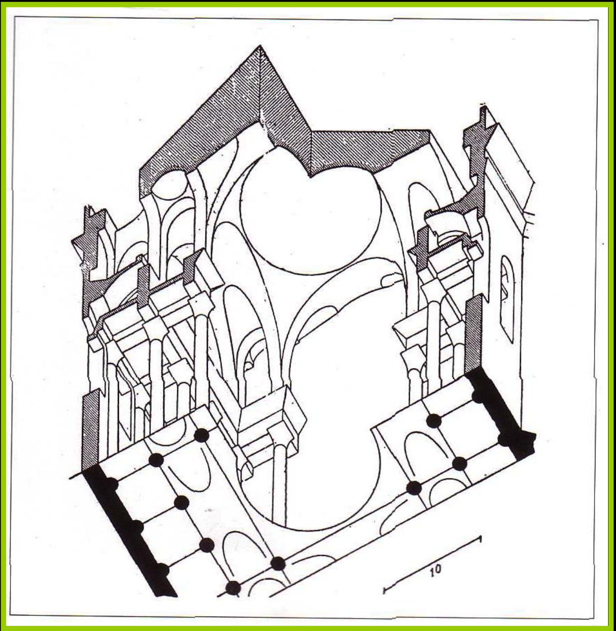
Edward Ford: “The Details of Modern Architecture”, 1990

→ ***ARCHITECTURE as SYNTHESIS:***

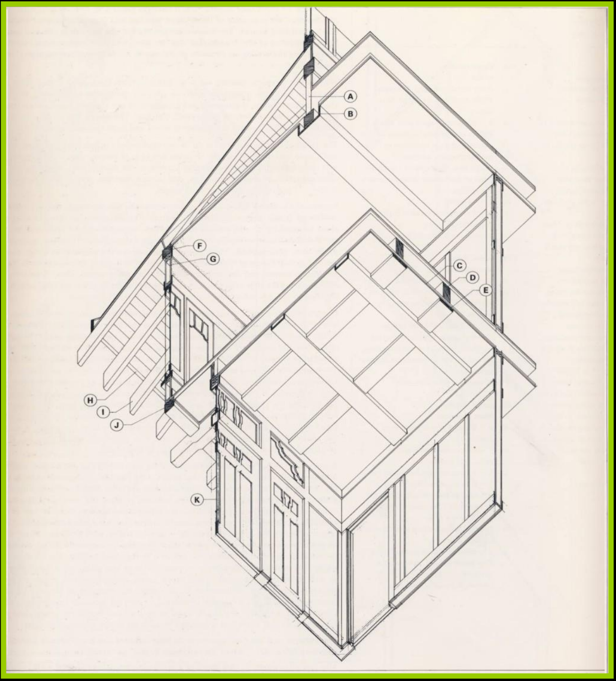
(MORPHOLOGY + TECHNOLOGY)

ARCHITECTURAL INTENTION:

- **SPACE + FORM**
- **STRUCTURE**
- **ORGANIZATION, ‘FUNCTION’**
- **OPERATION/ PERFORMANCE**
- **DETAILING**
- **MATERIALS USED**
- **TECHNOLOGY, TOOLS, METHODS, LABOR**

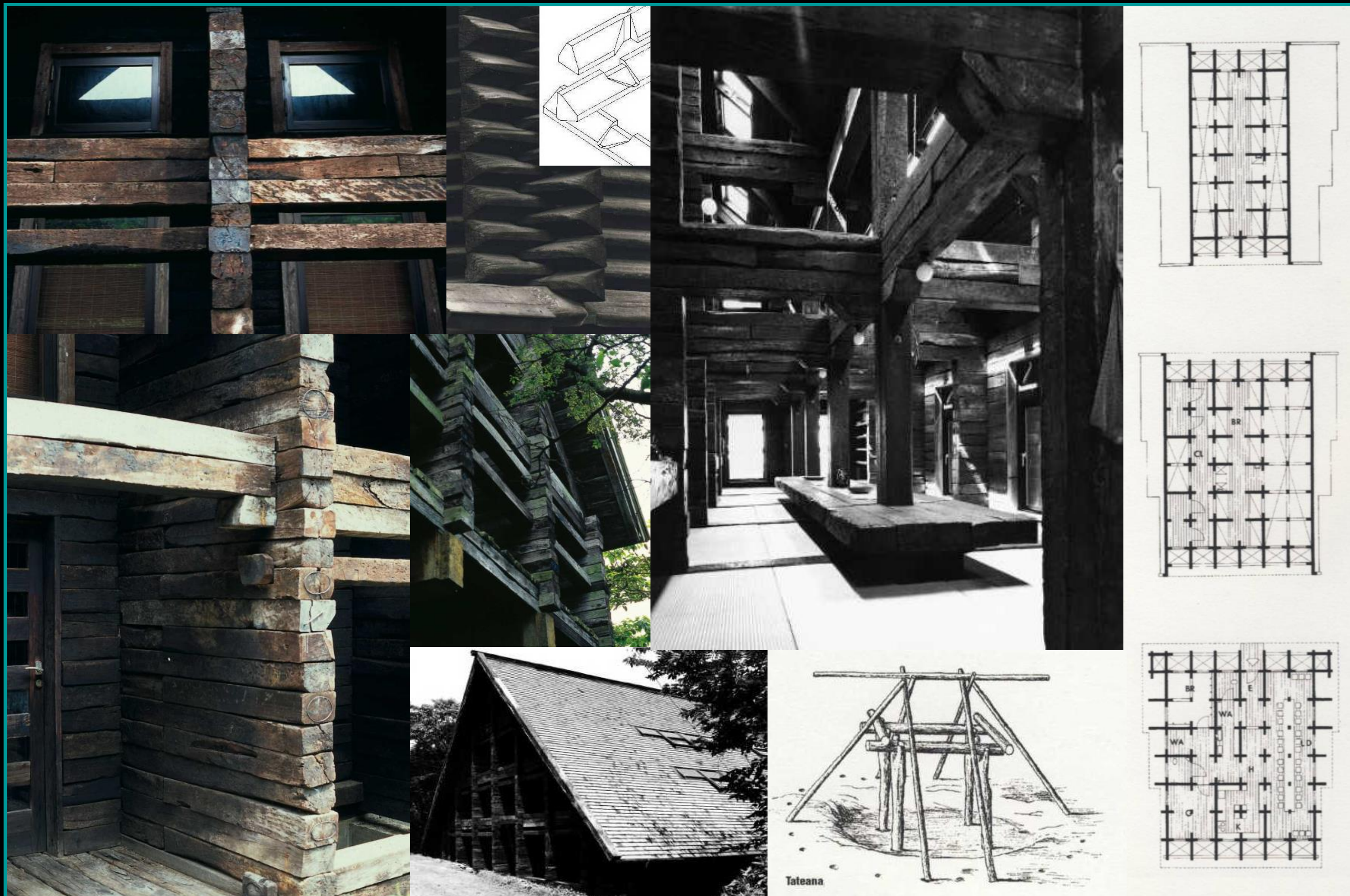


Auguste Choissy: “Histoire de l’architecture”, 1899



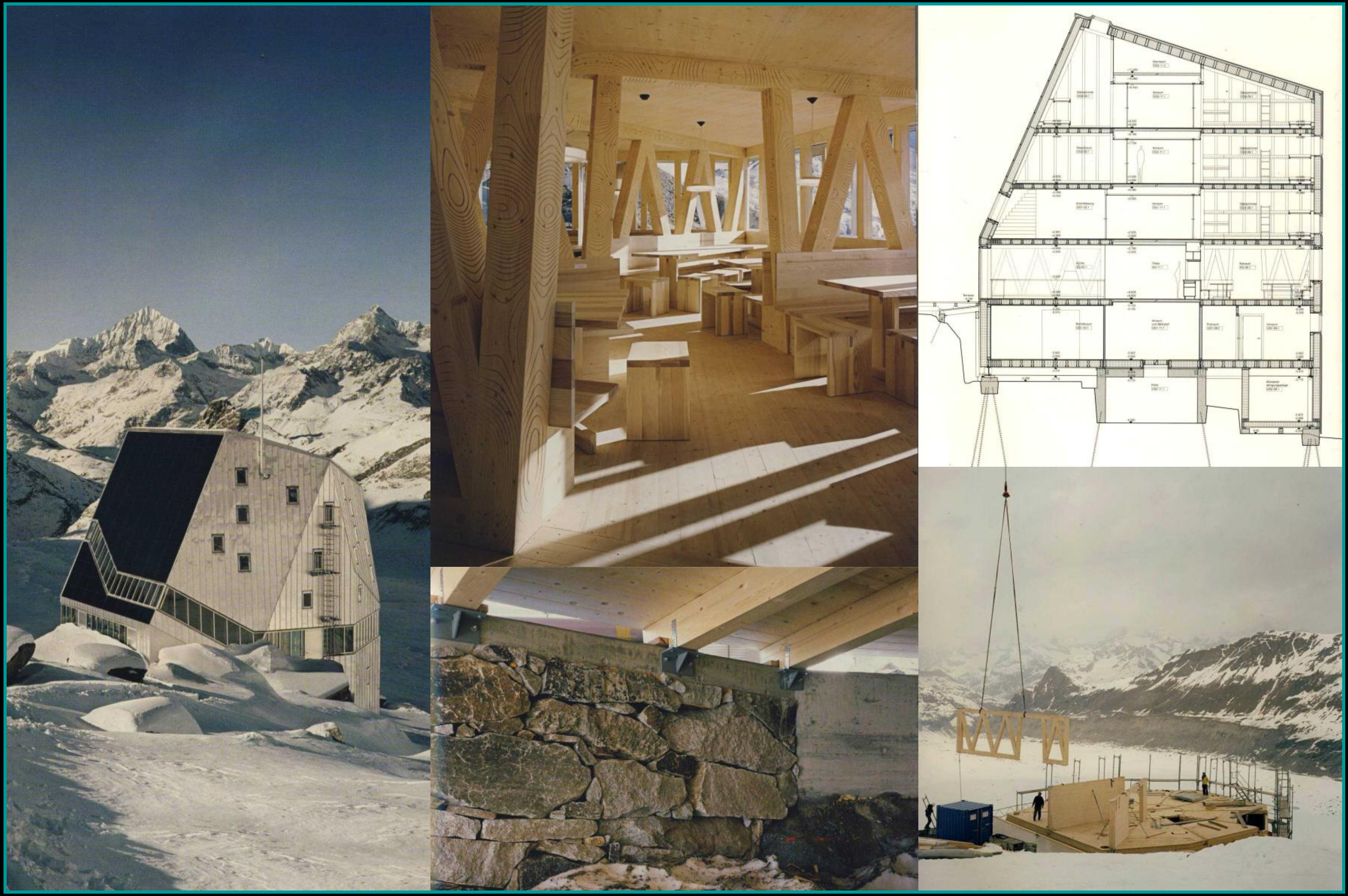
Edward Ford: “The Details of Modern Architecture”, 1990

→ *ARCHITECTURE IS A SYNTHESIS: SPACE + STRUCTURE …:*



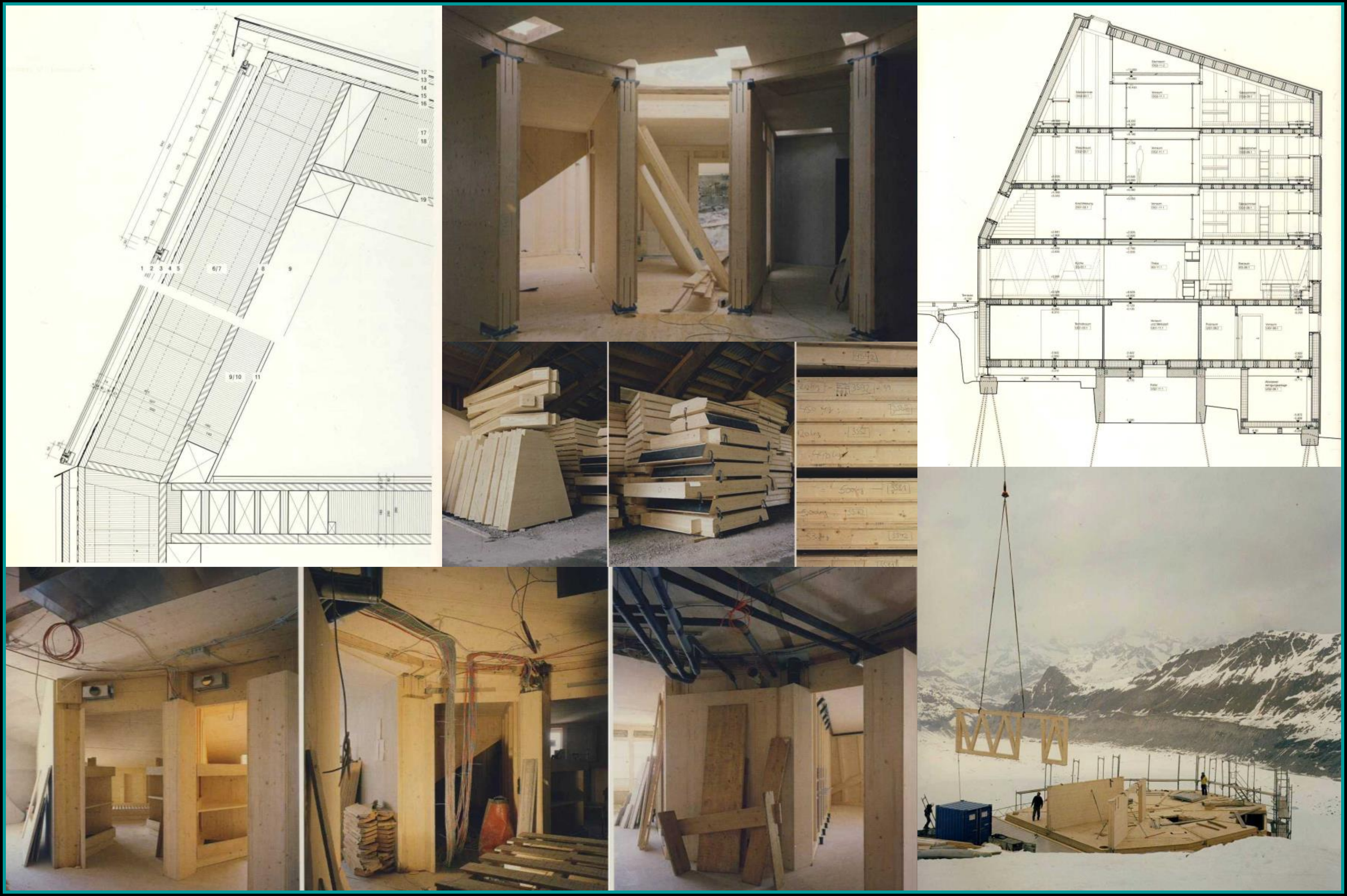
Shin Takasuga: “Railway Sleeper House” Seitogakushi Dormitory, Miyakejima Japan 1980

→ *ARCHITECTURE IS A SYNTHESIS: SPACE + STRUCTURE …:*



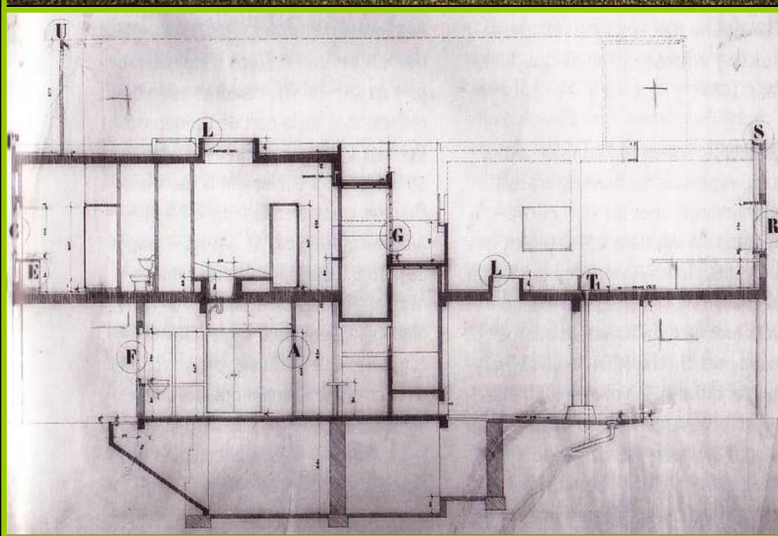
A.Deplazes: “Monte Rosa SAC Hut”, Switzerland 2010

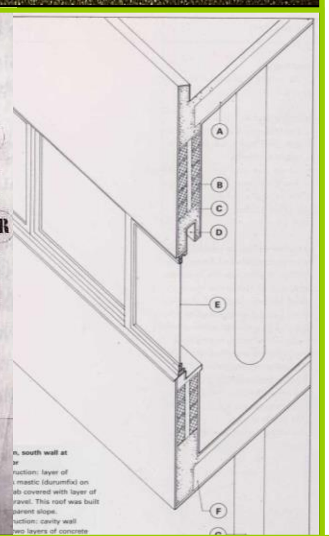
→ *ARCHITECTURE IS A SYNTHESIS: SPACE + STRUCTURE ...:*



A.Deplazes: “Monte Rosa SAC Hut”, Switzerland 2010

→ AESTHETICS





"Friends of your House"

It seems most likely that the Savoyes moved into the villa some time during the summer of 1930, probably in July. Le Corbusier stayed in constant contact with his former clients over the course of the next eight years, up until their abandonment of the villa on the eve of World War II. The relationship was one of ongoing dispute and litigation.

In 1931, Le Corbusier acted as intermediary on behalf of his client in negotiations with Cormier, with a view to obtaining a reduction in the contractor's bill for the work carried out.

In addition, M. Savoye requested an impromptu survey from the Compagnie de Chauffage Central, further to faults in the heating system. (59) The whole affair, which dragged on for around three years, was even more regrettable in view of the health problems experienced by the Savoyes' son, who spent 1933 in a sanatorium in Chamonix. The villa was cold and damp and suffered from substantial heat loss due to the large glazing and insufficient capacity of the heating system.

However, it was during the years 1936–1937 that the relationship would really turn sour between Le Corbusier and Mme Savoye, who by then had apparently taken the situation in hand.

On 7 September 1936, six years after the villa's completion, Mme. Savoye wrote to Le Corbusier on "Les Heures Claires" headed notepaper, reiterating: "It's raining in the hall, it's raining on the ramp and the wall of the garage is absolutely soaked. What's more, it's still raining in my bathroom, which floods in bad weather, as the water comes in through the skylight. The gardener's walls are also wet through." (62)

Le Corbuser replied in a way that tempered the facts, assuring his client that everything could be repaired and that he would make the necessary arrangements with the new builder chosen by the Savoyes.

In June of the following year, Mme. Savoye launched another attempt, claiming that the work undertaken had not been effective, that the gardener's lodge was still ridden with damp, and that the villa's laundry room was permanently flooded.

Le Corbusier did not remain inactive in the face of these missives. He called on a company specialised in issues of damp – apparently to no avail, given that a clash came about in autumn 1937. Mme. Savoye sent another letter on different headed notepaper and with different typeface: "Your letter dated the 7th of this month surprised me enormously. After innumerable demands you have finally accepted that this house which you built in 1929 is uninhabitable. Your ten-year responsibility is at stake and I have no need to foot the bill. Please render it habitable immediately. I sincerely hope that I will not have to take recourse to legal action." (64)

The epilogue to the first part of the Villa Savoye's history, shortly before it was abandoned by its owners, is furnished by Le Corbusier himself. On 31 October 1937, he wrote one last time to M. Savoye: "Dear Sir, this note completes my letter which I dictated yesterday upon my return from Brussels (...) I would like to assure you that we wish to do our utmost to satisfy you and that you should consider us friends of your house. What is more, I hope to remain a personal friend of yours, since our relationship has always been based on one of trust. I am, and will always remain, the friend of my clients." (66)

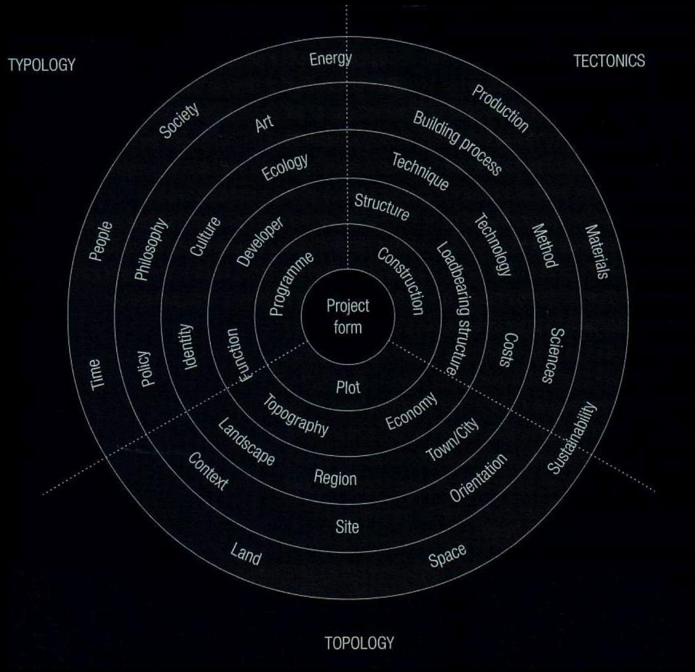
→ KNOWLEDGE OF MATERIALS + PROCESSES:

Materials used in three typical houses

15th-century farmhouse	18th-century London house	Modern American house
Stone rubble walls	Fired brick	Concrete
Timber structural members	Lime mortar	Rigid insulation
Pegs for structural members	Lead sheets	Engineered wood joists
Thatch	Wood double-hung windows with glass	Solid sawn studs, joists, rafters
Lime plaster	Lead gutters	Wood and plastic windows with glass
Wattle	lime plaster	Gypsum wallboard
Daub	Oil paint	Gypsum wallboard joint compound
Stone	Iron hinges and latches	Bricks
Timber shutters	Iron railings	Cement mortar
Iron hinges and latches	Stone paving	Latex-based paint
. . . not much more	Varnish	Plastic pipe
	Cut nails	Pipe cement
	Chimney flue pipe	Cast iron pipe
	. . . not much more	Pipe compound
		Plumbing fixtures
		Sheet metal ducts
		Sheet metal gutters and leaders
		Plywood
		Nails
		Wood siding
		Asphalt shingles
		Electric cable consisting of copper wire and insulation
		Lighting fixtures
		Switches and outlets
		Carpet
		Laminate for countertops
		Glue for laminate
		Weather-stripping for windows and doors
		. . . and quite a bit more

Construction of an eighteenth-century London house

→ *STRATEGY :*

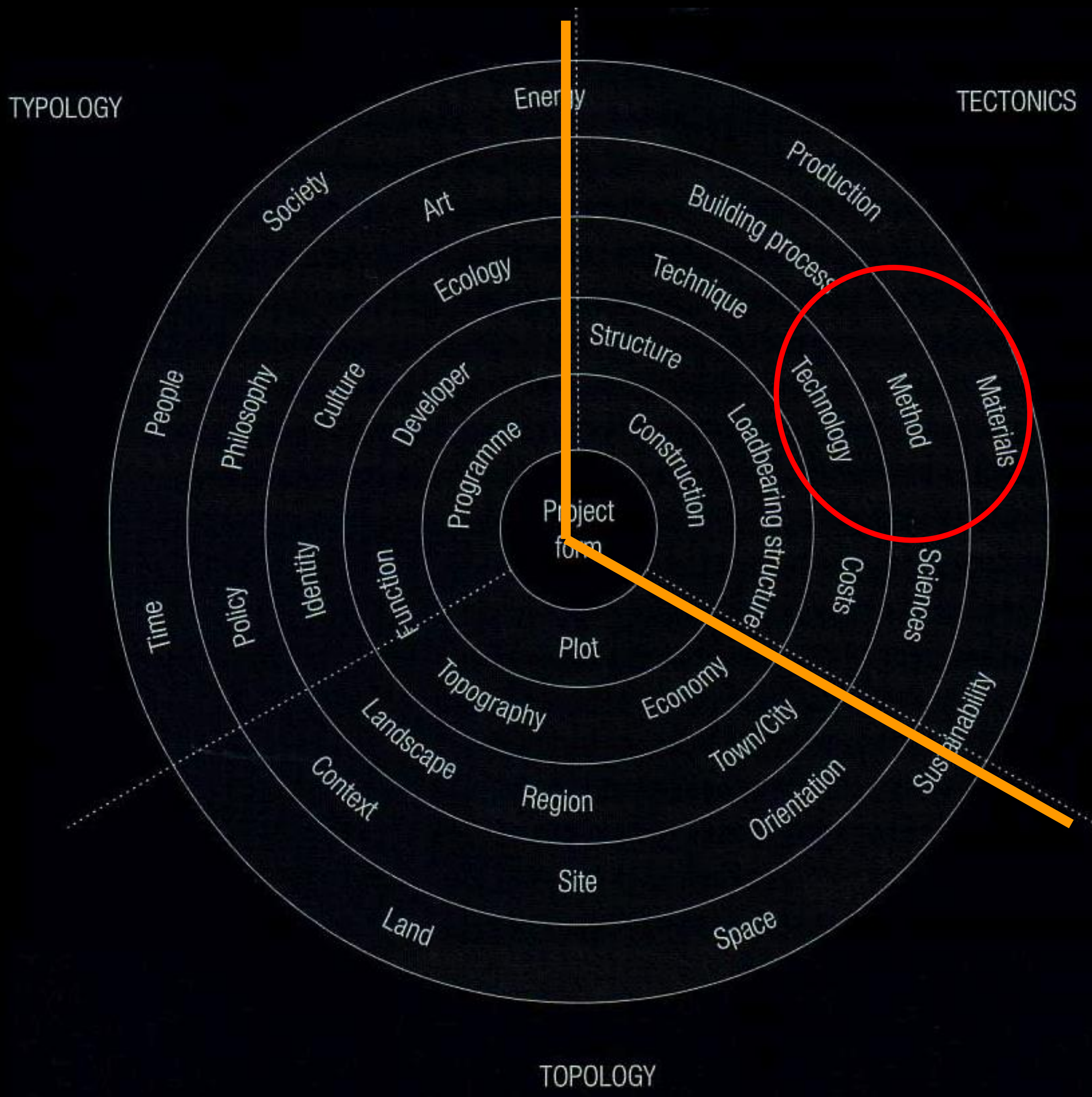


THE CHARACTER OF AN

'ARCHITECTURAL EXPERIENCE' DEPENDS ON

HOW SOMETHING IS **MATERIALIZED**:

THEREFORE, IT IS DETERMINED BY THE TECHNICAL REALIZATION AND STRUCTURAL COMPOSITION OF THE SUBSTANCES AND MATERIALS USED.


TYPOLOGY
TECTONICS
TOPOLOGY
Energy
Production
Building process
Technique
Structure
Construction
Loadbearing structure
Technology
Method
Materials
Costs
Sciences
Sustainability
Orientation
Space
Town/City
Economy
Plot
Project form
Site
Region
Topography
Landscape
Context
Land
Time
Policy
Identity
Function
Programme
Developer
Culture
Philosophy
People
Society
Art
Ecology

MATERIAL REQUIREMENTS

THERE IS **NEVER ONLY ONE REASON** TO SPECIFY A MATERIAL: THE DESIGN PROCESS DEMANDS A **NEGOTIATION** BETWEEN MULTIPLE REQUIREMENTS:

- CONCEPTUAL
- TECHNICAL
- STRUCTURAL
- FUNCTIONAL
- AESTHETIC
- PRACTICAL
- SUSTAINABLE
- LEGAL
- ECONOMIC

→ *FORM HAS TO WITHSTAND* ***'NATURAL FORCES'*** :

- **GRAVITY** (WEIGHT [DEAD/LIVE LOADS], SOIL CONDITIONS)
- **HUMIDITY, MOISTURE, RAIN**
- **TEMPERATURE Δ; HEAT, COLD**
- **WIND, STORMS, EARTHQUAKES** (LATERAL FORCES)
- **DAYLIGHT; UV-CONTENT**
- **POLLUTION**
- **SOUND / 'NOISE'**
- *'FORCES'* OF **USE / MIS-USE**

ANTICIPATION

... LIFE CYCLE WILL DEPEND ON QUALITY OF CONSTRUCTION !




→ *MATERIAL SPECIFICS WOOD:*

WEIGHT:	30 - 70 LB./CU.FT.
COMPRESSIVE STRENGTH:	500 - 1,500 PSI
TENSILE STRENGTH:	500 - 1,500 PSI
MODULUS OF ELASTICITY:	~ 1,200,000 PSI
FIRE RESISTANCE:	COMBUSTIBLE
WATER RESISTANCE:	DECAYS
THERMAL EXPANSION COEF.:	$19 \times 10^{-6}\,°F^{-1}$ (CROSS-GR.) $2 \times 10^{-6}\,°F^{-1}$ (ALONG-GR.)
THERMAL CONDUCTIVITY:	~0.08 BTU/hr.ft.°F
SPECIFIC HEAT CAPACITY:	0.00072 BTU/LB.°F
AESTHETICS:	GRAINED, WARM, LESS-UNIFORM ALMOST ALWAYS 'FINISHED', (...SUBJECTIVE...)
RELATIVE ECONOMICS:	CHEAP TO ...VARIES...

('GLUE-LAMS': STRENGTH INCREASES SIGNIFICANTLY)

→ *MATERIAL SPECIFICS:*

~50	WEIGHT:	490 LB./CU.FT.
1,500	COMPRESSIVE STRENGTH:	36,000 PSI
1,500	TENSILE STRENGTH:	36,000 PSI
1,200,000	MOD. OF ELASTICITY:	29,000,000 PSI
COMB.	FIRE RESISTANCE:	NON-COMBUSTIBLE
DECAYSS	WATER RESISTANCE:	RUSTS, CORRODES
20×10^{-6} 2×10^{-6}	THERMAL EXPANSION COEF.:	$\sim 7 \times 10^{-6}$ °F^{-1}
~0.08	THERMAL CONDUCTIVITY:	26 BTU/hr.ft.°F
0.0007	SPECIFIC HEAT CAPACITY:	0.11 BTU/LB.°F
	AESTHETICS:	PRECISE, REFINED, PURE… ALMOST ALWAYS COATED, INDUSTRIAL, (…SUBJECTIVE…)
EXP.	RELATIVE ECONOMICS:	EXPENSIVE

Siegfried Giedion: “Building in France,
Building in Iron, Building in Ferroconcrete”, 1928

IRON → ‘STEEL’

Fig. 5. STEEL. Broken Steel Rod Enlarged Three Times
Note the great density of the structure in contrast to other building materials, such as wood: from this molecular structure arise certain properties and types of construction.

The introduction of iron into architecture signifies the change from craftsmanship to industrial building production. The beginnings of the new architecture can be dated to the day when the old production methods were abandoned and mechanically manufactured rolled iron replaced handwrought iron.

STONE can only resist compression. It allows inert masses to be layered into piles, but only the most extreme inventiveness allows it to achieve a certain hollowing out (Gothic). Stone signifies compact mass. Stone massively closes off spaces. The entire width of a wall is load-bearing. Broad horizontal openings contradict its structure.

IRON can be stretched and drawn together. It resists extension and pressure and hence bending.
The significance of iron is: to condense high potential stress into the most minimal dimensions. If a comparison is permitted, iron suggests both muscular tissue and skeleton in a building. Iron opens the spaces. The wall can become a transparent glass skin. To design a load-bearing wall becomes an intolerable farce.
This leads to new laws of design.

→ MATERIAL SPECIFICS MASONRY:

WEIGHT: 40 - 100 LB./CU.FT.

COMPRESSIVE STRENGTH: 1,000 - 10,000 PSI

TENSILE STRENGTH: NEGLIGIBLE

MODULUS OF ELASTICITY: ~ 1,200,000 PSI (COMP.)

FIRE RESISTANCE: FIRE- RESISTIVE

WATER RESISTANCE: VARIES, ...CRACKS...

THERMAL EXPANSION COEF.: $\sim 3 \times 10^{-6} - 5 \times 10^{-6}\ {}^{\circ}F^{-1}$

THERMAL CONDUCTIVITY: ~0.7 BTU/hr.ft.°F
~0.2 BTU/hr.ft.°F (AERATED)

SPECIFIC HEAT CAPACITY: 0.2 BTU/LB.°F

AESTHETICS: SOLID, STRONG, ROUGH, REGIONAL, (...SUBJECTIVE...)

RELATIVE ECONOMICS: ...VARIES...

→ *MATERIAL SPECIFICS CONCRETE:*

WEIGHT: 150 $^{LB.}/_{CU.FT.}$ (NORMAL)

50-100 $^{LB.}/_{CU.FT.}$ (LIGHTWEIGHT)

COMPRESSIVE STRENGTH: 1,500 - 10,000 PSI

TENSILE STRENGTH: NEGLIGIBLE

MODULUS OF ELASTICITY: ~ 3,150,000 PSI (COMP.)

FIRE RESISTANCE: FIRE- RESISTIVE

WATER RESISTANCE: VARIES, ...CRACKS...

THERMAL EXPANSION COEF.: $\sim 4 \times 10^{-6} - 6 \times 10^{-6}\ ^{\circ}F^{-1}$

THERMAL CONDUCTIVITY: ~0.6 BTU/hr.ft. °F (NORMAL)
~0.3 BTU/hr.ft. °F (LIGHTWEIGHT)

SPECIFIC HEAT CAPACITY: 0.2 BTU/LB. °F (NORMAL)

AESTHETICS: HEAVY, STRONG, ROUGH, INDUSTRIAL, COLD, (...SUBJECTIVE...)

RELATIVE ECONOMICS: ...FAIRLY CHEAP...

→ MATERIAL SPECIFICS GLASS:

WEIGHT: 158 LB./CU.FT. (FLOAT GLASS)

COMPRESSIVE STRENGTH: 5,000 - 7,000 PSI (…!…)

TENSILE STRENGTH: NEGLIGIBLE

FIRE RESISTANCE: NON-COMBUSTIBLE

WATER RESISTANCE: GOOD

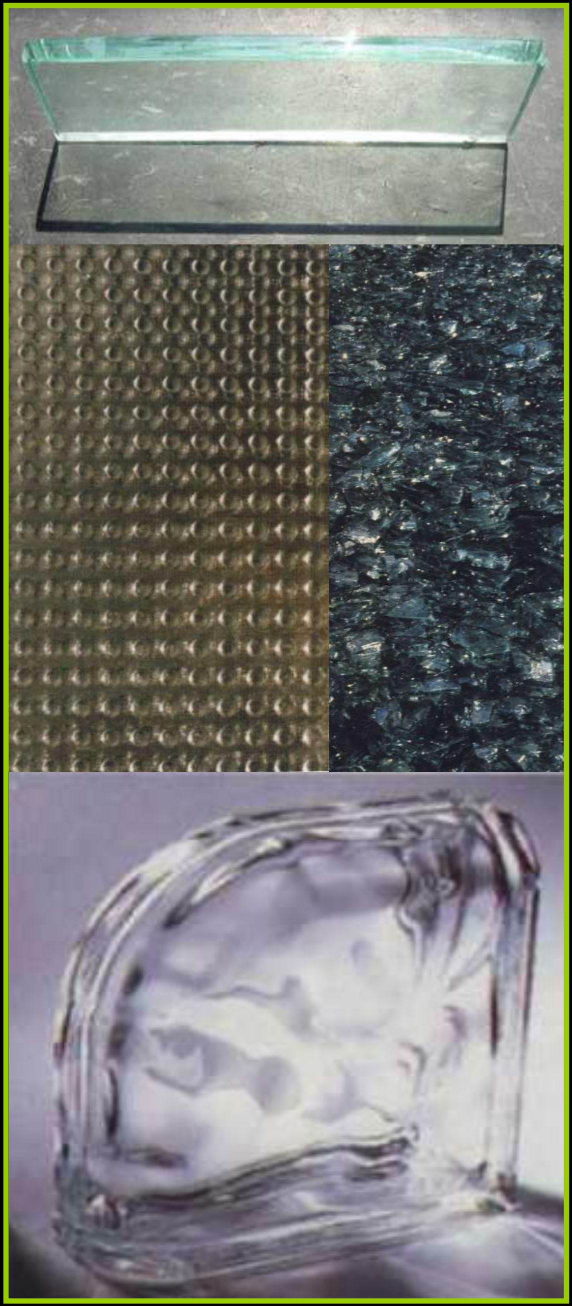
THERMAL EXPANSION COEF.: $\sim 13 \times 10^{-6}\ ^{\circ}F^{-1}$

THERMAL CONDUCTIVITY: ~ 0.4 BTU/hr.ft. °F

SPECIFIC HEAT CAPACITY: 0.2 BTU/LB. °F

AESTHETICS: TRANSPARENT, REFLECTIVE, POLISHED, INDUSTRIAL, (…SUBJECTIVE…)

RELATIVE ECONOMICS: …FAIRLY EXPENSIVE…



→ MATERIAL SPECIFICS INSULATION:
HERE: RIGID, I.e.: POLYSTYRENE

WEIGHT: 1 - 2 LB./CU.FT.

COMPRESSIVE STRENGTH: 13 - 30 PSI

TENSILE STRENGTH: 30 - 60 PSI

FIRE RESISTANCE: COMBUSTIBLE

WATER RESISTANCE: FAIR… (material dependent)

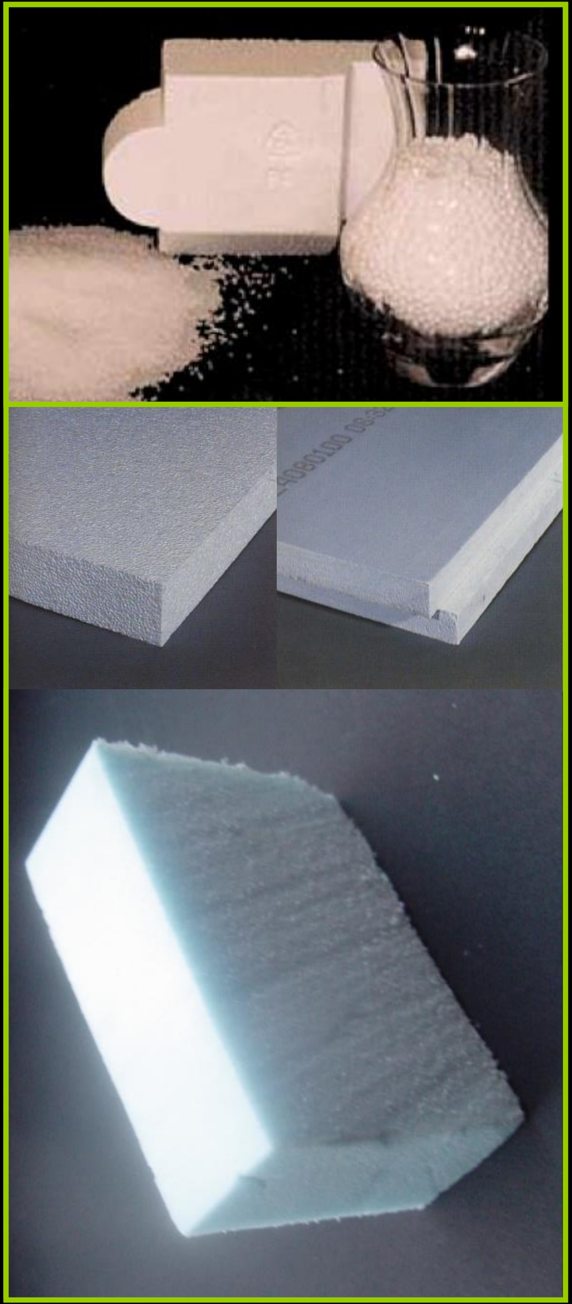
THERMAL EXPANSION COEF.: $\sim 50 \times 10^{-6}\ ^{\circ}F^{-1}$

THERMAL CONDUCTIVITY: ~ 0.02 BTU/hr.ft. °F

SPECIFIC HEAT CAPACITY: 0.08 BTU/LB. °F

AESTHETICS: ALMOST ALWAYS INVISIBLE,
INDUSTRIAL, (…SUBJECTIVE…)

RELATIVE ECONOMICS: …INEXPENSIVE…

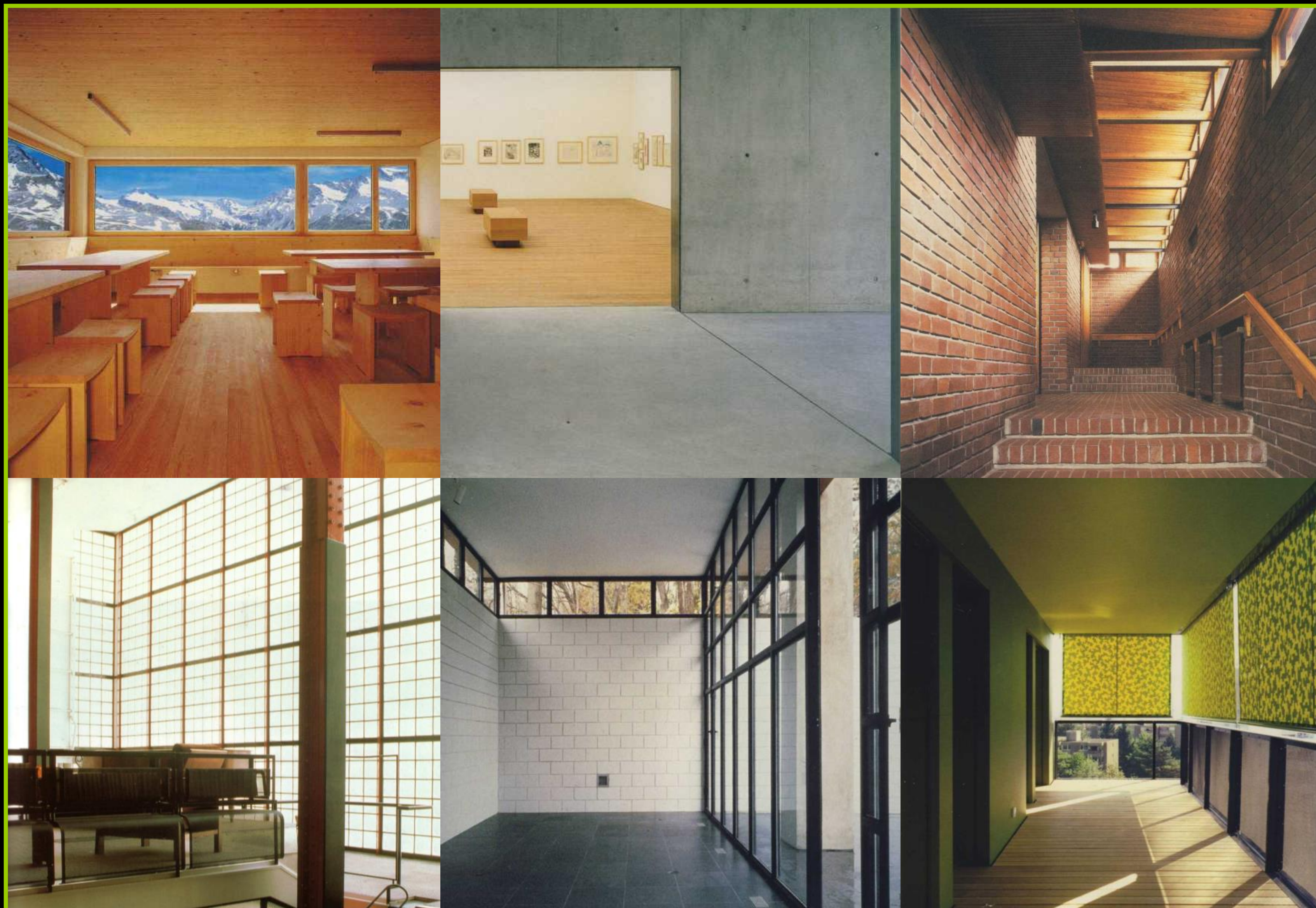


→ *MATERIAL SPECIFICS SERVE PHYSICAL PURPOSES:*

- ➔ STRENGTH; ‘BASE SUPPLY’ ; ‘HEIGHT SUPPLY’
- ➔ SPANNING; ‘SPACE WIDTH SUPPLY; ‘OPENING SUPPLY’
- ➔ STORING HEAT/COLD (CREATING ‘MICRO-CLIMATES’)
- ➔ INSULATING (…CREATING ‘MICRO-CLIMATES’ , AGAIN…)
- ➔ PENETRATION/FACILITATION OF DAYLIGHT
- ➔ PROTECTION AGAINST WATER
- ➔ RUN PIPES, CONDUITS,…ETC.
- ➔ EASY CLEANABLE, MAINTAINABLE SURFACES
- ➔ LIFE CYCLES (WITHSTANDING NATURAL FORCES)
- ➔ ADJUSTABILITY, FLEXIBILITY (CHANGES)
- ➔ CREATING A SENSE OF SPACE + AMBIENCE

→ *MATERIAL SENSIBILITY*

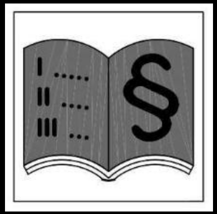
CONCEPTUAL / PHEMOMENOLOGICAL



→ *SPECIFIC FUNCTIONAL <u>PURPOSES</u>:*

- ➔ SHELTER (BUS STOPS, …)
- ➔ LIVING / RESIDENTIAL
- ➔ BUSINESS / COMMERCIAL
- ➔ MANUFACTURING (FACTORIES, …)
- ➔ CULTURE (MUSEUMS, THEATERS, …)
- ➔ RELIGION (CHURCHES, SYNAGOGUES,…)
- ➔ RECREATION (SPORTS, PARKS, …)
- ➔ EDUCATION (SCHOOLS, COLLEGES, …)
- ➔ HOSPITALS, ETC.

➔ **"OCCUPANCY GROUP"**



RELATED TO: CONSTRUCTION TYPES (IA/B, IIA/B, IIIA/B, IV, VA/B)

→ *REGULATORY REQUIREMENTS:* LEGAL: HEALTH + SAFETY

- ➔ **BUILDING CODES (...)**
- ➔ **ZONING ORDINANCES**
  - TYPES OF ACTIVITIES
  - COVERAGE
  - FLOOR-AREA-RATIO (FAR)
  - HEIGHT
  - SET BACKS
  - FIRE ZONES
  - PARKING SPACES
- ➔ **LANDMARK STATUS** (HISTORIC DISTRICT,...)
- ➔ **AMERICANS W/ DISABILITIES ACT** (ADA)
- ➔ **OCCUPATIONAL SAFETY + HEALTH ACT** (OSHA)
- ➔ **INSURANCES → FIRE RESISTANCE**
- ➔ *INFO RESOURCES:* UNDERWRITERS LABORATORIES / FACTORY MUTUAL
  - AMERICAN SOCIETY FOR TESTING+MATERIALS (ASTM)
  - AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
  - CONSTRUCTION SPEC'S INSTITUTE (CSI) → MasterFormat
  - TRADE ASSOCIATIONS (I.e.: Wood Product Association)

→ BUILDING CODES

LEGAL

TABLE 503
ALLOWABLE HEIGHT AND BUILDING AREAS
Height limitations shown as stories and feet above grade plane.
Area limitations as determined by the definition of "Area, building," per floor.

		TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
	HGT(feet)									
GROUP	Hgt(S)	UL	160	65	55	65	55	65	50	40
A-1	S	UL	5	3	2	3	2	3	2	1
	A	UL	UL	15,500	8,500	14,000	8,500	15,000	11,500	5,500
A-2	S	UL	11	3	2	3	2	3	2	1
	A	UL	UL	15,500	9,500	14,000	9,500	15,000	11,500	6,000
A-3	S	UL	11	3	2	3	2	3	2	1
	A	UL	UL	15,500	9,500	14,000	9,500	15,000	11,500	6,000
A-4	S	UL	11	3	2	3	2	3	2	1
	A	UL	UL	15,500	9,500	14,000	9,500	15,000	11,500	6,000
A-5	S	UL	UL	UL	UL	UL	UL	UL	UL	UL
	A	UL	UL	UL	UL	UL	UL	UL	UL	UL
B	S	UL	11	5	4	5	4	5	3	2
	A	UL	UL	37,500	23,000	28,500	19,000	36,000	18,000	9,000
E	S	UL	5	3	2	3	2	3	1	1
	A	UL	UL	26,500	14,500	23,500	14,500	25,500	18,500	9,500
F-1	S	UL	11	4	2	3	2	4	2	1
	A	UL	UL	25,000	15,500	19,000	12,000	33,500	14,000	8,500
F-2	S	UL	11	5	3	4	3	5	3	2
	A	UL	UL	37,500	23,000	28,500	18,000	50,500	21,000	13,000
H-1	S	1	1	1	1	1	1	1	1	NP
	A	21,000	16,500	11,000	7,000	9,500	7,000	10,500	7,500	NP
H-2	S	UL	3	2	1	2	1	2	1	1
	A	21,000	16,500	11,000	7,000	9,500	7,000	10,500	7,500	3,000
H-3	S	UL	6	4	2	4	2	4	2	1
	A	UL	60,000	26,500	14,000	17,500	13,000	25,500	10,000	5,000
H-4	S	UL	7	5	3	5	3	5	3	2
	A	UL	UL	37,500	17,500	28,500	17,500	36,000	18,000	6,500
H-5	S	3	3	3	3	3	3	3	3	2
	A	UL	UL	37,500	23,000	28,500	19,000	36,000	18,000	9,000
I-1	S	UL	9	4	3	4	3	4	3	2
	A	UL	55,000	19,000	10,000	16,500	10,000	18,000	10,500	4,500
I-2	S	UL	4	2	1	1	Np	1	1	NP
	A	UL	UL	15,000	11,000	12,000	Np	12,000	9,500	NP
I-3	S	UL	4	2	1	2	1	2	2	1
	A	UL	UL	15,000	11,000	10,500	7,500	12,000	7,500	5,000
I-4	S	UL	5	3	2	3	2	3	1	1
	A	UL	60,500	26,500	13,000	23,500	13,000	25,500	18,500	9,000
M	S	UL	11	4	4	4	4	4	3	1
	A	UL	UL	21,500	12,500	18,500	12,500	20,500	14,000	9,000
R-1	S	UL	11	4	4	4	4	4	3	2
	A	UL	UL	24,000	16,000	24,000	16,000	20,500	12,000	7,000
R-2[a]	S	UL	11	4	4	4	4	4	3	2
	A	UL	UL	24,000	16,000	24,000	16,000	20,500	12,000	7,000
R-3[a]	S	UL	11	4	4	4	4	4	3	3
	A	UL	UL	UL	UL	UL	UL	UL	UL	UL
R-4	S	UL	11	4	4	4	4	4	3	2
	A	UL	UL	24,000	16,000	24,000	16,000	20,500	12,000	7,000
S-1	S	UL	11	4	3	3	3	4	3	1
	A	UL	48,000	26,000	17,500	26,000	17,500	25,500	14,000	9,000
S-2	S	UL	11	5	4	4	4	5	4	2
	A	UL	79,000	39,000	26,000	39,000	26,000	38,500	21,000	13,500
U	S	UL	5	4	2	3	2	4	2	1
	A	UL	35,500	19,000	8,500	14,000	8,500	18,000	9,000	5,500

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.
UL = Unlimited
a. As applicable in Section 101.2.

TABLE 601
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (hours)

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
	A	B	A[d]	B	A	B	HT	A[d]	B
Structural frame[a] Including columns, girders, trusses	3[b]	2[b]	1	0	1	0	HT	1	0
Bearing walls									
Exterior[f]	3	2	1	0	2	2	2	1	0
Interior	3[b]	2[b]	1	0	1	0	1/HT	1	0
Nonbearing walls and partitions									
Exterior	See Table 602								
Interior[e]	See Section 602								
Floor construction Including supporting beams and joists	2	2	1	0	1	0	HT	1	0
Roof construction Including supporting beams and joists	$1^1/_2$[c]	1[c]	1[c]	0	1[c]	0	HT	1[c]	0

For SI: 1 foot = 304.8 mm.

a. The structural frame shall be considered to be the columns and the girders, beams, trusses and spandrels having direct connections to the columns and bracing members designed to carry gravity loads. The members of floor or roof panels which have no connection to the columns shall be considered secondary members and not a part of the structural frame.
b. Roof supports: Fire-resistance ratings of structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.
c. 1. Except in Factory-Industrial (F-I), Hazardous (H), Mercantile (M) and Moderate-Hazard Storage (S-1) occupancies, fire protection of structural members shall not be required, including protection of roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.
   2. In all occupancies, heavy timber shall be allowed where a 1-hour or less fire-resistance rating is required.
   3. In Type I and Type II construction, fire-retardant-treated wood shall be allowed in buildings not over two stories including girders and trusses as part of the roof construction.
d. An approved automatic sprinkler system in accordance with Section 903.3.1.1 shall be allowed to be substituted for 1-hour fire-resistance-rated construction, provided such system is not otherwise required by other provisions of the code or used for an allowable area increase in accordance with Section 506.3 or an allowable height increase in accordance with Section 504.2. The 1-hour substitution for the fire resistance of exterior walls shall not be permitted.
e. For interior nonbearing partitions in Type IV construction, also see Section 602.4.6.
f. Not less than the fire-resistance rating based on fire separation distance (see Table 602).

TABLE 602
FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE[a]

FIRE SEPARATION DISTANCE (feet)	TYPE OF CONSTRUCTION	GROUP H	GROUP F-1, M, S-1	GROUP A, B, E, F-2, I, R[b], S-2, U
< 5[c]	All	3	2	1
≥ 5 < 10	IA Others	3 2	2 1	1 1
≥ 10 < 30	IA, IB IIB, VB Others	2 1 1	1 0 1	1 0 1
≥ 30	All	0	0	0

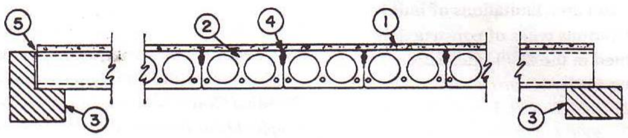
For SI: 1 foot = 304.8 mm.
a. Load-bearing exterior walls shall also comply with the fire-resistance rating requirements of Table 601.
b. Group R-3 and Group U when used as accessory to Group R-3, as applicable in Section 101.2 shall not be required to have a fire-resistance rating where fire separation distance is 3 feet or more.
c. See Section 503.2 for party walls.

→ *FIRE RESISTANCE RATINGS:*

LEGAL

Design No. J921

Restrained Assembly Ratings—2 and 3 Hr. (See Item 1)
Unrestrained Assembly Rating—2 Hr.



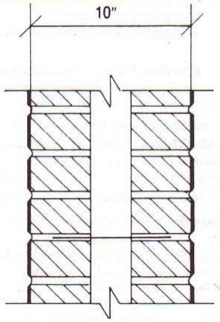
Restrained End Detail | Unrestrained End Detail

1. **Concrete Topping**—3000 psi compressive strength. Normal weight 150 ± 3 pcf unit weight or lightweight, 112 ± 3 pcf unit weight.

Rating	Thickness-In.
2	0
3	1¼

2. **Precast Concrete Units***—Light-weight aggregate. Cross-section similar to the above illustration. Units 8, 10 or 12 in. thick, 16, 20 or 24 in. wide with 2 or 3 core holes.
3. **End Details**—Restrained and unrestrained. Min bearing 3 in.
4. **Joint**—Clearance between slabs at bottom, full length, min 1/16 in., max 5/16 in. grouted full length with sand-cement grout, 3500 psi min.
   Note—A ¾-in. lateral expansion joint to be provided the full length and depth of the slabs every 14 ft. Expansion should be obtained with noncombustible, compressible material, for example; 12 sheets of 1/16 in. thick asbestos paper.
5. **End Clearance**—Clearance for expansion at each end of slabs shall be equal to L/17 (¼ ± 1/16) in., where "L" equal to length of span in feet.

*Bearing the UL Classification Marking



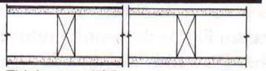
Four-Hour Fire Rating

10-IN. BRICK CAVITY WALL

Non-combustible or no members framed in

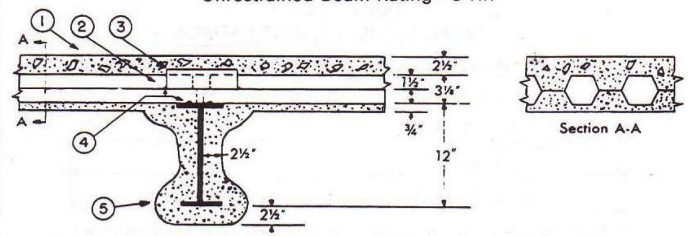
Units at least 75 percent solid
No plaster required

References 1, 7 and 9

Fire Rating	Sound Rating STC	GA File No.	DETAILED DESCRIPTION	SKETCH AND DESIGN DATA
1 HR	30 to 34	WP 3620	**Construction Type: Gypsum-Veneer Base, Veneer Plaster, Wood Studs** One layer ½" type X gypsum veneer base applied at right angles to each side of 2 x 4 wood studs 16" o.c. with 5d etched nails, 1¾" long, 0.099" shank, ¼" heads, 8" o.c. Minimum 1/16" gypsum-veneer plaster over each face. Stagger vertical joints 16" and horizontal joints each side 12". Sound tested without veneer plaster. (LB)	Fire / Sound  Thickness: 4⅞" Approx. Weight: 7 psf Fire Test: UC, 1-12-66 Sound Test: G & H IBI-35FT. 5-26-64

Design No. A814

Restrained Assembly Rating—3 Hr.
Unrestrained Assembly Rating—3 Hr.
Unrestrained Beam Rating—3 Hr.



Beam—W12×27, min size.

1. **Sand-Gravel Concrete**—150 pcf unit weight 4000 pcf compressive strength.
2. **Steel Floor and Form Units***—Non-composite 3 in. deep galv units. All 24 in. wide, 18/18 MSG min cellular units. Welded to supports 12 in. O.C. Adjacent units button-punched or welded 36 in. O.C. at joints.
3. **Cover Plate**—No. 16 MSG galv steel.
4. **Welds**—12 in. O.C.
5. **Fiber Sprayed***—Applied to wetted steel surfaces which are free of dirt, oil or loose scale by spraying with water to the final thickness shown above. The use of adhesive and sealer and the tamping of fiber are optional. The min and density of the finished fiber should be 11 pcf and the specified fiber thicknesses require a min fiber density of 11 pcf. For areas where the fiber density is between 8 and 11 pcf, the fiber thickness shall be increased in accordance with the following formula:

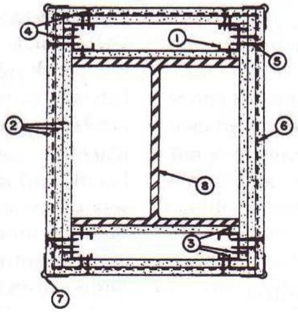
$$\text{Thickness, in.} = \frac{(11)\ (\text{Design Thickness, in.})}{\text{Actual Fiber Density, pcf.}},$$

Fiber density shall not be less than 8 pcf. For method of density determination refer to General Information Section.

*Bearing the UL Classification Marking.

Design No. X511

Rating—3 Hr.

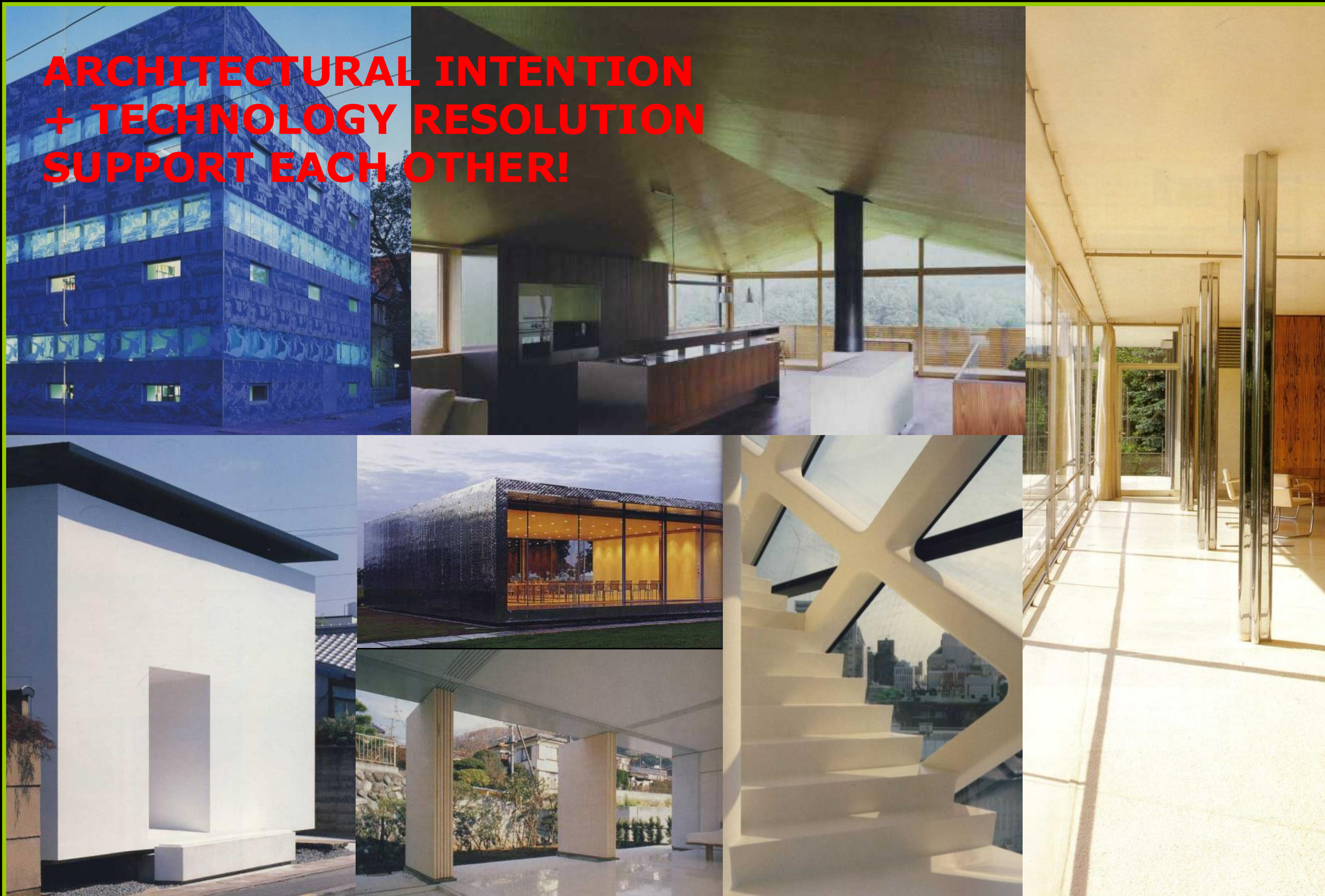


1. **Steel Studs**—1⅝ in. wide with leg dimensions of 1-5/16 and 1-7/16 in. with a ¼-in. folded flange in legs, fabricated from 25 MSG galv steel, ¾- by 1¾-in. rectangular cutouts punched 8 and 16 in. from the ends. Steel stud cut ½ in. less in length than assembly height.
2. **Wallboard, Gypsum***—½ in. thick, three layers.
3. **Screws**—1 in. long, self-drilling, self-tapping steel screws, spaced vertically 24 in. O.C.
4. **Screws**—1⅝ in. long, self-drilling, self-tapping steel screws, spaced vertically 24 in. O.C., except on the outer layer of wallboard on the flange, which are spaced 12 in. O.C.
5. **Screws**—2¼ in. long, self-drilling, self-tapping steel screws, spaced vertically 12 in. O.C.
6. **Tie Wire**—One strand of 18 SWG soft steel wire placed at the upper one-third point, used to secure the second layers of wallboard only.
7. **Corner Beads**—No. 28 MSG galv steel, 1¼ in. legs or 27 MSG uncoated steel, 1⅜ in. legs,

→ SEMIOTICS: REVELATION

→ SEMIOTIC: ‘REPRESSION’ (ABSTRACTION)

AESTHETICS



→ *“WHAT’S WRONG HERE ?”*

“CUTTING CORNERS”

AN ARCHITECT MUST BE A MASTER OF INTEGRATION:

– CONCEPTUAL
– TECHNICAL
– STRUCTURAL
– FUNCTIONAL
– AESTHETIC
– PRACTICAL
– SUSTAINABLE
– LEGAL
– ECONOMIC
– SOCIAL
– CULTURAL
…

“Meeting the needs of the present generatior m-
promising the ability of future generations to needs.”

SUSTAINABILITY

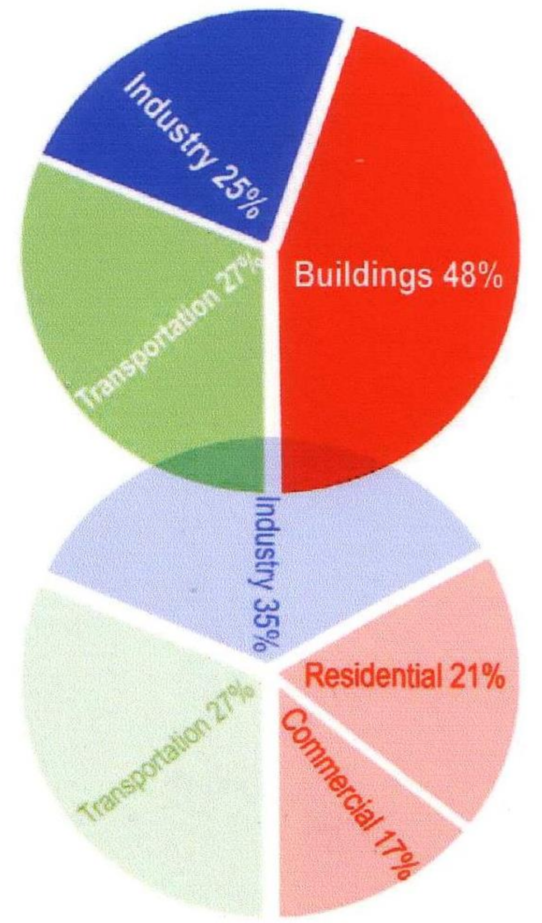
"Meeting the needs of the present generation without compromising the ability of future generations to meet their needs."

HOW PRUDENT DO WE USE OUR FINITE MATERIALS?

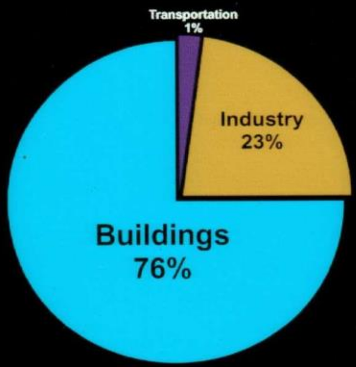
- → **RESOURCES, EMISSIONS, POLLUTION**
- → ORIGIN + MANUFACTURE OF BUILDING MATERIALS
- → EMBODIED ENERGY
- → TRANSPORTATION
- → CONSTRUCTION OF THE BUILDING
- → USE/MAINTENANCE OF THE BUILDING
- → LIFE CYCLE ESTIMATE
- → RECYCLING, REUSE OPTIONS
- → DEMOLITION OF THE BUILDING

→ *SUSTAINABILITY:* (*"MAKING CHOICES"*) … *ENERGY*

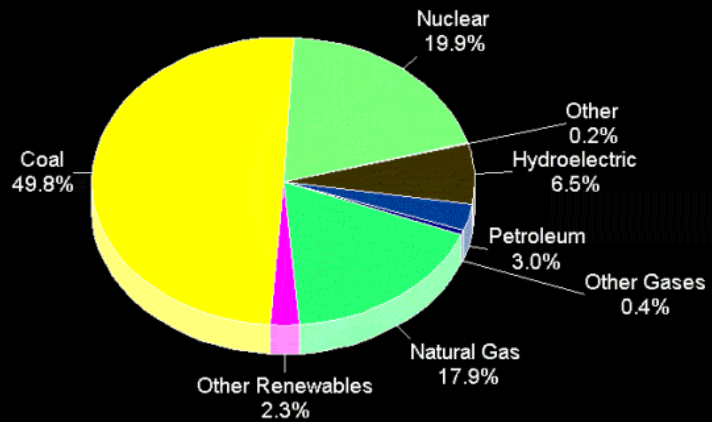
- → 38 % OF PRIMARY ENERGY IS CONSUMED BY BUILDINGS.
- → 48 % WOULD BE ACCOUNTED IF ENERGY USED IN PRODUCTION + TRANSPORTATION OF BUILDING MATERIALS IS INCLUDED !
- → OVER THE NEXT 20 YEARS: U.S.A. WILL ADD CA.22 MIO. BUILDINGS, WHICH WILL CONSUME ENERGY: HEATING AND COOLING REQUIREMENTS ARE HIGHLY DEPENDENT ON QUALITY OF BUILDING



Combining the annual energy required to operate residential, commercial, and industrial buildings along with the embodied energy of industry-produced building materials like carpet, tile, glass, and concrete exposes buildings as the largest energy consuming sector.



76% of all power plant generated electricity is used to operate buildings.



→ *SUSTAINABILITY:* *RECYCLING/GARBAGE*

Assuming the entire waste production to equal 100 %, one can divide it into contributing factors as follows:

– Household waste, bulk waste, trade waste	approx. 12 %
– Toxic waste	approx. 5 %
– Production waste	approx. 35 %
– Construction waste	approx. 48 %

Construction waste is nearly 50 % of the total waste, a primary target for the recycling economy.

Mineral Building Materials
Mineral building materials such as concrete, calcareous sandstone and bricks are easily re-used. Light building materials such as aerated plaster, drywall and foam mortar can be channelled through separate cycles into the new production of these materials.

Wood
Wood can be processed in the form of strands or used as insulation. Older, treated woods may contain contaminants (PCBs), which make re-use more difficult.

Metals
Metals can usually be treated and re-used without any loss in quality. Coatings limit recycling options.

Glass
Glass recycling usually consists of a long process from plate glass through cast glass to container glass, wherein high-grade recycling depends upon the pollution abatement in manufacture of glass panes.

Bituminous Materials
Rolled building material, such as tarpaper for roofing, is recyclable; coatings with a mineral base can easily be re-used as rubble or ballast. Coatings for insulating materials can only be separated out with great effort and must usually be completely disposed of.

Insulating Materials
Polystyrene can be integrated into the recycling process as an insulant (granulates, insulating grist, new panels). Mineral-strand boards or panels for interior construction are not yet recyclable.

→ BY THE YEAR 2035, $^{2}/_{3}$ OF THE BUILT ENVIRONMENT IN THE U.S. WILL BE EITHER NEW OR RENOVATED.

→ RECYCLING POTENTIAL:
- MATERIAL SEPARABILITY
- MATERIAL HOMOGENITY
- COMPOSITE SEPARABILITY
- LOW MATERIAL DIVERSITY
- MATERIAL IDENTIFICATION
- RECOVERY/REUSE/MODUL.

→ PUBLIC SECTOR MUST OFFER MASSIVE SUPPORT FOR RECYCLING, EVEN IN BORDERLINE CASES, TO AVOID ENVIRONMENTAL BURDENS IN THE FUTURE.

→ SUSTAINABILITY: (LEED, USGBC)

LEED — LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN

Version 2.1 Registered Project Checklist

Project Name

LEED Project #

Sustainable Sites — 14 Points

Yes	?	No			
Y			Prereq 1	**Erosion & Sedimentation Control**	Required
			Credit 1	**Site Selection**	1
			Credit 2	**Urban Redevelopment**	1
			Credit 3	***Brownfield Redevelopment***	1
			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
			Credit 4.3	**Alternative Transportation**, Alternative Fuel Vehicles	1
			Credit 4.4	**Alternative Transportation**, Parking Capacity and Carpooling	1
			Credit 5.1	***Reduced Site Disturbance**, Protect or Restore Open Space*	1
			Credit 5.2	**Reduced Site Disturbance**, Development Footprint	1
			Credit 6.1	**Stormwater Management**, Rate and Quantity	1
			Credit 6.2	**Stormwater Management**, Treatment	1
			Credit 7.1	**Landscape & Exterior Design to Reduce Heat Islands**, Non-Roof	1
			Credit 7.2	***Landscape & Exterior Design to Reduce Heat Islands**, Roof*	1
			Credit 8	**Light Pollution Reduction**	1

Water Efficiency — 5 Points

Yes	?	No			
			Credit 1.1	***Water Efficient Landscaping**, Reduce by 50%*	1
			Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
			Credit 2	**Innovative Wastewater Technologies**	1
			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
			Credit 3.2	**Water Use Reduction**, 30% Reduction	1

Energy & Atmosphere — 17 Points

Yes	?	No			
Y			Prereq 1	**Fundamental Building Systems Commissioning**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**CFC Reduction in HVAC&R Equipment**	Required
			Credit 1	**Optimize Energy Performance**	1 to 10
			Credit 2.1	**Renewable Energy**, 5%	1
			Credit 2.2	**Renewable Energy**, 10%	1
			Credit 2.3	**Renewable Energy**, 20%	1
			Credit 3	***Additional Commissioning***	1
			Credit 4	**Ozone Depletion**	1
			Credit 5	**Measurement & Verification**	1
			Credit 6	**Green Power**	1

Materials & Resources — 13 Points

Yes	?	No			
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
			Credit 1.1	**Building Reuse**, Maintain 75% of Existing Shell	1
			Credit 1.2	**Building Reuse**, Maintain 100% of Shell	1
			Credit 1.3	**Building Reuse**, Maintain 100% Shell & 50% Non-Shell	1
			Credit 2.1	**Construction Waste Management**, Divert 50%	1
			Credit 2.2	**Construction Waste Management**, Divert 75%	1
			Credit 3.1	**Resource Reuse**, Specify 5%	1
			Credit 3.2	**Resource Reuse**, Specify 10%	1
			Credit 4.1	**Recycled Content**, Specify 5% (post-consumer + _ post-industrial)	1
			Credit 4.2	**Recycled Content**, Specify 10% (post-consumer + _ post-industrial)	1
			Credit 5.1	**Local/Regional Materials**, 20% Manufactured Locally	1
			Credit 5.2	**Local/Regional Materials**, of 20% Above, 50% Harvested Locally	1
			Credit 6	**Rapidly Renewable Materials**	1
			Credit 7	**Certified Wood**	1

Indoor Environmental Quality — 15 Points

Yes	?	No			
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	Required
			Credit 1	**Carbon Dioxide (CO_2) Monitoring**	1
			Credit 2	**Ventilation Effectiveness**	1
			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
			Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
			Credit 4.2	**Low-Emitting Materials**, Paints	1
			Credit 4.3	**Low-Emitting Materials**, Carpet	1
			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber	1
			Credit 5	**Indoor Chemical & Pollutant Source Control**	1
			Credit 6.1	**Controllability of Systems**, Perimeter	1
			Credit 6.2	**Controllability of Systems**, Non-Perimeter	1
			Credit 7.1	**Thermal Comfort**, Comply with ASHRAE 55-1992	1
			Credit 7.2	**Thermal Comfort**, Permanent Monitoring System	1
			Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

Innovation & Design Process — 5 Points

Yes	?	No			
			Credit 1.1	**Innovation in Design**: Provide Specific Title	1
			Credit 1.2	**Innovation in Design**: Provide Specific Title	1
			Credit 1.3	**Innovation in Design**: Provide Specific Title	1
			Credit 1.4	**Innovation in Design**: Provide Specific Title	1
			Credit 2	**LEED™ Accredited Professional**	1

Project Totals (pre-certification estimates) — 69 Points

Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-69 points

→ SUSTAINABILITY: LONGEVITY

3rd International Architecture Symposium, Pontresina, Switzerland 2000

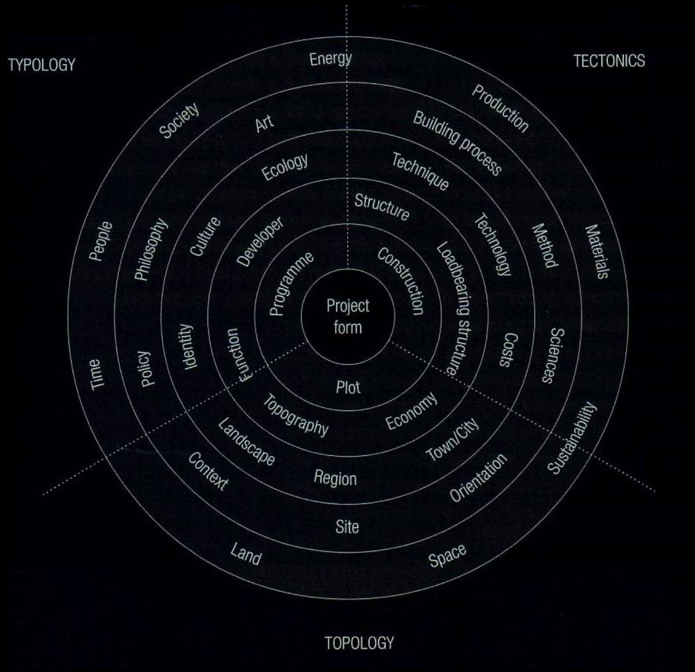
Hans Kollhoff, Germany:

"The real question is, which structures will still be around 75 years from now. Just look at the works of Jean Nouvel; in five years time they'll be ready for pulling down!"

Jean Nouvel, France:

"Whoever builds with bricks and inserts little windows must be very limited upstairs!"

→ *ESSENCE :*



CREATING AN

‘ARCHITECTURAL EXPERIENCE’ DEPENDS ON

COMPLEX **KNOW-HOW**:

TECHNICAL REALIZATION COMPETENCIES, STRUCT-

URAL COMPOSITION AND INTEGRATION SKILLS

ARE ESSENTIAL TO CREATE IT !