

How use the
Glass
Interview with Architects

Q1

Tell us about your favourite project that you used Glass in or another architect's work - it can be in the interior, on the facade, doesn't matter where it's used.

central courtyard of the building that has helped to define its strong identity.

Thanks to a specially designed structure, the partitions of the glazed facades follow a rhythmic pattern where the structure is embedded and remains hidden to the eye.

In that way, the glazed facades seem to be free from structural requirements and their pattern can expressively be used to create a rich dialogue not only among the glazed facades themselves but also between them and the rest of the building.

The courtyard becomes a 'musical' architectural element, bathed by the changing natural light captured by the glazed facades.

At night, through the transparency of the glazed facades, lights from inside the building bathe the space of the courtyard and create an intimate place for relaxing and for enjoying the decaying light of the sunset.



A5 Swiss House IV, Muzzano

CEBRA (Mikkel Frost)

Apart from the glass, you'll find in the windows of our projects, we do not use the material a lot.

I remember visiting Maison de Verre in Paris as a student some 25 years ago. It made a great impression on me. The house is designed by Pierre Chareau in 1928 and it was decades ahead of time in terms of transparency effects, details and aesthetics. I believe it is open to the public today and it is certainly worth a visit.

Davide Macullo Architects

Glass is a natural material. Glass represents first of all a transparency between inside and outside, secondly, a potential of using it for its reflection characteristics. An interesting recent project in glass is the work of Jean Nouvel for the entrance wall of the Fondation Cartier in Paris for its dimension and relation between two spaces that are both outdoor spaces but in two different conditions: street-garden. In our house in Muzzano (A5, 094p) we used the same principle in a reduced intimate space where the glass has been used for its reflecting characteristics. Both are inspired by the work of the artist Dan Graham (A6).



A6 Pavillon - Dan Graham ©wikipedia commons

Donner Sorcinelli Architecture

The use of glass always represents an exciting challenge to be played in between transparencies and reflections. One of the project where the combined use of glass and other materials has been developed according to these aspects it was the design of a Primary School in Carbonera (Italy). In this case, the visual connection between the common spaces and classrooms with the landscape has been the main driver of the whole design process.

Katsutoshi Sasaki+Associates

National Gallery in Germany by Mies van der Rohe (A7).

Keiichi Hayashi Architect

Clean Room / Yuji Takeoka

Aside context in art, I like this artwork, because it simultaneously creates two spaces such as an empty space inside glass box and huddled imbrication space of spectators and other exhibitions, which



A7 new National Gallery - Mies van der Rohe ©Jean-Pierre Dalbéra



A8 Deutscher Werkbund Pavilion Exterior



A9 Refurbished an Office, ©Pedro Nuno Pacheco

created by reflection of glass exterior.

LANDÍNEZ+REY arquitectos

Undoubtedly our references for glass architecture are those of the history of architecture. In the first place, the radical and wise use of glass in the Maison de Verre by Pierre Chareau or the Pavilion by Bruno Taut for the Deutscher Werkbund (A8) in 1914: these are architectural lessons for glass use. In advance, the architecture of Mies van der Rohe, in 1928, the Glass House of Philip Johnson, that seem to evolve towards the use of glass, today, by Kazuyo Sejima.

Our Train Station in Rivas-Futura (396p) (Madrid, Spain) is definitely a glass box arranged on a podium and protected with a shade covering floating above it, according to our climate. By linear aluminum louvers in front of the glazing, a bioclimatic shade covering is created.

It offers protection against west solar direct radiation avoiding overheating and provides reflected natural lighting inside the spaces avoiding glare. Also, a covered exterior area where the external stairs between public spaces is provided.

m artı d mimarlık

Izmir Chamber (050p) of Geological Engineers is a small scale project that we have designed on a narrow parcel. It is located on an attached parcel. Services, circulation elements are located at the back side of the parcel which enables building to get light in from one facade of it. For maximising use of natural light in the building, glass curtain wall was used on that facade. In order to, reflect institutional identity, topographical references are used for geometry of the facade.

modostudio

An architectural icon that was never built is the Mies van der Rohe Glass Skyscraper (1922). Mies van der Rohe was one of the first architect to understand the poetics of glass and to bring this material to extreme solutions.

Mork-Ulnes Architects

It is hard not to think of Mies - with either the Farnsworth house or the Friedrichstrasse skyscraper project as being the most groundbreaking use of glass in the modernist sense.

murmuro

We have refurbished an office (A9, 316p), actually, transformed three small office spaces into a bigger one. In this project we have used glass as a partition material that would allow us to keep the flow and open feel needed. The main workroom, for about 40 people, has an entire side in glass/window frames for the outside, and the two smaller sides also in glass, facing the kitchen and lounge area on one side and the partners office/meeting room on the other.

NISHIZAWA ARCHITECTS

BEN THANH restaurant (068p) is our favourite project that using glass for the partition inside.

object-e architecture

Our project for the Cyprus Medical School competition (A10, Next Page) is based on the principle that a medical school, as any other uni-

TOUCH Architect

Café Pixel(A16) is located at the city center of Udonthani, Thailand. It has a limited land area which can be approached from main street directly. There are three primary functions which are café, restaurant, and bar, together in one space with time-sharing functions: café / bakery and healthy food restaurant in the morning, while using as a craft-beer bar in the evening.

Since it is a time-sharing, massing and zoning design of this café was created in the way to suit these both contrast functions. There are two floors, the first floor with café and bar counter, and the mezzanine floor for only customers' seats, which fit in a rectangular function box, by concerning building codes, rules, and regulations. In order to maximize the amount of seats, an open-plan and flexible seating is needed.

One simple box was turning to a pixelate box with 1x1 meter of each pixel. It creates a façade pattern, continuing into inside space. The pixel is not only used for façade, but also integrated and used as 'pixel bar seats' and a decoration shelf for displaying beverages items.

Material of the pixel is all glass, which contains both transparent clear glass and translucent glass, in order to portray different effects through each type of material and each amount of glass layers: single or double. White translucent glass will help reduce and reflect direct sunlight during daytime for café, while lighting design inside will glow as a craft-beer bar during nighttime. It creates different atmosphere for different time.

UNStudio

In the La Defense offices in Almere (NL) the facades are clad with glass panels in which a multi-coloured foil is integrated and, depending on the time of day and the angle at which you view them, a variety of different colours are reflected. The office workers there have said that the effect is as if the sun shines in that courtyard every day of the year.



A15 Toledo - Glass Pavillion ©Adam C Nelson



A16 Café Pixel

Q2

**What are
the strengths and weaknesses
of Glass?**

ARPHENOTYPE

The raw materials for glass are practically unlimited available. However, it is relatively sensitive to mechanical stress, if not specific made. Probably a downside of glass is its cost, especially when it comes to special glass constructions.

AZC

The strengths are the transparence, the lightness, the long-lasting with no maintenance.

Weakness, the price and the fact that in some extreme temperature areas, hot and cold it does not protect the interior.

BOARD

When it comes to architecture, one of the considerable weaknesses of glass - next to its porousness that exposes it to the constant risk of cracking – is its ability to transmit light and heat, if too thin and unprotected, that can easily overheat interior spaces during sunny days. To avoid that from happening we proposed to install aluminium profiles as Brise Soleil with a shading effect all over the glass facade of the “High and Dry” project. The use of triple glazing helped keeping the interior spaces in moderate temperatures during the summer months. The proposed highly effective sunscreen made of stainless steel limb-weave also ensured agreeable interior temperatures during hot days. All these measures led to a highly energy efficient administrative building.

Carlos Lampreia

Glass is a marvelous material, because in strict sense we can get a transparent wall using it. But sometimes we commit the error of looking at glass as an invisible material, and thats a mistake. Glass its the most visible of all materials, because it is a perfect and shining highly procesed material. The bigger weakness of glass is its fragility and dependence on other subtructers that are required while using it.

Casanova+Hernandez Architects

As mentioned before, for us the potentials of using glass are enormous.

Glasses can be transparent or can present a wide range of translucency, they can be colored, can be printed, can create rich reflections or can be matt.

Nowadays it is possible for the designer to express very different architectonic intentions by using different glass qualities, by combining glasses of different properties, by curving them or by creating contrast with other materials that will be reflected on them. Glass is the most versatile material in our opinion. With its properties, it translates poetical intentions into architecture in a unique way.

CEBRA(Mikkel Frost)

The building codes in Denmark are rather strict when it comes to energy efficiency. So, when we design big glazed window areas, we struggle with heat loss in the winter and overheating in the summer. Glass as a cladding material is quite splendid though. We used it for our great mirror space in The Grundfos Halls of Residence(190p). It’s funny though, glass is probably the only material that an architect

cannot totally avoid. It would be like cooking without salt...

Davide Macullo Architects

Glass is the material of wonder: it can be the most solid or the most inexistent material, the most challenging and the most dangerous material. Too much reflection and transparence is against human nature. The extensive use of glass in building industry has brought the rise of a series of uncomfortable situations where people have increased their level of stress. I refer to situations such as glass buildings in metropolitan areas, for example London office spaces suffer from this extended use of glass for the working habitat of humans.

Donner Sorcinelli Architecture

There are no strengths or weaknesses but poetics’ potentials only.

Katsutoshi Sasaki+Associates

Weakness point is Heat insulating performance.

There are a lot of good points.

Keiichi Hayashi Architect

Strength: It is transparent material.

Weakness: It is too strong and too suddenly united between inside and outside through glass without consciousness.

LANDÍNEZ+REY arquitectos

The strengths and weaknesses of the use of glass in architecture have been linked to their intrinsic values around transparency, or not, or to their light-responsive properties.

Today the classic discourse of the use of glass in architecture has been added in an essential way its response in relation to the energetic factors.

m arti d mimarlık

Glass is advantegous due to its transparent characterisatics. However, bad heat control and sound insulation characteristics are improved by technological developments. Layerd use of glass with air gaps and coating it by various materials, improves its heat insulation capacity. As a result use of glass becomes more easier and wide-spread.

modostudio

The strengths of the glass is its transparency, a characteristic which can become a weakness too. Glass is a material that has to be used with extreme care. It can bring lightness but only if carefully technological detailed.

Mork-Ulnes Architects

Glass opens up so many opportunities to allow for more open, light filled structures.

A weakness of glass for us can be when we use too much glazing. It is often a temptation to generate too much transparency - taking away the power to frame views and manipulate light.

murmuro

Glass has the capability of defining a physic barrier and at the same

time, not. It’s weakness may be that is difficult to achieve acoustic comfort with it.

NISHIZAWA ARCHITECTS

Strength: Can help to create an in-between space and also connect the space inside and outside together.

With its transparent and reflection character, when the sunlight reflect into the glass, the angle of it can help to create the variety of interesting optical effects with surrounding context at different points of time, weathers or seasons. We think that it's really make sense when that partition can bring a refresh feeling for everyone, everytime they come to our building design.

Weakness: Sometimes still need some frames to protect the edges and surfaces. For this case, those glass was like a hand-craft so it’s really take time and money to make them reality to our building.

Not totally stop the air conditioner escaping from the inside space.

Need cleaning up regularly cause it easily get dirty

object-e architecture

“The longing for purity and clarity, for glowing lightness and crystal-line exactness, for immaterial lightness and infinite liveliness found a means of its fulfillment in glass—the most ineffable, most elementary, most flexible and most changeable of materials, richest in meaning and inspiration, fusing with the world like no other. This least fixed of materials transforms itself with every change of atmosphere. It is infinitely rich in relations, mirroring what is above, below, and what is below, above. It is animated, full of spirit and alive [...]”

Adolf Behne

As with tiles, we tend to think of glass in terms of the possibilities that it might offer. Adolf Behne’s quote summarizes those possibilities of glass as a material in the best possible way: transparency and reflections. Transformation of the material that echo changes in the atmosphere, the weather or the season. An almost immaterial quality that can be found between absence and presence. Maybe one of the main properties of glass is exactly this: it can occupy – with the proper design decisions – any place on the continuum that connects some of the most obvious architectural oppositions: transparency and opacity, presence and absence, visibility and obstruction of vision; glass can acquire virtually all possible points in between those extremes and therefore generate very complex conditions.

OFIS arhitekti

One strength is the diversity of natures or physical presences it can acquire. Fabricating a glass element is a very complex process, but at the same time it is possible to create tailored elements that can suit an enormous variety of environments, conditions and atmospheres.

Something that comes to our mind as a weakness of glass is the necessity to use auxiliary materials to install it. There are always limitations on the need to use profiles, substructures, limit the sizes of the panels, create joints, etc.

OOIO Architecture

Strengths: There is no material like glass, it is a must for most of constructions to solve interior-exterior situations. It is 100 recyclable. Pro-

vides magic games with natural light with reflections and nuances.

Weaknesses: In hot sunny weathers could be a problem to keep the interior fresh. Fragile. It is a cold material.

SLOT STUDIO

It is very common, and yet it keeps surprising us. Perhaps for its powerful visibility or our constant aim for transparency. There is something religious about glass, it is always associated with light and cleanliness. It appears to be the closest thing to nature (although it is not). Glass will always be appreciated if not needed because it closer to shelter than it is to ornament.

SMAR Architecture Studio

Glass weakness is always related to the cost. I'd say that the Strengths are related to the material properties. Of course, we have to talk here about transparency, reflection and light but glass is also able to be structural. The new Steve Jobs theatre is a recent example of how glass can become the structural element with no frames or pillars. New technologies allow glass also to have insulating properties using very thin layers of low iron glass and argon. We are now developing glass panels of 8m of height for the Science Island Museum we are designing in Kaunas. Lithuania has a very cold climate and we won't have more than 4.5 cm of glass façade.

Stefano Corbo STUDIO

Defining pros and cons in the use of glass is difficult, as every material should be considered in relation to the overall logic of the project, and based on the relationship between its different components.

stpmj Architecture

Strength: Transparency for views and the light, opacity for privacy, it can control the opacity with frit or print pattern.

Weakness: cost / price / Fragility

Studio Farris Architects

Strength: transparency and translucency, light weight, hard and durable, reusable and recyclable.

Weakness: costly material, requires regular cleaning.

SUPA architects schweitzer song

Glass doesn't have any weakness, frames have. A frame always feels like a compromise.

TAKK Architecture

The properties of transparency, flexibility, capability of changing of shape, make glass a unique material. Of course some weaknesses of it are its fragitily, price and thermal behavior.

TheeAe Architects

It goes beyond our profession to mention about technical terms of glass materials. However, for the aspect of architectural design, I don't have much ideas on it.

TOUCH Architect

Attribute of glass is mainly transparency and translucence. It is the

stpmj Architecture

장점: 채광이나 조망을 위한 투명함, 반대로 프라이버시를 위한 불투명함. 단일 재료임에도 투명함 정도를 여러 테크놀로지를 통해 조절이 가능하다. frit이나 프린트 패턴의 다양함 확보
단점: 예산에서의 비중이 크다 (코스트), 깨지기 쉬워 유지보수에 비용이 발생한다.

Studio Farris Architects

장점: 투명성과 반투명성, 경량, 단단함과 내구성, 재사용 및 재활용 할 수 있다는 점이다.
단점: 가격이 비싸며 정기적인 청소가 필요한 점이다.

SUPA architects schweitzer song

유리에 단점은 전혀 없다. 창틀은 언제나 타협처럼 느껴진다.

TAKK Architecture

투명성, 유연성과 모양을 변경할 수 있는 특성 덕분에 우리는 독특한 재료이다. 물론 단점은 부서지기 쉽다는 점과 가격 및 열적 거동이다.

TheeAe Architects

유리 재료의 기술적 특성에 대해 언급하는 것은 우리 분야 바깥의 일이다. 하지만 건축 디자인의 측면에서 봐도 별 다른 생각이 없다.

TOUCH Architect

유리의 주된 속성은 투명성과 반투명성이며 빛이 지나가는 것을 허용하는 유일한 건축 자재이다. 파사드에 미학을 만들어 낼뿐만 아니라 실내와 실외 공간을 연결하는 데 사용되며 자연 채광 덕분에 실내조명에 전기를 덜 소비할 수 있다. 그러나 유리는 열을 흡수하고 온실 효과를 일으킨다. 이 때문에 더 많은 에어컨을 사용하게 되고 에너지 소비를 증가시키기 때문에 모든 벽에 유리를 사용하는 것은 더운 기후에 적합하지 않다. 또한 쉽게 깨지기 때문에 보안을 위해서도 그다지 좋은 재료는 아니다.

반면에 위에 언급한 단점을 해결하는 유리 종류도 있다. 예를 들어, 열을 제외한 자연광만을 허용하는 저방사 유리로 로이유리(Low-E)가 있으며 깨지지 않는 안전유리도 있다. 그러나 이러한 부가 기능은 비용이 많이 든다.

UNStudio

필립 존슨 (Phillip Johnson)의 글래스 하우스(Glass House)가 집 전체를 유리로 지을 수 있다는 것을 이미 증명했기 때문에 내구력은 더 이상 예전처럼 문제가 아니다. 그러나 너무 많은 유리는 지속 가능한 열 부하에 관한 의문을 제기한다.

Interviewee PROFILE

Daide Macullo Architects



Donner Sorcinelli Architecture



Katsutoshi Sasaki +Associates



Keiichi Hayashi Architect



LANDINEZ+REY arquitectos



M artı D Mimarlık



Daide Macullo (b. Giornico, CH, 1965) lives and works in Lugano, Switzerland. Studied art, architecture and interior design. For 20 years (1990-2010) he was project architect in the atelier of Mario Botta with responsibility for over 200 international projects worldwide. He opened his own atelier in 2000.

The ethos of the studio is one of 'drawing from context' and the various contributions promote a dialogue between the specificity of the project and the universality of the contexts. His work has been published and awarded both at home and abroad. Selected realized projects include the WAP ART foundation mixed use gallery and apartment in Gangnam Seoul, South Korea, the Assuta Hospital in Ashdod, Israel, 5* Hotel and SPA facilities in Greece, the headquarter Jansen AG in Oberriet, Switzerland, Private Museum in Jeju South Korea, Sino-Swiss centre in Tianjing China, several houses and housing in Switzerland and abroad.

Current projects include a new Health and Wellness Hotel in Weggis, Switzerland and Marbella, Spain, houses and residential buildings in Switzerland, a beachfront villa in Heraklion, Greece, a Medical SPA in Baku, Azerbaijan. The work of the studio includes masterplanning, graphic design, branding consulting and custom designed furniture, now in production and spans to the creation of contemporary art collections for clients.

In Rossa Calanca Valley in the Grison Canton, Davide Macullo has started an urbanistic program to promote the intervention in situ of international artists to influence daily life through contemporary art. The first building realized in collaboration with Daniel Buren will be followed by other ten artists.

Donner Sorcinelli Architecture is an international architectural design office based in Italy.

Founded by architects Luca Donner and Francesca Sorcinelli, the firm pays particular attention to the theme of sustainable and affordable architecture in all its variants, based on experimentation and research in various fields like Architecture, Urban Design, Interior and Product Design.

Their projects have been awarded in International competitions:

"Social Housing Dev."- Piazzola sul Brenta 1st prize; " Social Housing Dev." -Presina, 1st prize; "Design Beyond East and West"- Seoul, 1st prize; "International Design Competition for Modern Saudi Houses, Affordability and Sustainability"- Riyadh, 1st prize; Urban Retrofitting of S.Elena's - Silea, 1st prize; Sansovino Masterplan -Montebelluna, 3rd prize; School Campus in Carbonera, 3rd prize;"Your Absolute" for a residential Tower, Mississauga, Honorary Mention; "Daejeon Urban Renaissance"- Daejeon, Honorable Mention.

They have been published in many international magazines, books and presented in several exhibitions in Italy and abroad.

DoSo are winners of the "Cityscape Architectural Review Award 2006", "SAIE selection Awards 2009" and the "20+ 10+ X World Architecture Award 2012". They have received an Honorary Mention at Modern Atlanta Prize 2011, an Acknowledgement Prize at Holcim Awards 2005 for sustainable constructions (MENA region) and they have been nominated by Korean Institute of Architects among "100 Architects of year 2017".

Luca Donner and Francesca Sorcinelli have been teaching at International Universities in Dubai after previous academic experiences in Italian Universities.

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Established: 1997

Biography
1967 Born in Osaka
1991 Graduated from Metal Engineering, Kansai University
1993 Graduated from Architecture, Kansai University
1997 Established Keiichi Hayashi Architect

Design Philosophy
It is important for me to make architecture using basic materials and uncomplicated construction methods. I try to create a system that is based on pure architecture but becomes complex when people use it.

www.haya-at.com

LANDINEZ + REY is an architectural practice co-founded in 2000 and based in Madrid (Spain) by the architects David Landinez González-Valcácel (Madrid, 1973) and Mónica González Rey (Paris, 1973). Both are formed as M.Arch (1999) in ETSAM-UPM (Faculty of Architecture of the Polytechnical University of Madrid, UPM) and both are also graduated as Building Engineers by UEM-Madrid (2013). David also is M.Arch in Efficient Buildings and Rehabilitation by UEM (Universidad Europea de Madrid) and Mónica has also postgraduated studies in Analysis and Real Estate Management by Colmillas University (ICAI-ICADE)

LANDINEZ + REY arquitectos [el2gaa] develops its activity as a working platform where architecture is sought from its capacity as a system generator. Systems capable of providing answer to both the place and the rest of the dimensions, scales and techniques demanded by each draft. Its work is based on the research that arises from the proposals presented to architectural competitions, many of them has been rewarded with awards and honorable mentions, others won and built.

Among these works we can find the Badajoz, Coria and Plasencia secondary schools and the Malpartida de Plasencia and Jaraiz de la Vera Gym Plvillions for the Regional Government of Extremadura, Spain and the Rivas Futura Underground Station for Metro de Madrid.

His works have been published in different specialized magazines and exhibited by different national and foreign institutions.

www.landinez-rey.com

M artı D Mimarlık was founded in 1987 in Izmir by Metin Kılıç and Dürrin Süer. They design various types of projects in various scales such as residential, commercial, healthcare, educational and urban design. With their intention that unites academic and practical skills, they contribute to today's architecture culture.

Metin Kılıç - Partner - Founder (Architect)
He was born in 1962. In 1985 he graduated from 9 September University, Faculty of Architecture. He has been working and conducting M artı D Mimarlık since 1987 as founder and partner. He has many projects such as hospitals, educational institutions, hospitals, residences, commercial buildings. He has been principal of İSMD between 2013-2015. He has many prizes in architectural competitions.

Dürrin Süer - Partner - Founder (Phd. Architect)
She was born in 1965 in Ankara. In 1987 she graduated from 9 September University, Faculty of Architecture. She has completed Masters and PhD Degrees in same university. Between 1987 - 2007 she has worked as academician in 9 September University, Faculty of Architecture. She has many articles published in architectural magazines about architecture education, architecture and utopia, architecture and technology, consumption spaces and residential spaces. She has been working in M artı D Mimarlık as founder and partner. She also takes place as jury member in architectural competitions and writes academical researches and articles.

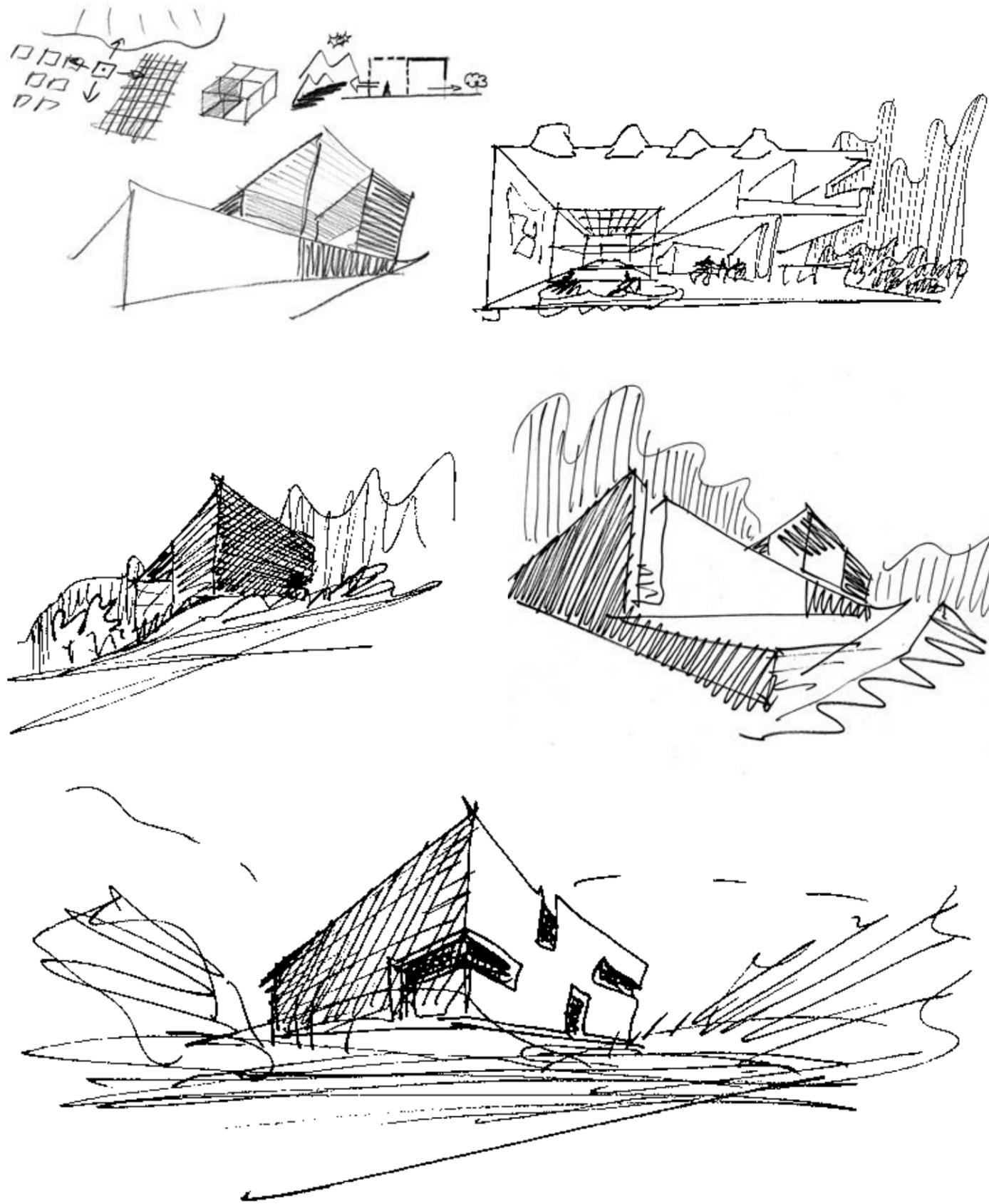
Ali Can Helvacıoğlu (Architect)
He was born in Izmir in 1989. He was graduated from Izmir University of Economics, Faculty of Architecture in 2011. He has been working in M artı D Mimarlık since 2011.

A case study of

GLASS

Architecture

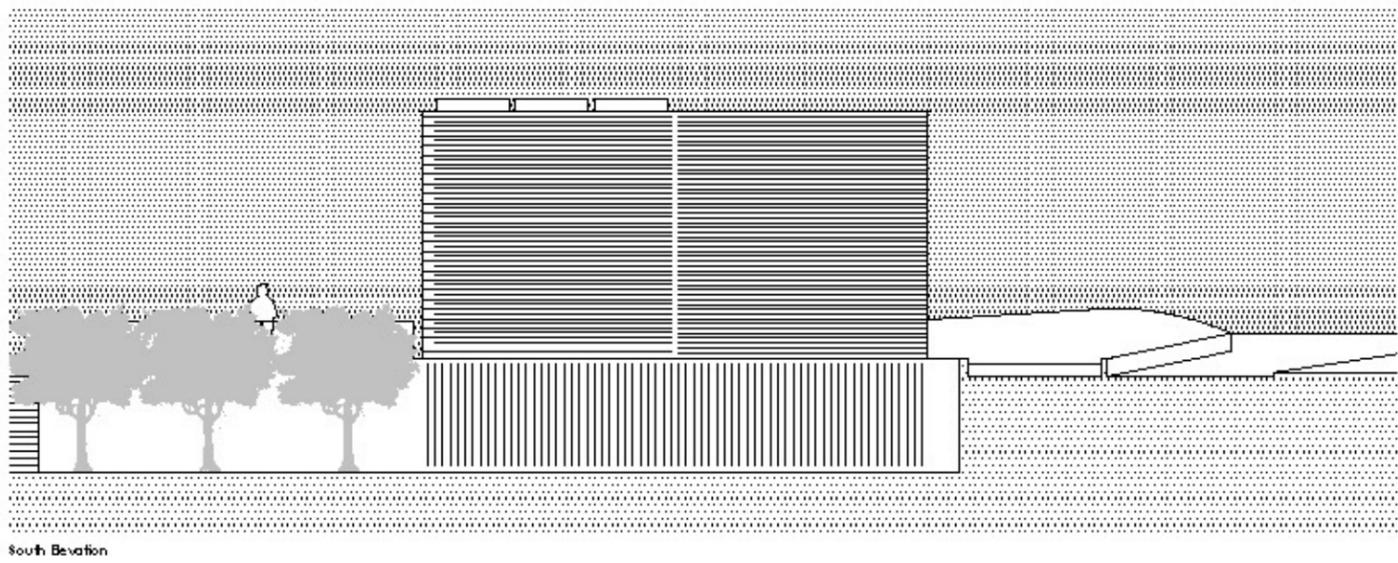
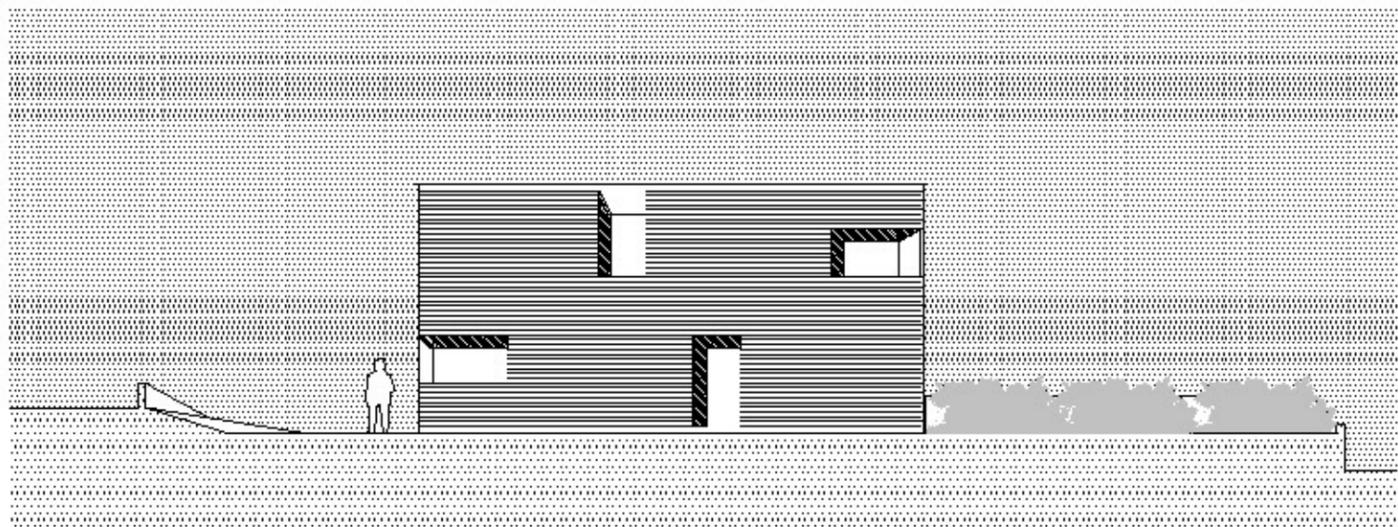
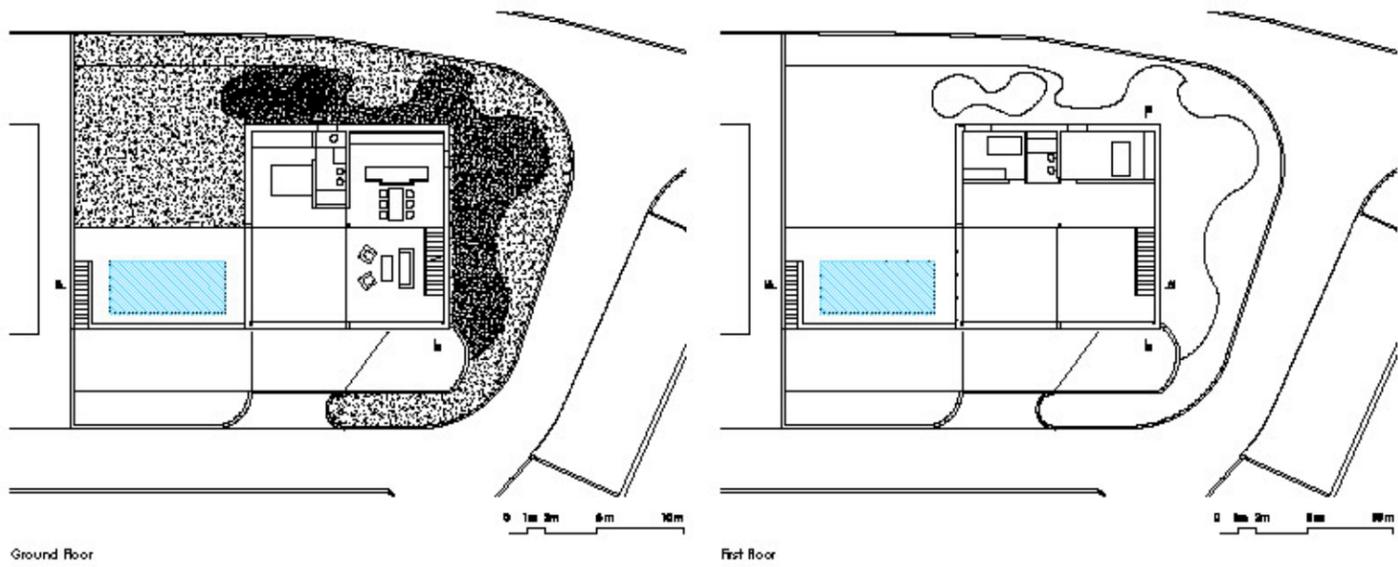


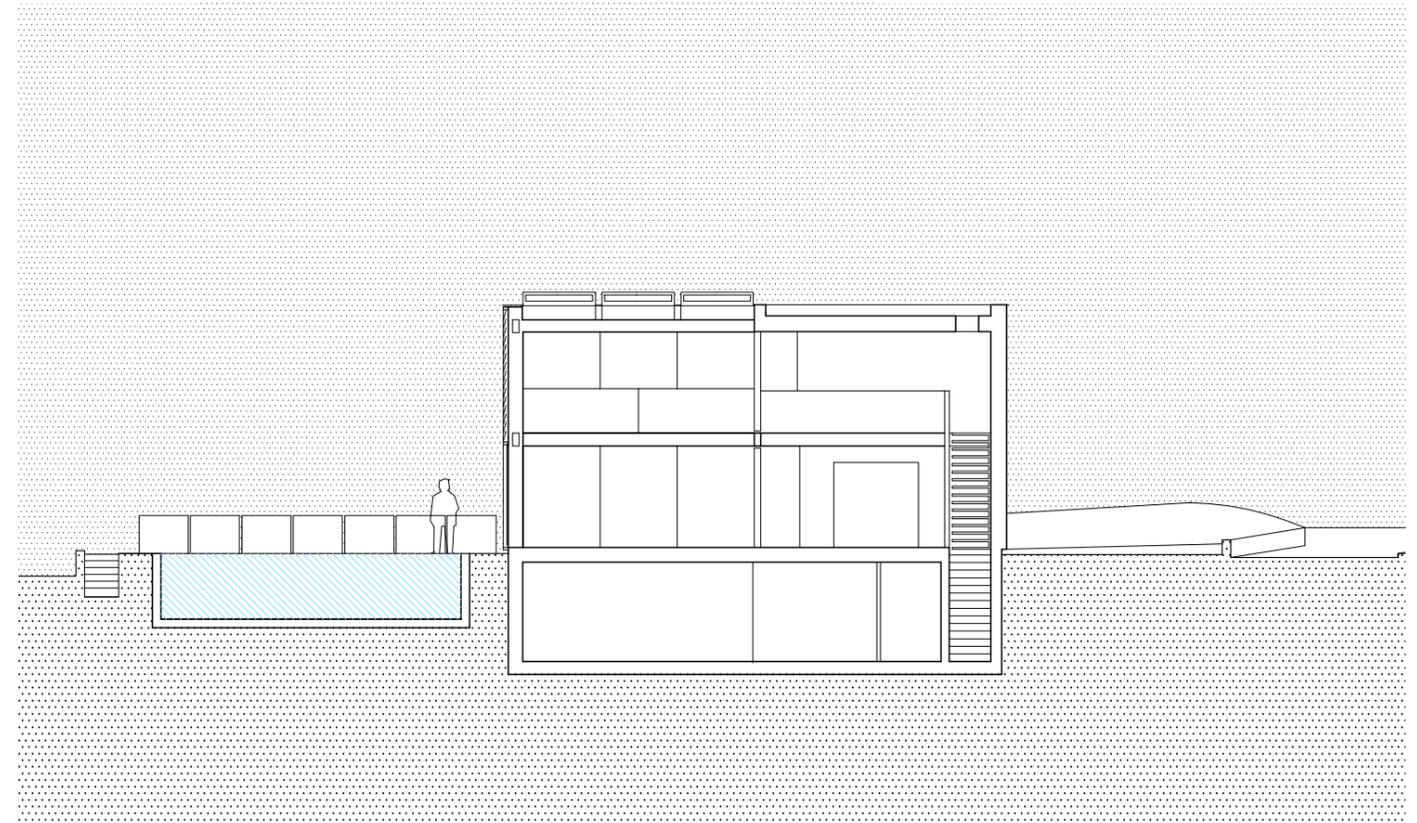


Idea Sketch

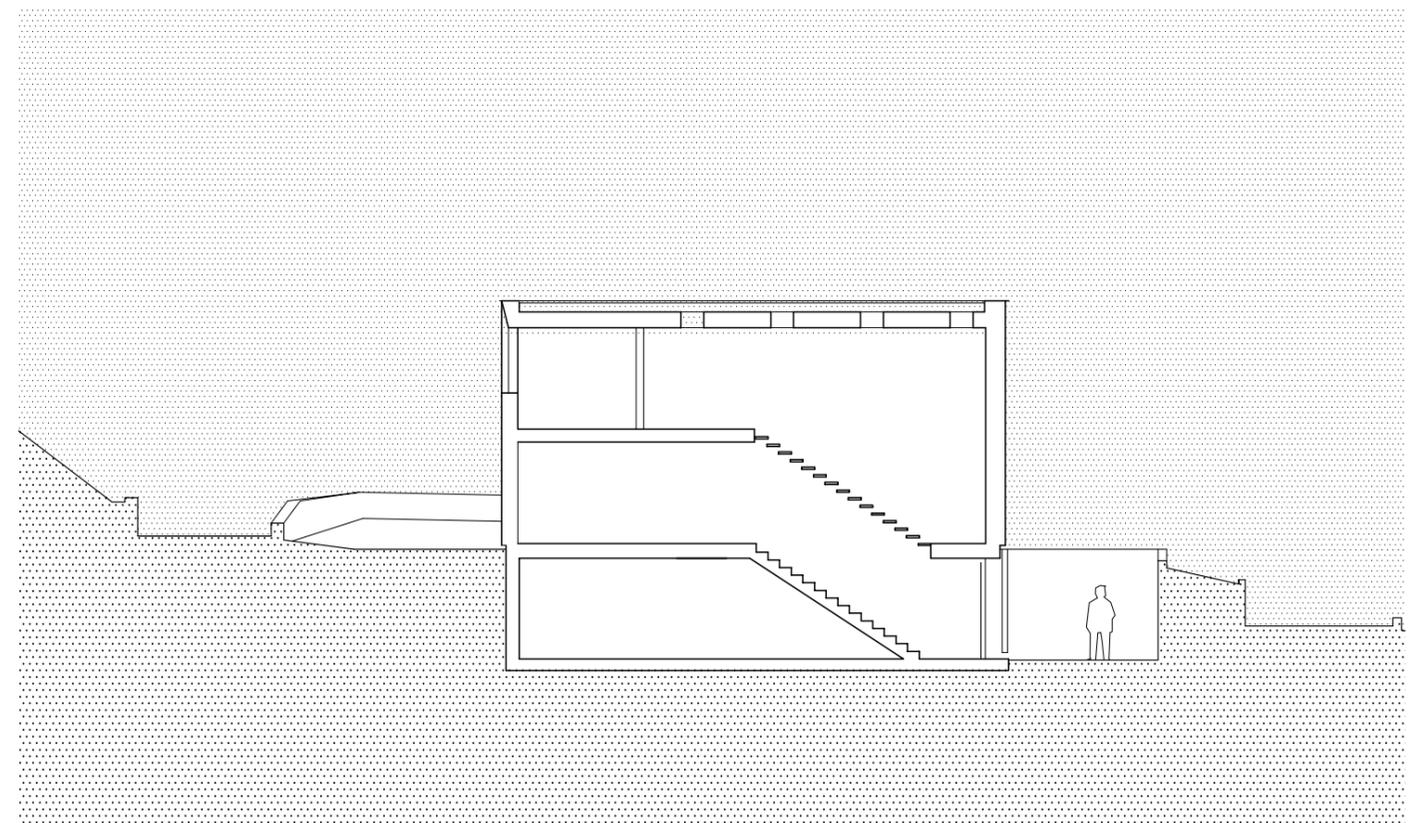


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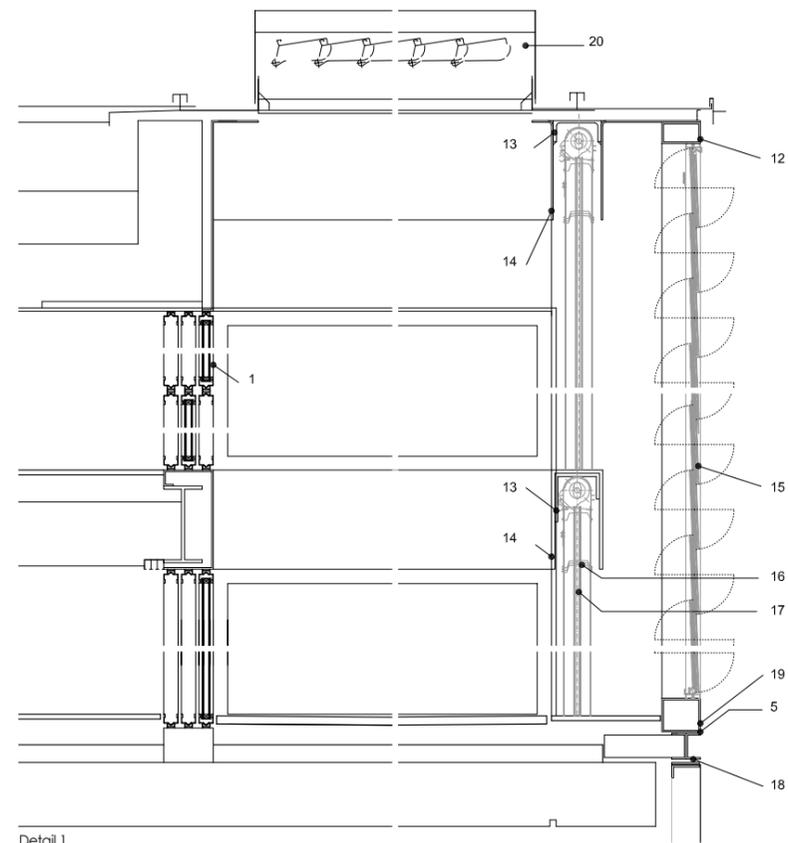




Section A-A



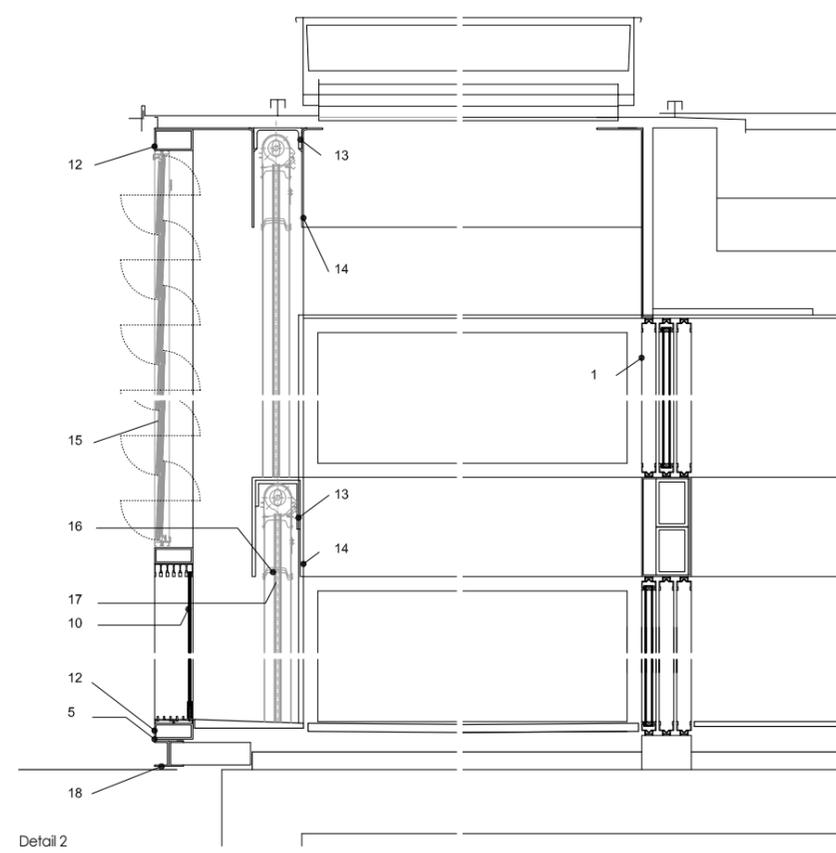
Section B-B



Detail 1

LEGEND

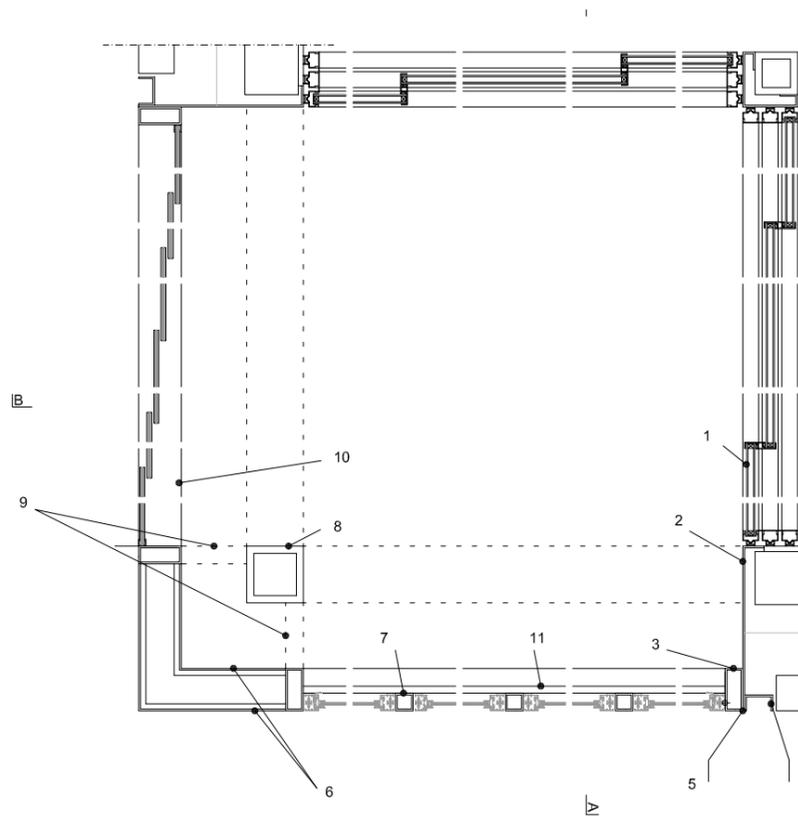
- 1 SLIDING GLASS WINDOWS TYPE VITROCSA 3001 FRAME ALUMINIUM ANODIZED
- 5 ANTI OXIDATION LAYER
- 12 ALUMINIUM PROFILE ANODIZED
- 13 STRUCTURAL STEEL "U" PROFILE
- 14 STEEL COVER TOOL RAL 9006
- 15 ELECTRICAL GLASS LOUVERS TYPE HAHN FRAME ALUMINIUM ANODIZED
- 16 ELECTRICAL ALUMINIUM LOUVERS
- 17 ALUMINIUM RAILS
- 18 "U" STRUCTURAL STEEL PROFILE 80/50 MM
- 19 PROFILE 120/105 MM ALUMINIUM ANODIZED
- 20 SMOKE EXHAUST ELECTRICAL BOXES (LOUVERS) TYPE "COLT"



Detail 2

LEGEND

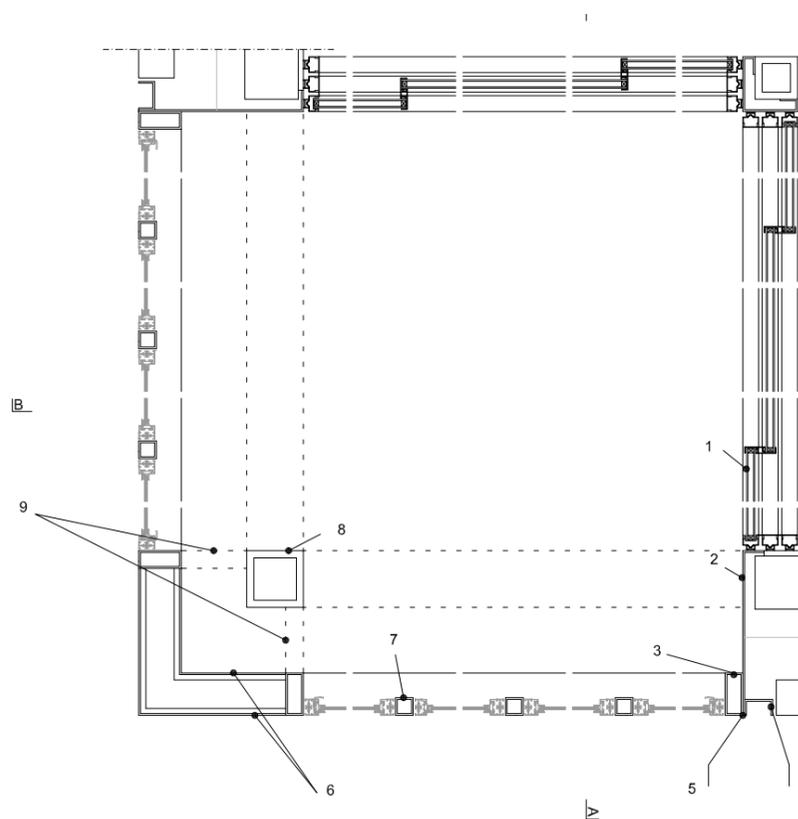
- 1 SLIDING GLASS WINDOWS TYPE VITROCSA 3001 FRAME ALUMINIUM ANODIZED
- 5 ANTI OXIDATION LAYER
- 10 GLASS SLIDING PANELS TYPE AWESO 330 FRAME ALUMINIUM ANODIZED
- 12 ALUMINIUM PROFILE ANODIZED
- 13 STRUCTURAL STEEL "U" PROFILE
- 14 STEEL COVER TOOL RAL 9006
- 15 ELECTRICAL GLASS LOUVERS TYPE HAHN FRAME ALUMINIUM ANODIZED
- 16 ELECTRICAL ALUMINIUM LOUVERS
- 17 ALUMINIUM RAILS
- 18 "U" STRUCTURAL STEEL PROFILE 80/50 MM



Detail 3

LEGEND

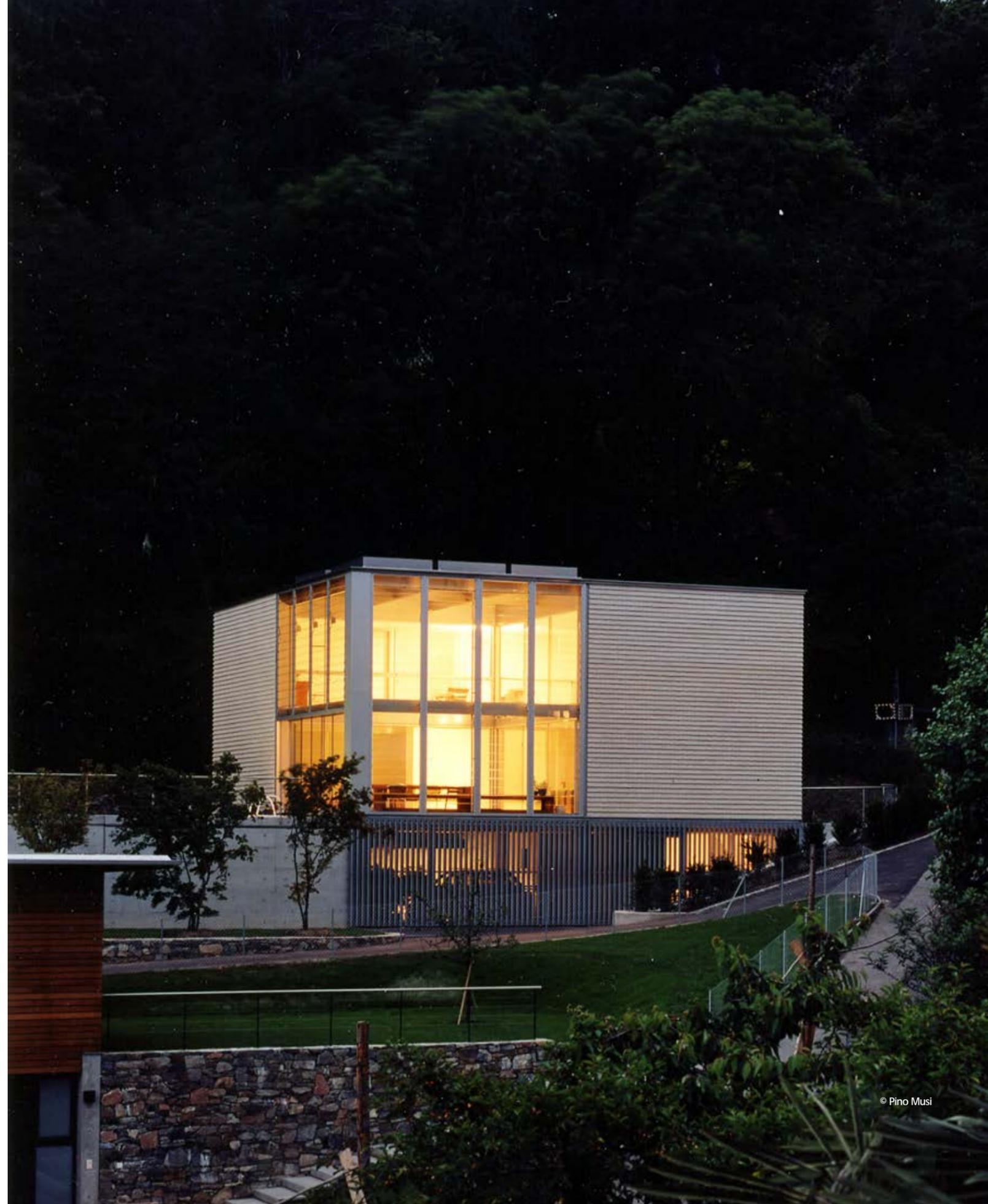
- 1 SLIDING GLASS WINDOWS TYPE
VITROCSA 3001 FRAME ALUMINIUM ANODIZED
- 2 LOWER STEEL TOOL RAL 9006
- 3 PROFILE 50/120 MM ALUMINIUM ANODIZED
- 4 STEEL PROFILE "U" 80/50 MM RAL 9006
- 5 ANTI OXIDATION LAYER
- 6
- 7 PROFILE 50/50 MM ALUMINIUM ANODIZED
- 8 STRUCTURE 150/150 MM RAL 9006
- 9 FIXATION STEEL 20/20 MM RAL 9006
- 10 GLASS SLIDING PANELS TYPE
AWESO 330 FRAME ALUMINIUM ANODIZED
- 11 STEEL PROFILE 20 MM RAL 9006



Detail 44

LEGEND

- 1 SLIDING GLASS WINDOWS TYPE
VITROCSA 3001 FRAME ALUMINIUM ANODIZED
- 2 LOWER STEEL TOOL RAL 9006
- 3 PROFILE 50/120 MM ALUMINIUM ANODIZED
- 4 STEEL PROFILE "U" 80/50 MM RAL 9006
- 5 ANTI OXIDATION LAYER
- 6 ALUMINIUM TOOL ANODIZED
- 7 PROFILE 50/50 MM ALUMINIUM ANODIZED
- 8 STRUCTURE 150/150 MM RAL 9006
- 9 FIXATION STEEL 20/20 MM RAL 9006



Architectural Material Series

To be Continued