(Re)Turn to Stone

by

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My grandmother
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Abstract

In contemporary Armenia, stone is ubiquitous -- from street furniture to the home, from thousands of public water fountains to thousands of medieval churches, from municipal buildings to Soviet housing blocks disguised under stone tiles. Stone is a vital part of the cultural fabric, holding both physical as well as intangible cultural heritage. During a period described as the Dark Age for the Byzantine Empire, Armenian masons developed advanced stone building techniques, producing a rich heritage of religious architecture, much of which still stands today.

However, driven by standardization and efficiency, concrete has largely replaced stone as a structural material, reducing it to veneer surfaces while still tasked with carrying an enormous cultural load. Though the appearance of stone is pervasive, certain stonework techniques are dying out.

The thesis attempts to perpetuate a culture of stone by producing architecture that necessitates those techniques of stonework and re-prioritizes the knowledge of the masons that has been rendered obsolete as a byproduct of standardization.

Situated in my hometown of Sisian, in southern Armenia, the thesis spans the ambiguous seam between the civic and the domestic spheres of my grandmother's house, street, and neighborhood. The outcome is a new cultural fabric of stone that runs all the way from the civic to the domestic, continuous from the curb to the hearth.

Thesis Supervisor: Timothy Hyde
Title: Associate Professor of Architecture

Preface

What follows is a personal journey from western academia to my hometown, in search of things I knew had value but didn't have the tools to see them clearly. A cultural journey of an architecture student searching for a language to understand - in architectural terms - the many stone playgrounds of my childhood. It is also a journey from something called architecture to an embodied craft of stone masonry. A cultural inquiry mediated through conversations with masons. The provocation of the thesis is an ongoing dialogue between architecture as artifact and the embodied skills and techniques that produce the architecture.

The research underlying this thesis was an attempt to understand an existing culture of stone. It involved interviews in Armenia with masons, visits to medieval churches, quarries and stone cutting facilities, followed by remote conversations and my own experiments as a way to understand the techniques at play. This research was the basis for the proposition that this thesis makes for returning to stone, which would not have been possible without the generous funding from the The Marvin E. Goody Award.

Contents

1. Premise

A Culture of Stone

In contemporary Armenia, stone is ubiquitous -- from street furniture to the home, from thousands of public water fountains to thousands of medieval churches, from municipal buildings to Soviet housing blocks disguised under stone tiles. Stone is a vital part of the cultural fabric, holding both physical as well as intangible cultural heritage. During a period described as the Dark Age for the Byzantine Empire, Armenian masons developed advanced stone building techniques, producing a rich heritage of religious architecture, much of which still stands today.

Though the appearance of stone is pervasive, concrete has largely replaced stone as a structural material, reducing it to veneer surfaces while still tasked with carrying an enormous cultural load. As a result, certain stonework techniques are dying out. At stake is the disappearance of specific embodied techniques.


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The Soviet era concrete buildings with stone veneer highlight the cultural importance of stone in Armenia. In this culture of stone, where you build a house for your grandchildren and a church for centuries, stone has embodied the material properties that would enable a lasting architecture. When concrete as a primary structure was introduced, the impulse was to clad it with stone - if only to preserve the cultural imaginary of things being made out of stone.

The insistence on stone veneer was a way of resisting a modernist imposition and reincorporating stone even when it was structurally unnecessary. These buildings demonstrate the cultural impulse and resistance to the complete replacement of stone, as well as a strategy of survival.

St. Hovhannes in Sisian, 6th century.

Masons

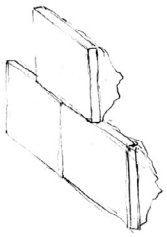
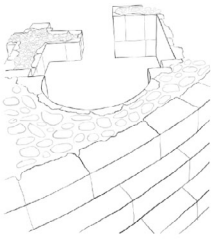
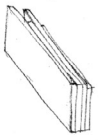
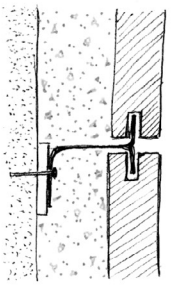
The literature on medieval Armenian architecture focuses on plan typologies and formal descriptions of complex spaces.

What is not discussed is what it takes to produce those forms. What kind of work does it take to build these spaces? What kind of skill and technique is required to cut a block of stone in a certain way? What is the method of assembly of given elements? What does it take to sustain that knowledge? At stake is the disappearance of specific embodied techniques - knowledge embodied by the mason, that cannot be abstracted into architectural drawings. Formal studies fail to acknowledge the fact that this knowledge is inextricably tied to one's body.

By focusing on the embodied knowledge of the masons who produce this architecture, I suggest deprivileging architectural objects, and seeing it as the outcome of the work of the masons.

	Mason	Site	Tools
Պատաքար / wall builder /			
Քարտաշ / stone carver /			
Շինարար / worker /			

We can understand this culture of stone as a matrix of three distinct types of masons who embody three distinct relationships between stone and architecture.

Language	Unit of stone	Technique	
	 600 lbs	 միդիս / midis /	
	 3000 lbs		
	 45 - 70lbs		

Instead of reinforcing existing hierarchies of master masons versus construction workers, skilled versus unskilled laborers, The thesis sees the distinct types of masons as equal players in the culture of stone.

Պատշար
/ wall builder / constructs or restores stone buildings

Harutyun Samsonyan (left)
Andranik Karapetyan (right)

Քարտաշ
/ stone carver / carves monolit
that range from tombstones to

Babik

hic ornamental cross-stones,
water fountains.

Շինարար
/ stone cutter, stone layer / cuts or clads stone at a construction site

Ararat Mikaelyan

How does the nature of the work change depending on whether you are restoring an old church or working on cladding?

"You see, when you are cladding, it's like eating borscht every single day. Whereas here, today you are eating a meat soup, the next day is borscht, and the other day might be a different soup. It's interesting. You don't get tired while working. You are thinking the whole time, and it all comes together gradually. And all of a sudden you realize that you are done, not noticing how the time went by.

There, you go, do the same thing 50 times, trying to do your 40square meters per day so you can get paid.

Here, it's interesting. Today it's a concave angle, tomorrow it's a convex angle, another day it's curved. The work is always interesting. I am impatient to get to the next place, and figure out how it's gonna work. Then you look and you have set the key stone and you are all done.

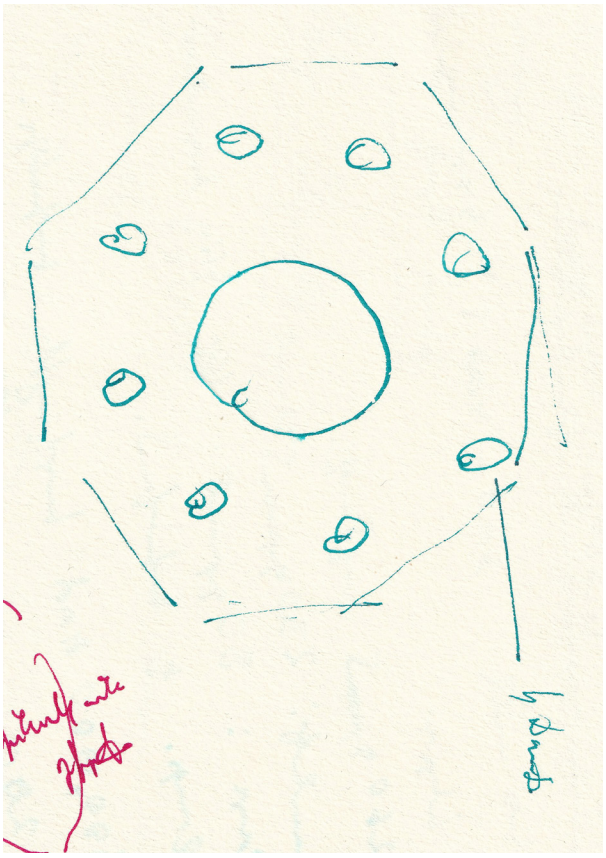
That's where the beauty lies in restoring an old church.

In the new construction, you know what's ahead of you. In the old, when you find a piece of stone, find its place, and use that piece to figure out other relationships, your interest keeps growing. Especially when you find a piece that's maybe half broken and you have to restore it, place it in its original location, make it beautiful while preserving the old, it makes you feel good, because you are appreciating the sweat that this other person has put into the stone before you. There is no need to discard all of that. That's the main difference."

Andranik Karapetyan
June 2021

Could you draw how the vessels were buried inside the dome? It looked like there were multiples of them.

"Yes, there is a big one in the middle and small ones around, like this. They are facing down, and in between you pour the mixture. And small pieces of stones. But light ones, not like basalt, lighter ones - it's porous. Some people use those to scrub their feet. That's the kind of rocks you use in the dome, to be lighter and to conserve on the mortar too."



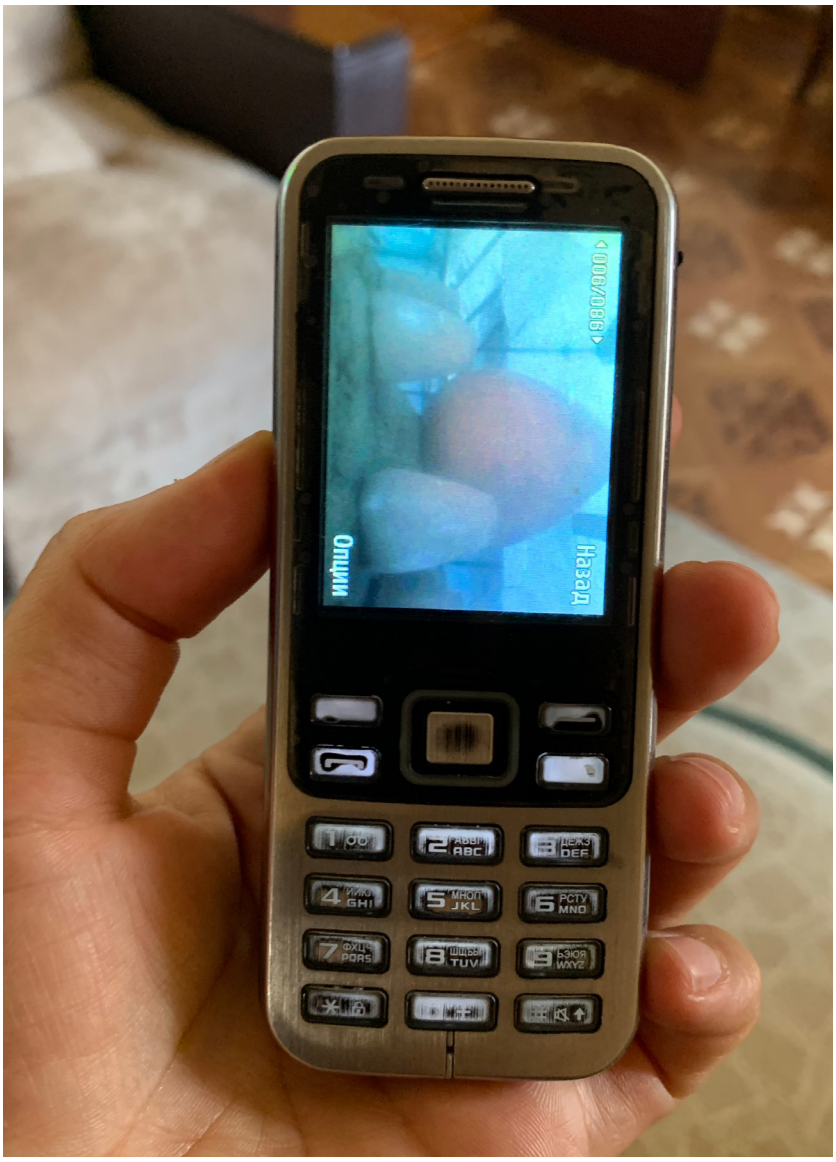


Photo of a photo from the reconstruction of Tatev Monastery, where large ceramic vessels are burred inside the mortar to reduce the weigh of the dome, conserve on mortar, and produce an echoing effect under the dome.


ՀԱՆԳՈՒՅՑ 1
ՀԱՆԳՈՒՅՑ 2
ՀԱՆԳՈՒՅՑ 3
ՀԱՆԳՈՒՅՑ 5 Մ 1:25
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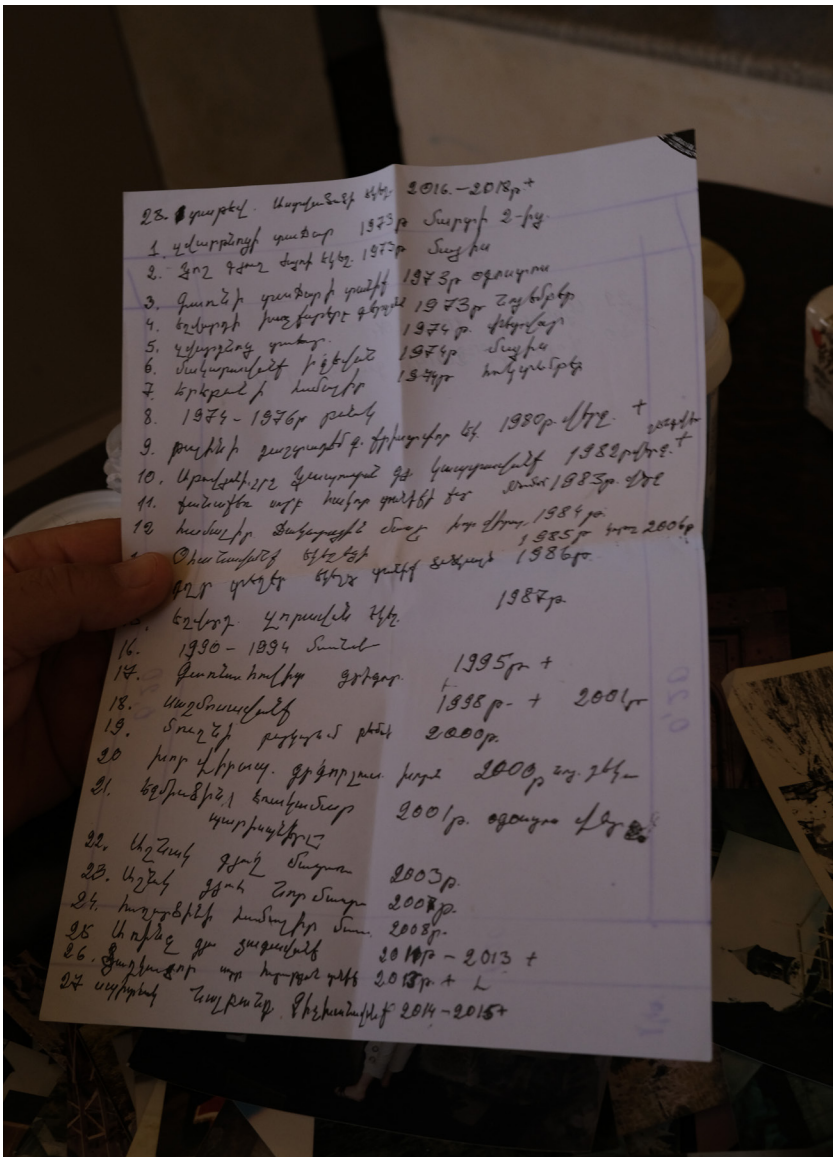
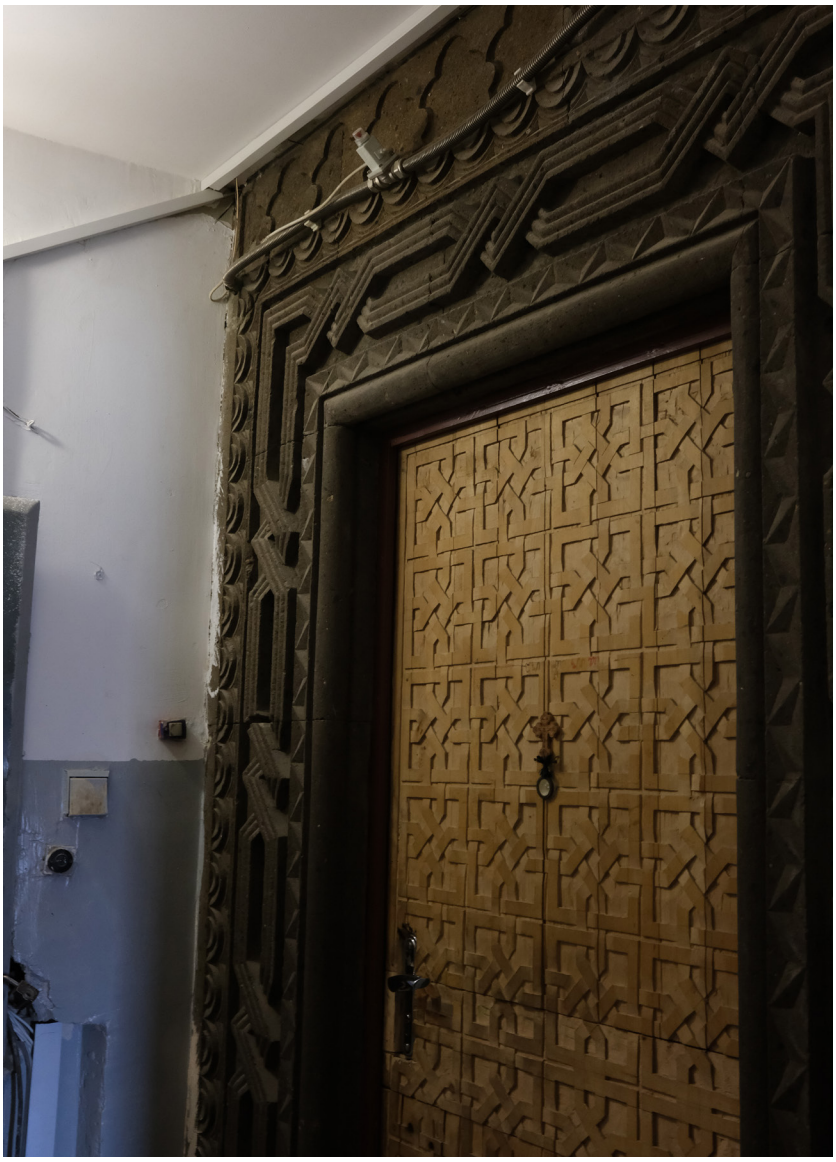


An incomplete list of Andranik's projects in chronological order.



The entrance to Andranik's home in an apartment building.

Babik's workshop overlooking St. Hovhannes.

Stone with polished facing (սրբատաշ) and rough-cut backing (կոպտատաշ). Used for “midis” technique of construction.

Enok (left) & Ararat (right) during a coffee break

Embodied Knowledge

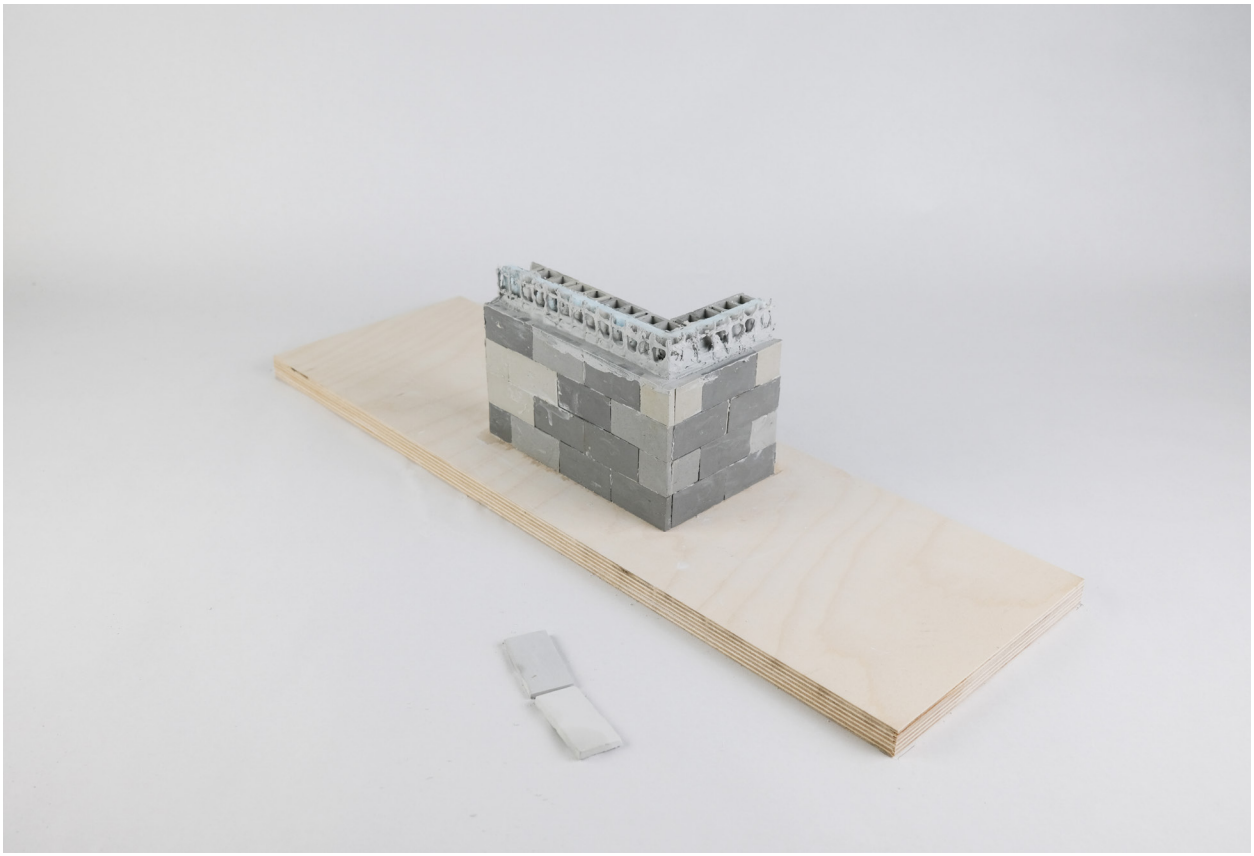
The masons drawing on stone with stone about stone -- highlights the fact that their embodied knowledge cannot be abstracted into a nonphysical form and are attained with and through stone.

The following pages are excerpts from an extended conversation that I have been having with a mason. Through the process of making models – or modeling the process, I attempted to produce an embodied account of the techniques at play. In this exchange, the mason is giving me a piece of theoretical knowledge - in the form of a drawing, which I am enacting in order to acquire an embodied understanding.

What becomes evident in the exchange is the difference between theoretical and embodied knowledge. It is the difference between knowing whether the crevice of the squinch can be built with a single piece of stone or not.

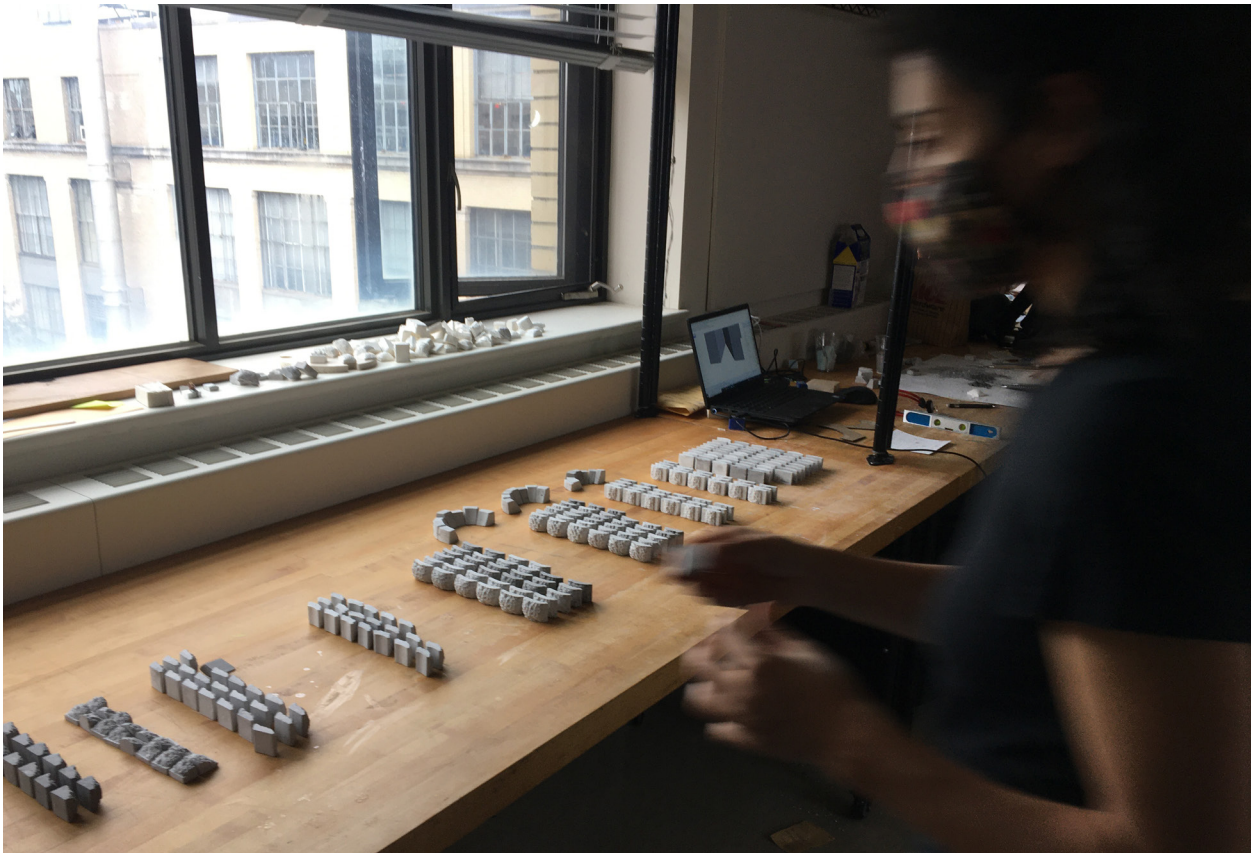
Midis Technique

Two layers of dressed stone are filled with lime mortar and rubble stone to create a structural wall. The stone acts as false formwork during construction. Once complete, it protects the middle layer from the elements, making it a long lasting system. Most buildings prior to the Soviet era were built with the midis technique. However, this method of building is dying out and there are only a handful of masons that hold this knowledge.

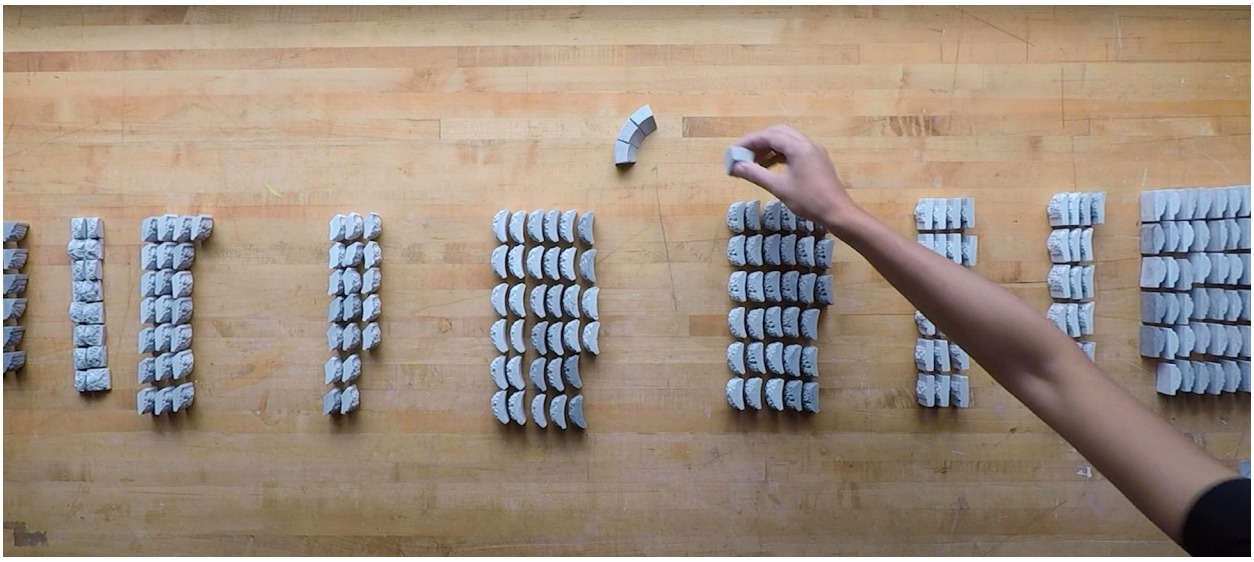


Industrial Technique

Poured concrete or CMU blocks are clad with thin stone tiles. Driven by efficiency and standardization, this has become the dominant way of building in Armenia today. The tendency to think of value only through financial terms, comes at the expense of cultural values, such as building a house that will last for multiple generations.



Carved and cast plaster blocks, in preparation for assembly.



The families of various geometries required for building a portion of a church.

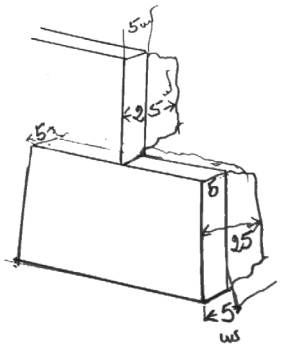
Nare

Good afternoon Varpet Andranik. I've a question.
Roughly, what is the proportion between the rough and the dressed part of the stone?

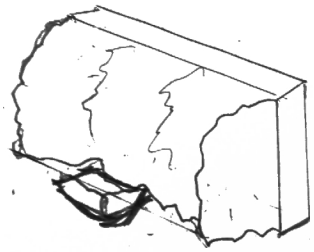
Is the 5cm enough to keep it standing?

Do you carve the tailstone in a specific way or is it a scrap piece of stone?

Varpet Andranik



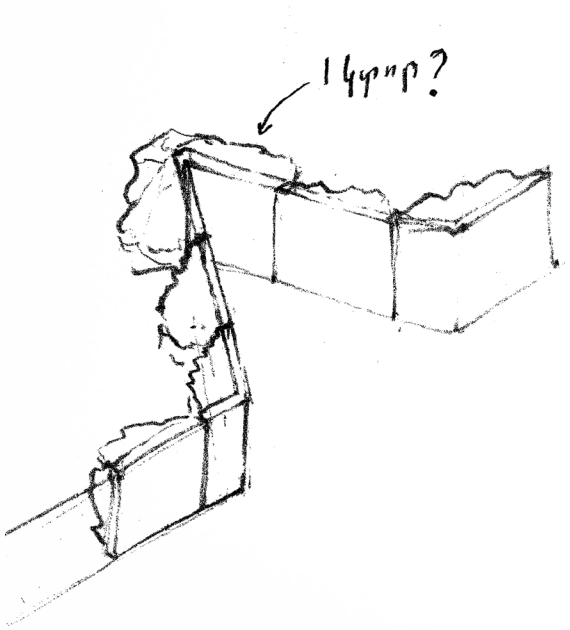
We place what's called a "tailstone" to keep the stone standing.



Just a piece of stone to be placed underneath. That's all.

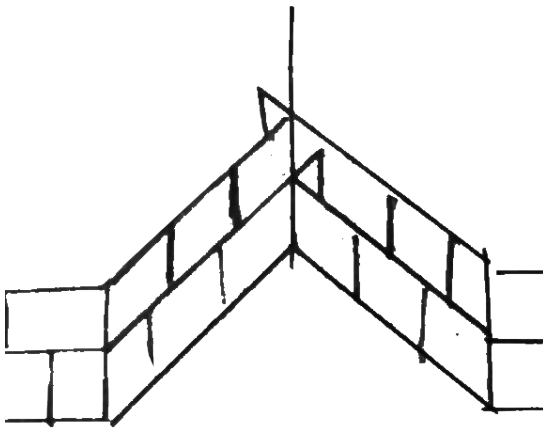
Nare

Is the corner piece of the niche carved from a single piece?

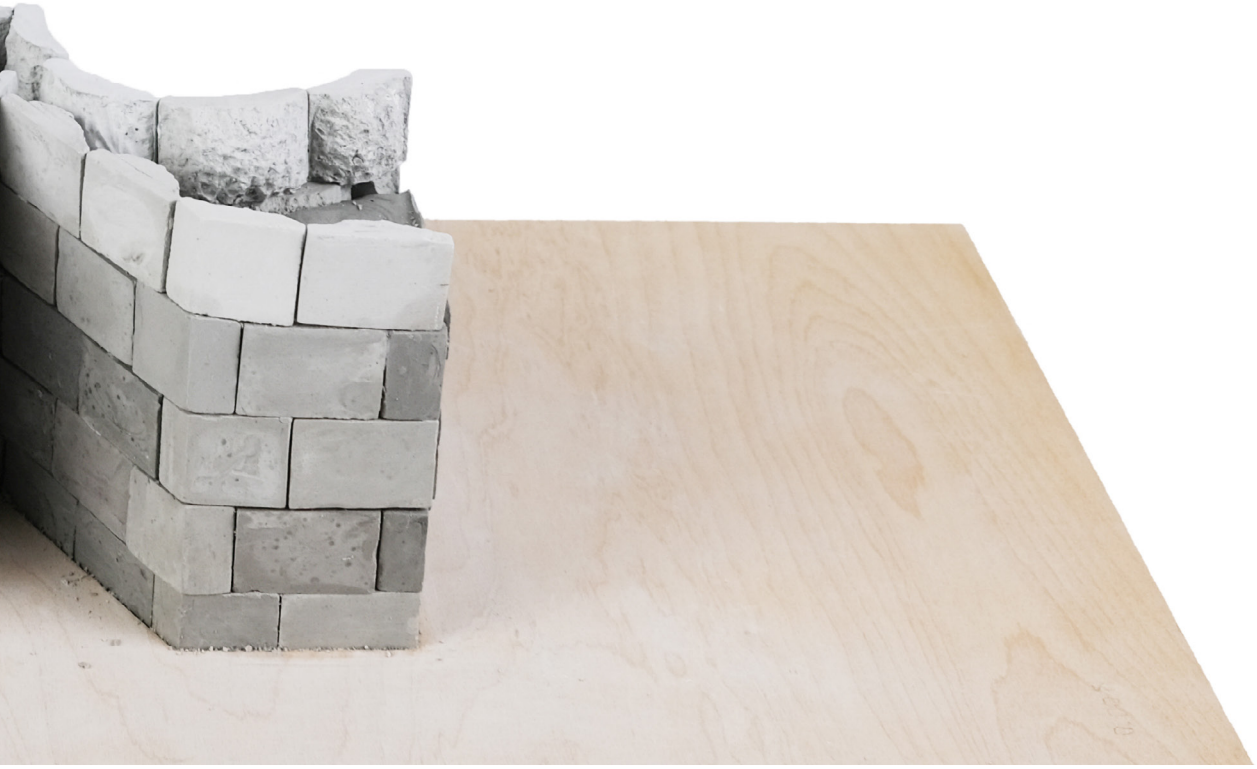


Varpet Andranik

That stone can't be carved from one piece.
It has to be two pieces.



The part that is sticking out, stays in the mortar
as a link.



Nare

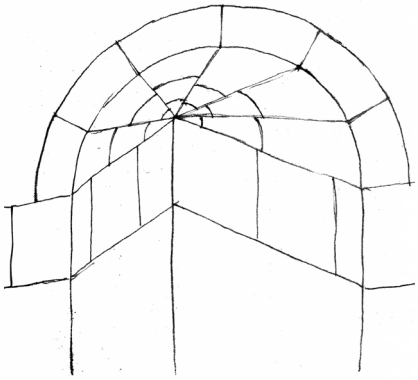
Am I bothering you with too many questions? :)

Varpet Andranik

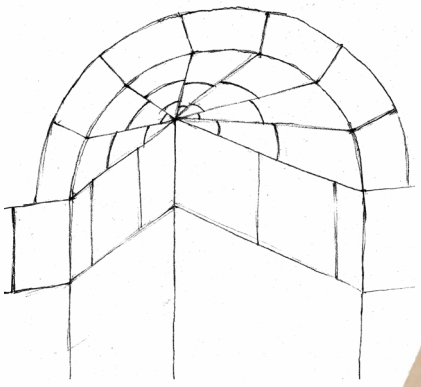
No, it's normal.
You just need to see how a piece of stone is carved, on site, observe everything, to understand if you can place that stone on the wall or not.

Otherwise, just by drawing, you won't get anywhere.

Nare



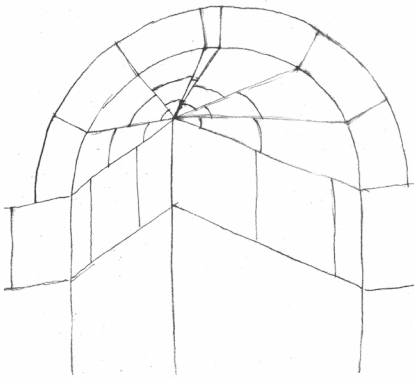
Oh I see. I was just looking at one of the niches from Sisian church. That's why I had drawn with an even number of stones.



Varpet Andranik

The arch of the niche that you've drawn, can't be with 6 stones. It's either 7, 9, 5. It's an odd number. This drawing is wrong.

Meaning, the odd stone needs to be in the middle, the rest around it for it to work.



If you look at it carefully, at the top, they placed a keystone. It's just small. Whatever stone they had at hand, that's what they used. But it does have a keystone.
A 25cm keystone.

Varpet Andranik

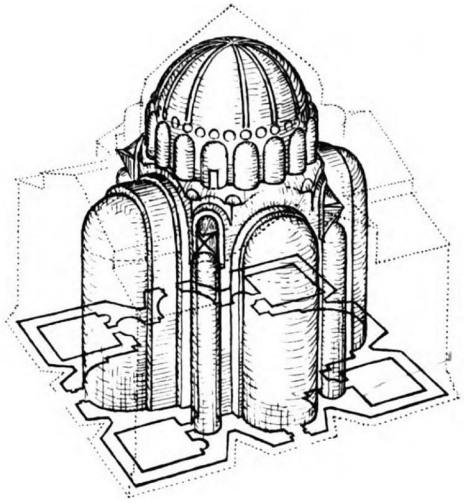
That's right! This is how the arch needs to be.

Characteristic Stonework

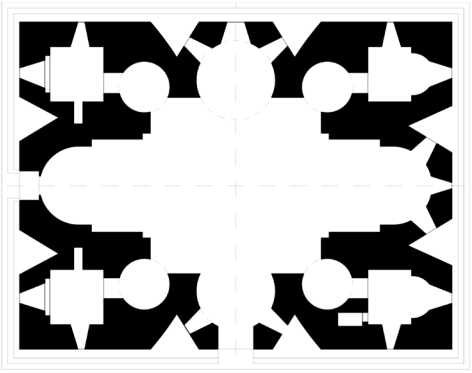
The characteristics of this architecture is directly linked to the techniques of stonework, enacted by the masons.

The midis technique of stone masonry, which consists of two layers of dressed stone sandwiched with mortar and rubble, allow the masons to render interior and exterior surfaces independent from each other. The formal language is the direct result of the logic of the technique itself.

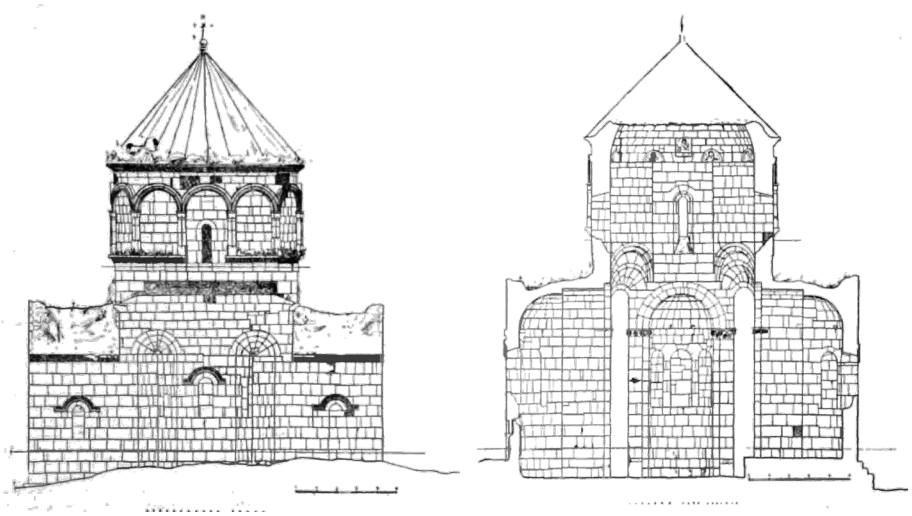
To understand the relationship between the technique and it's spacial and architectural implications, I studied one of the oldest standing examples of stonework - the church of St Hovhannes located in Sisian, built in the 6th century.



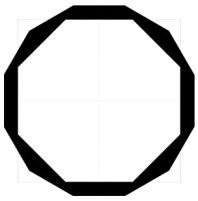
envelope diagram of the church of St Hripsime by Keneth J. Conat



Typical of all structures built with this technique, the interior articulations of St. Hovhannes are disguised under uniform and monolithic surfaces of the exterior. A rectangular contour masks circular, semi-circular, polygonal and more complex forms. The only elements that reveal interior transitions are the squinches - triangular half-conic niches carved from the outside of the wall.



elevation and section of the church of St Hovhannes by Stepan Mnatsakanyan



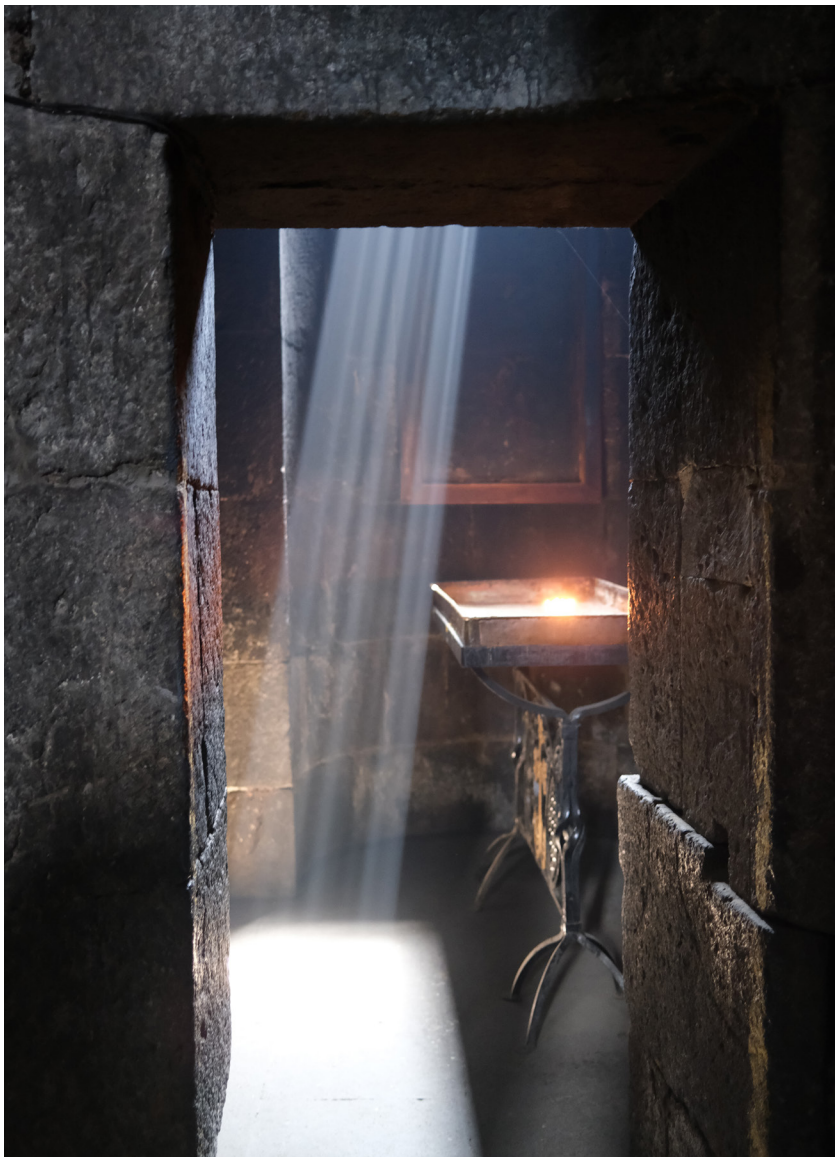
To create a dome on top of a square plan, several geometric techniques are used to facilitate the translations of form and load. In this case, there are four squinches around the corners of the square plan. The squinches then support an 8 sided prism, which is nested inside a 12 sided prism from the outside. The dome is spherical on the interior and conical on the exterior.

During my research in Armenia, I gathered different representations of stone. Some of those representations are architects drawings other are adaptations of those by the masons. They all exist with some level of inaccuracy in relationship to reality.

Another representation of stone is a digital reconstruction of the St. Hovhannes that I produced using photographs. Just like the architect's drawings, the digital model is attempting to get close to the stone, yet remaining inaccurate in its own way.

What the digital model enables is the legibility of the seams of individual blocks, which then begin to reveal the work of the masons - but only to an extend.

The surface fails to convey how a given block of stone was carved, shaped, lifted, held in place or how it is linked to the inner rubble layer of the wall.



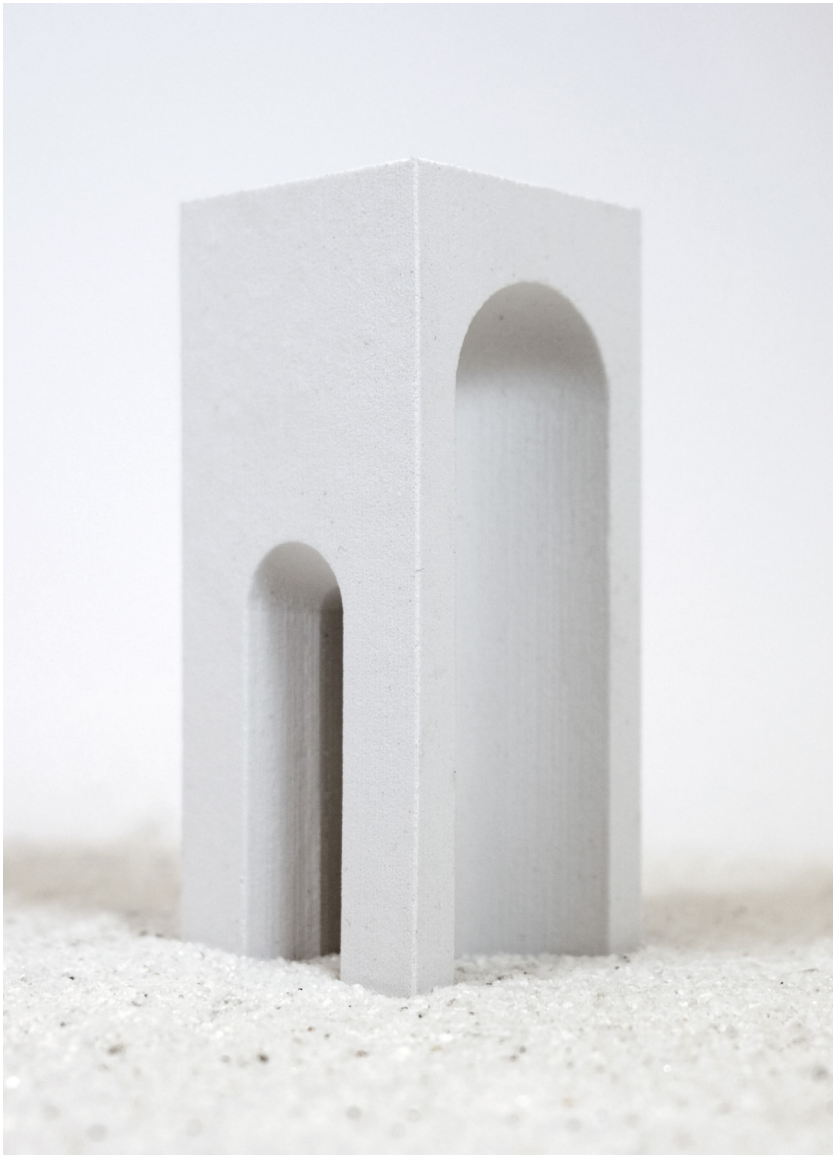
2. Experiments

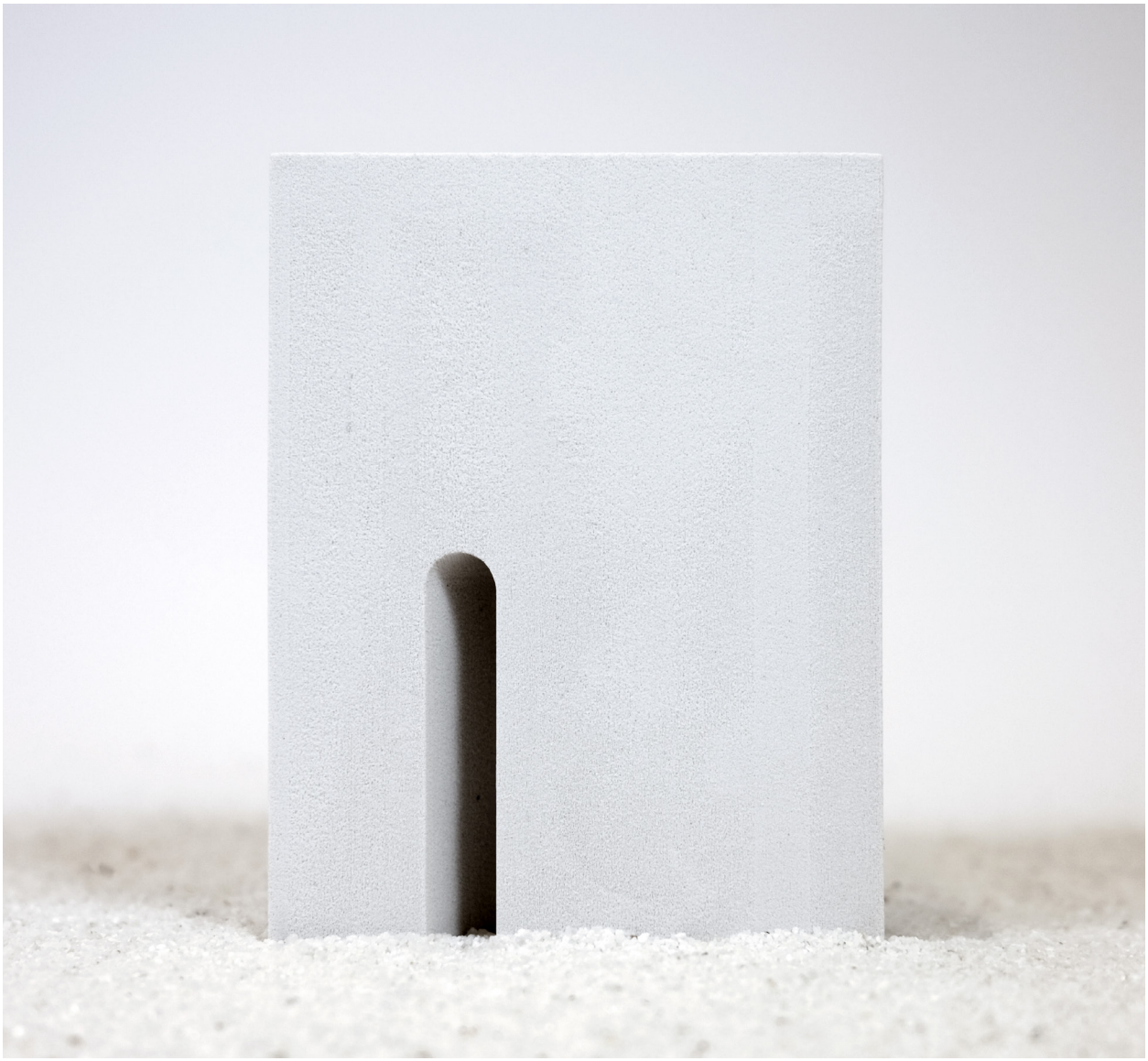
Monuments

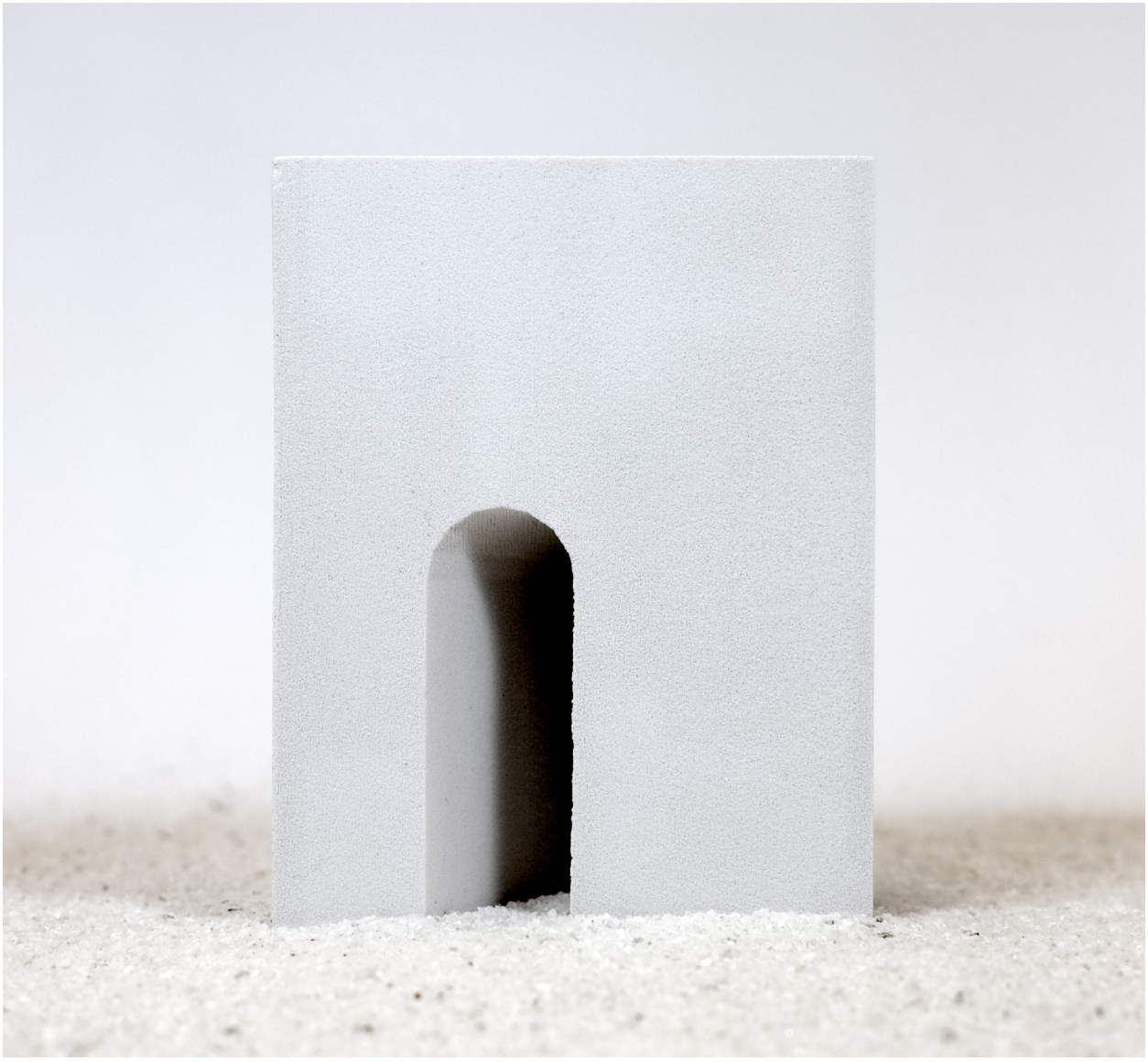
The techniques that are dying out are inherently monumental. The scale of a single block of stone. The proportion of a squinch relative to the human body. The physical labor, knowledge, and skills required to manipulate a heavy material like stone into that form. These are constructions that embody monumentality in the civic sphere.

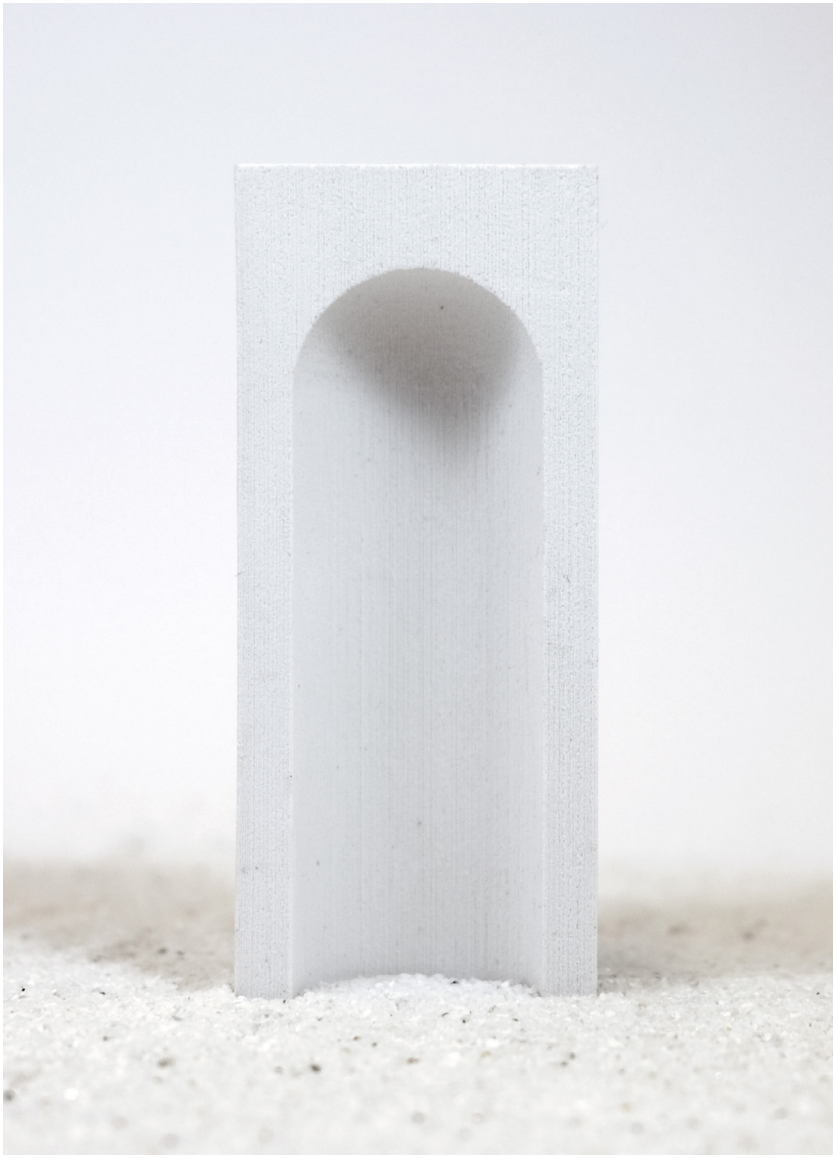
What I'm proposing is an architecture that consists of monuments with embedded domesticity that together produce a house, along a street in a town. The monuments are exaggerations, cognizant of the domestic scale. The outcome is a new unit of construction, which isn't the block of stone, but the monumental element that can produce architecture for various needs. The monuments are units of possibilities.

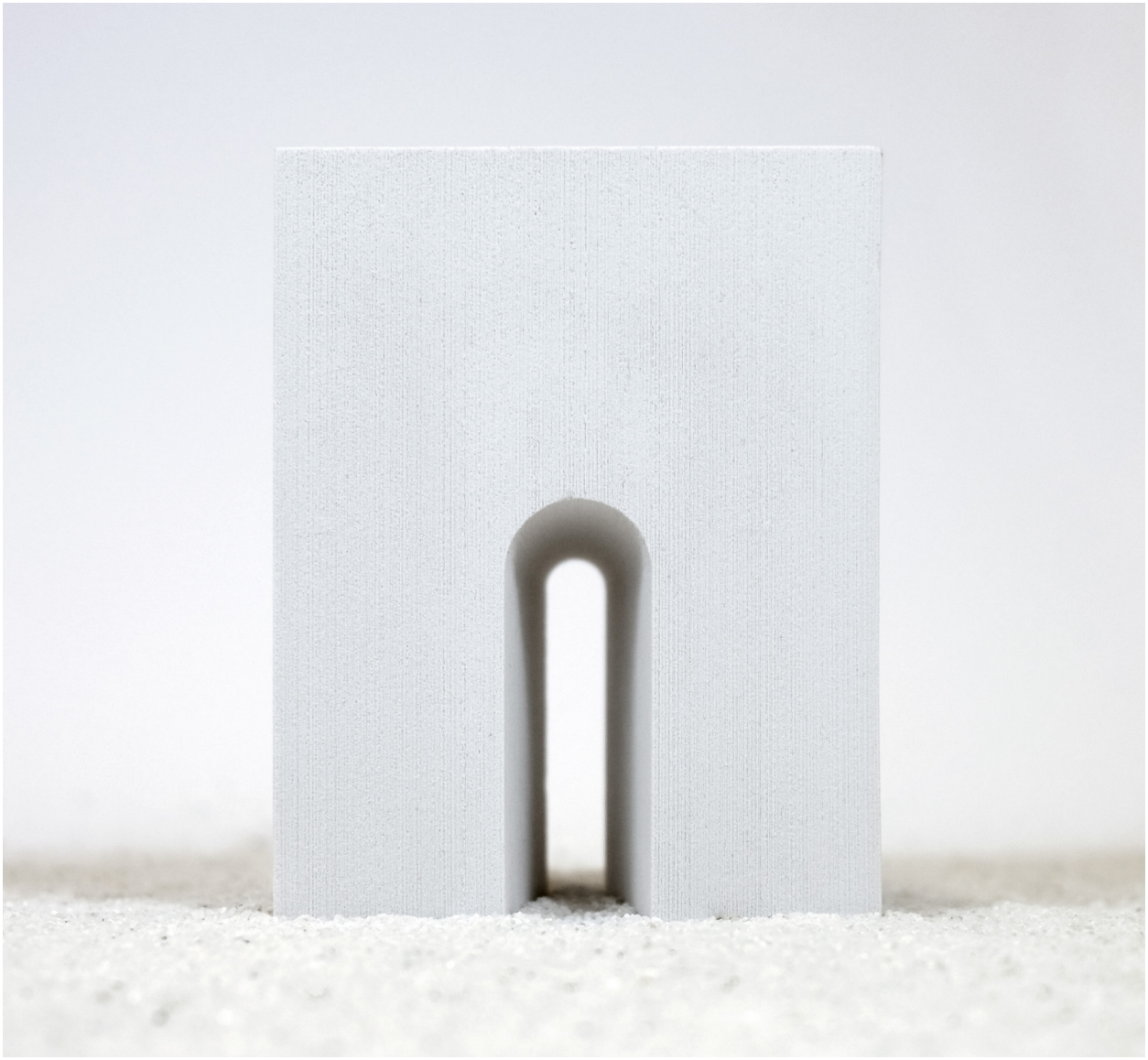
The series of experiments that follow, explore how the typical elements of the church can be altered, reconfigured, and the architectural qualities of the resulting spaces.

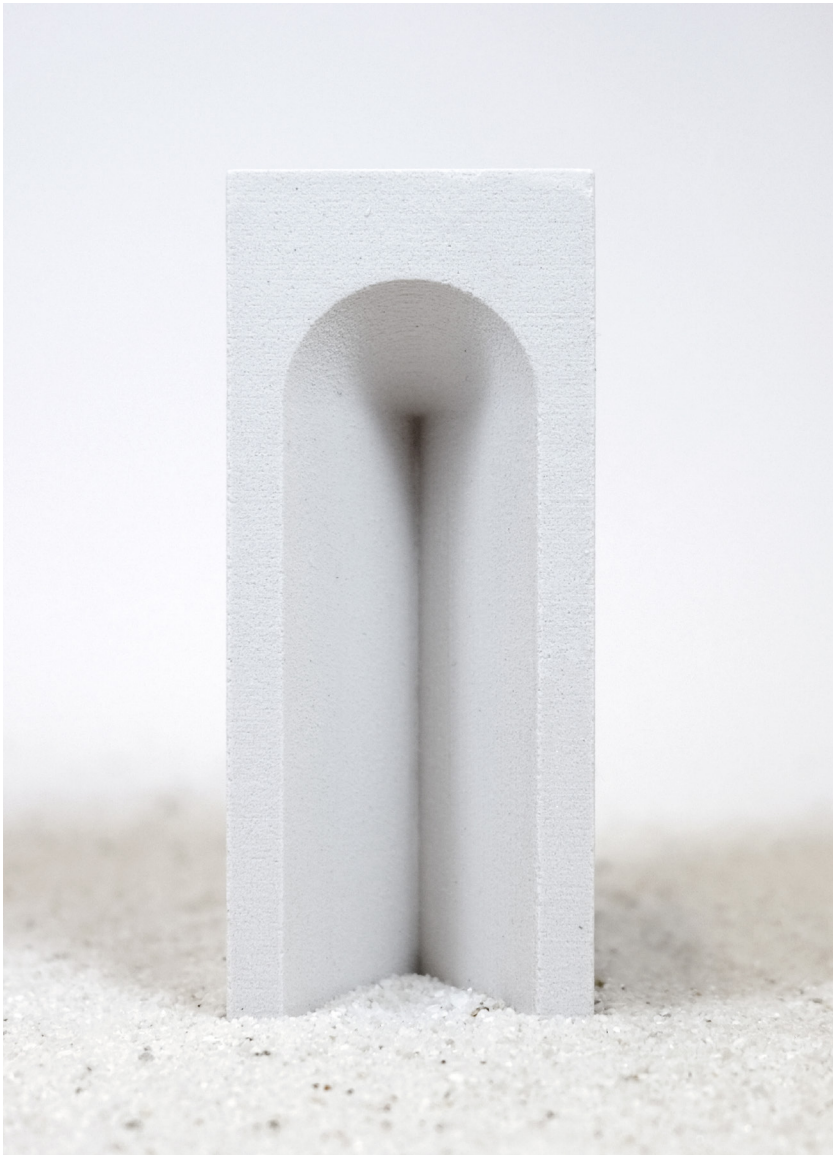


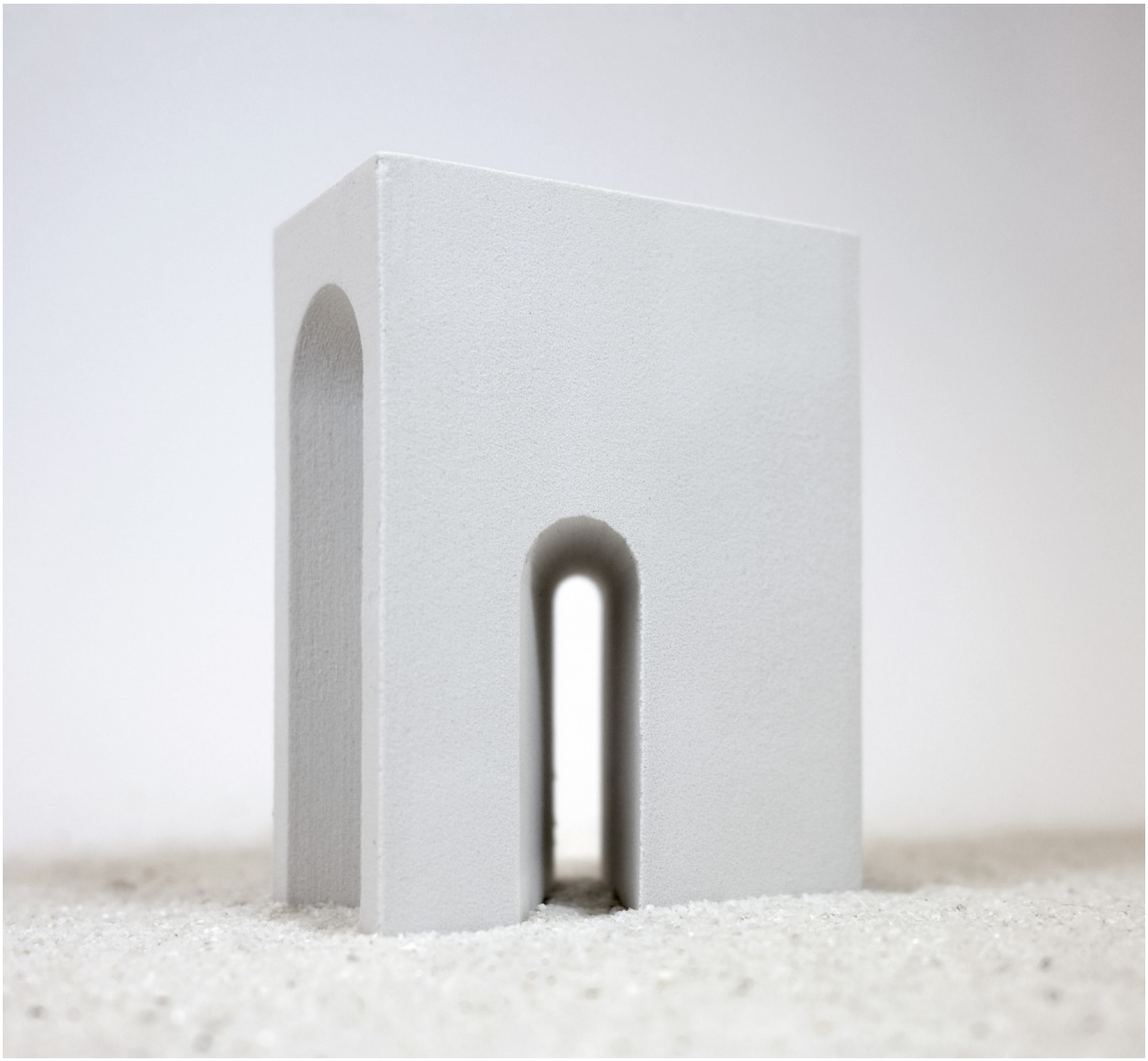




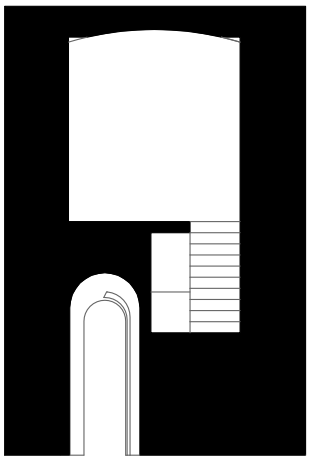


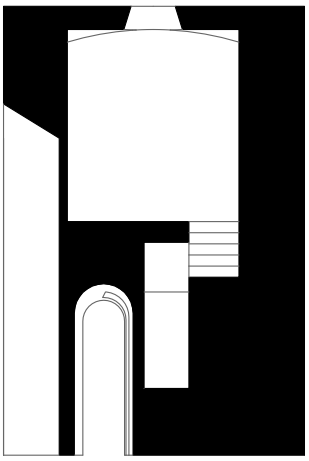


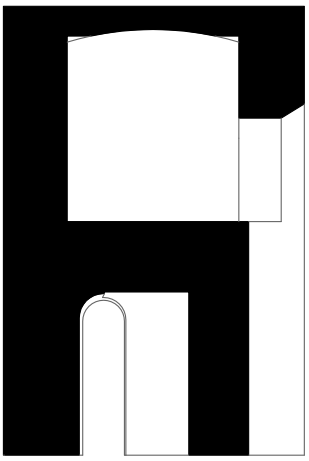


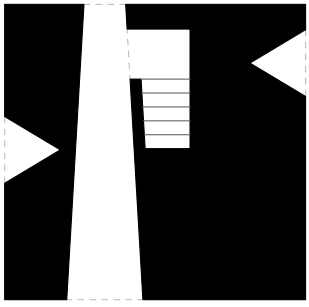


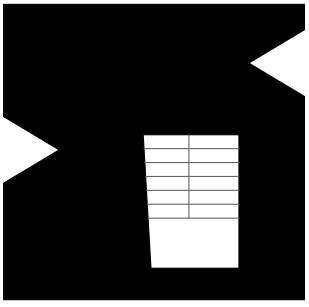
Monument A

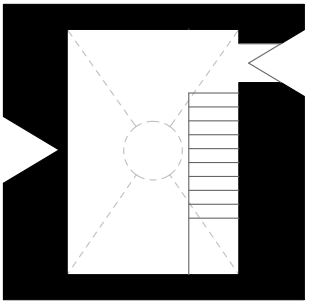


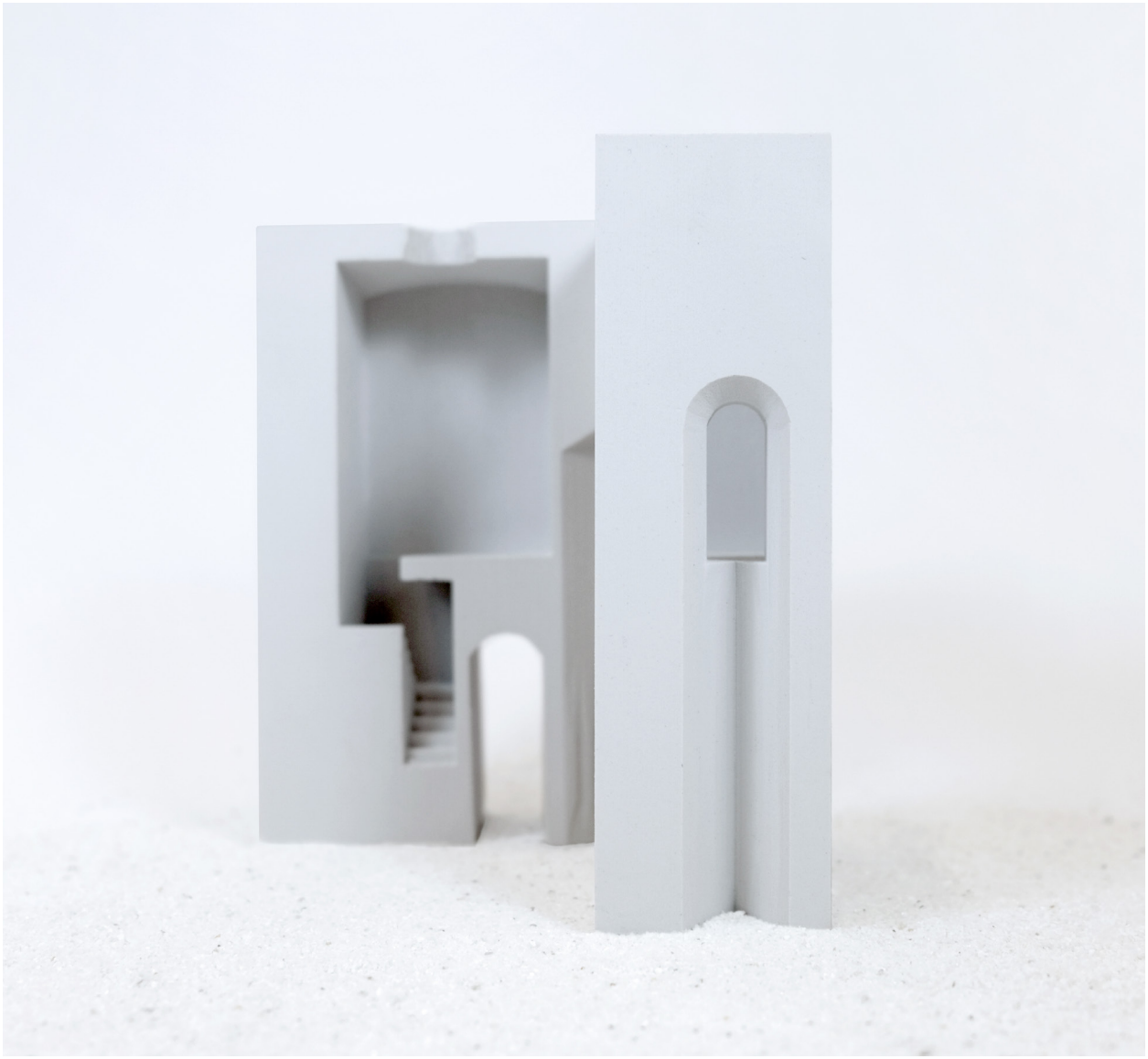




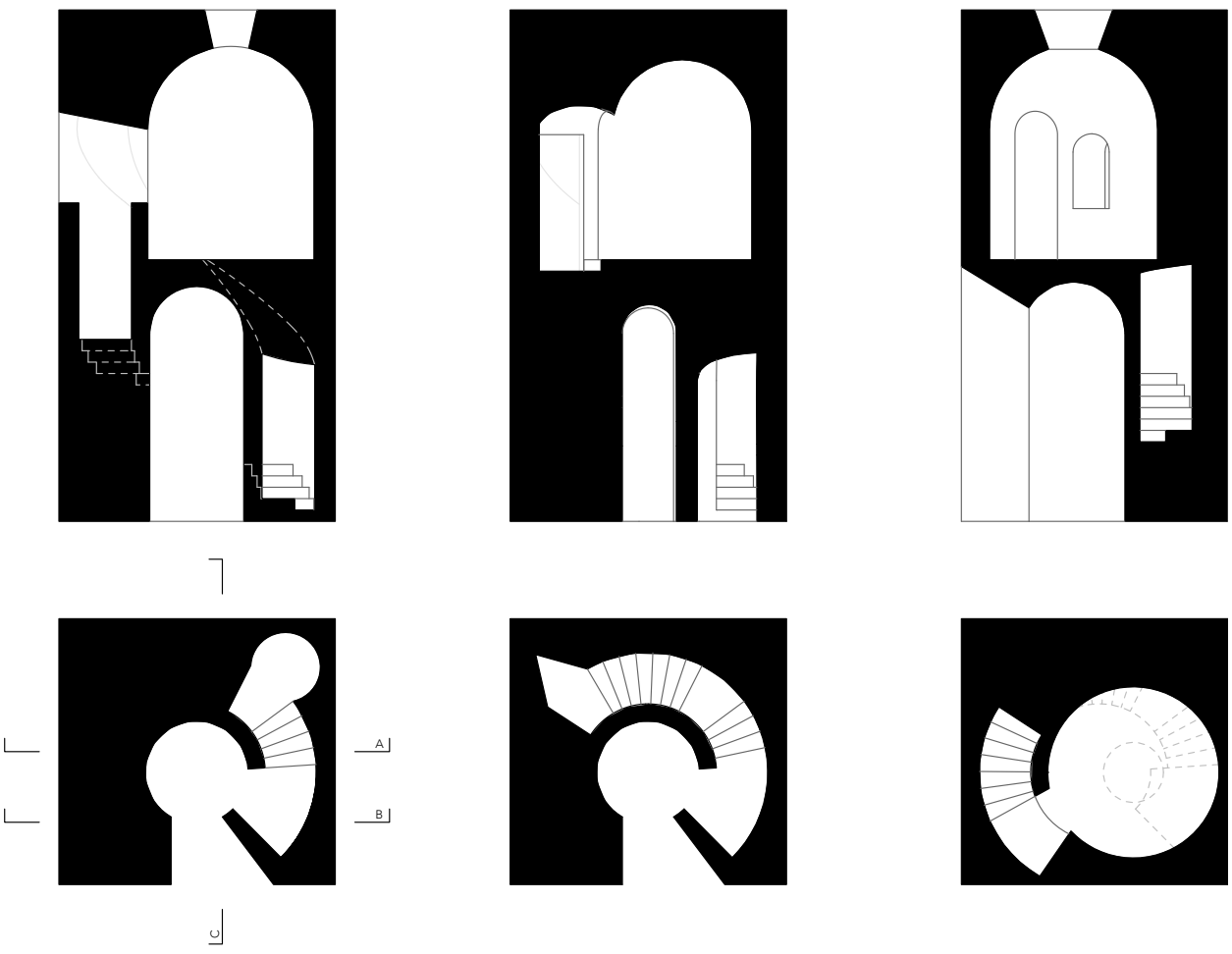




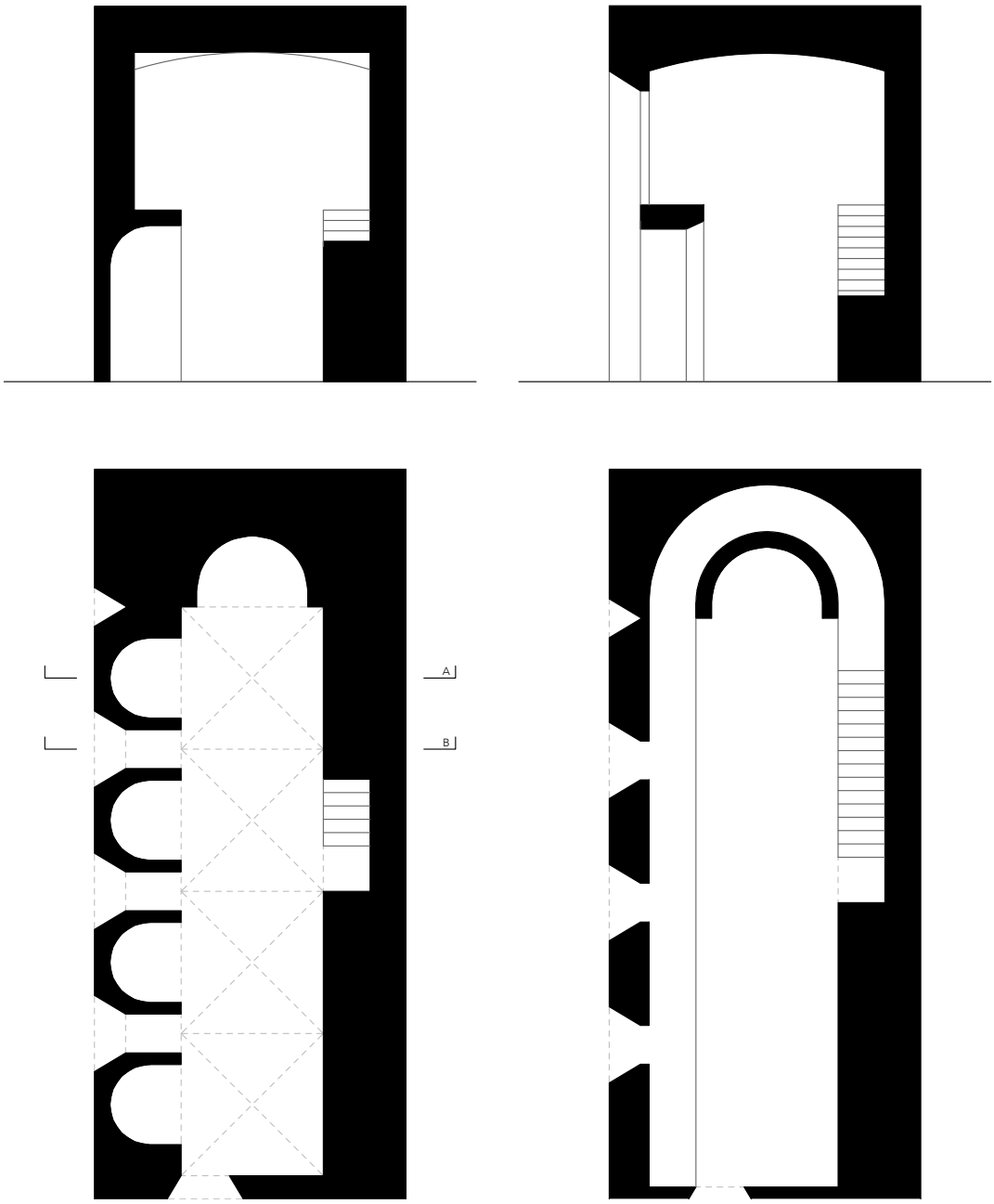


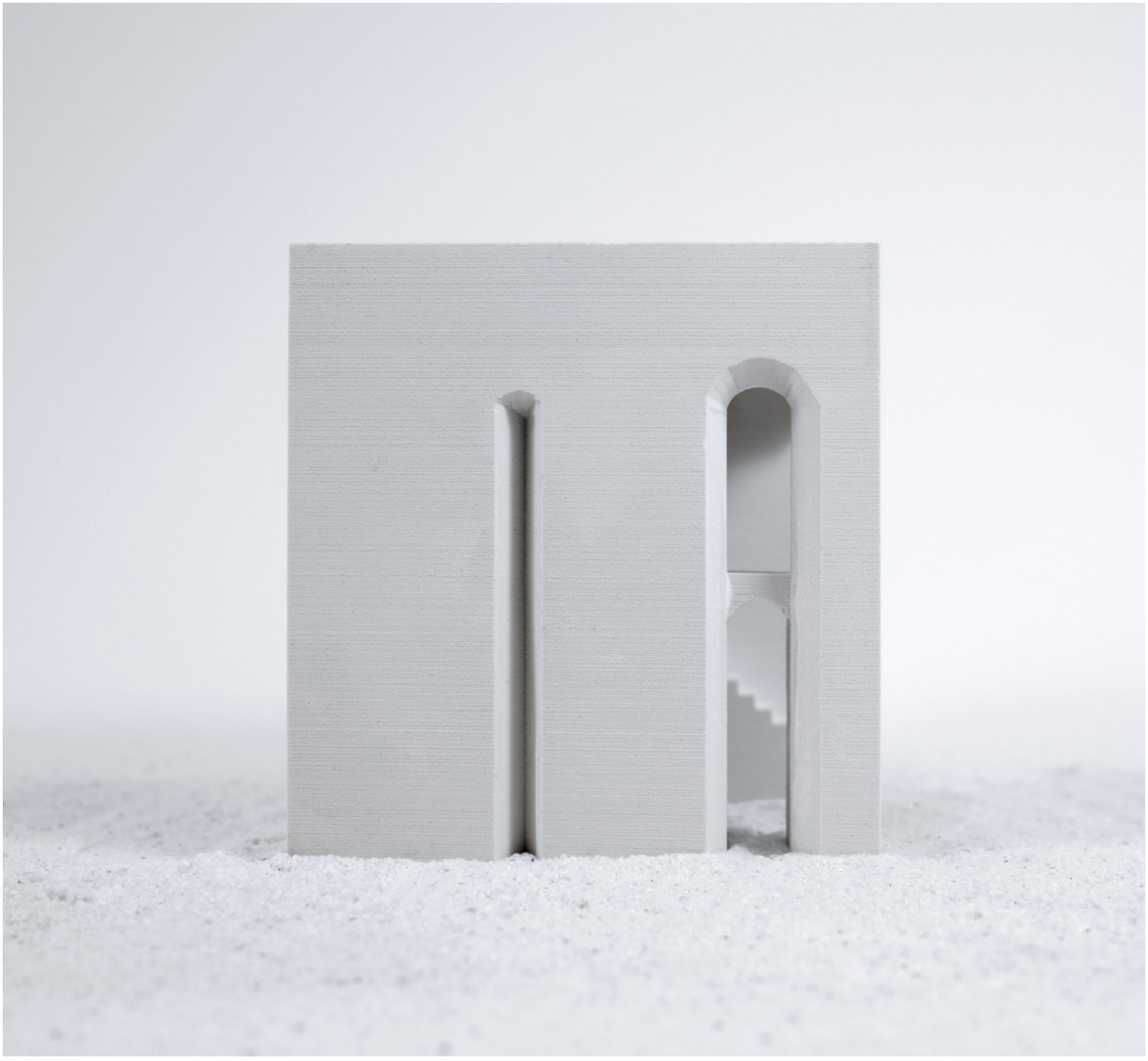


Monument B



Monument C



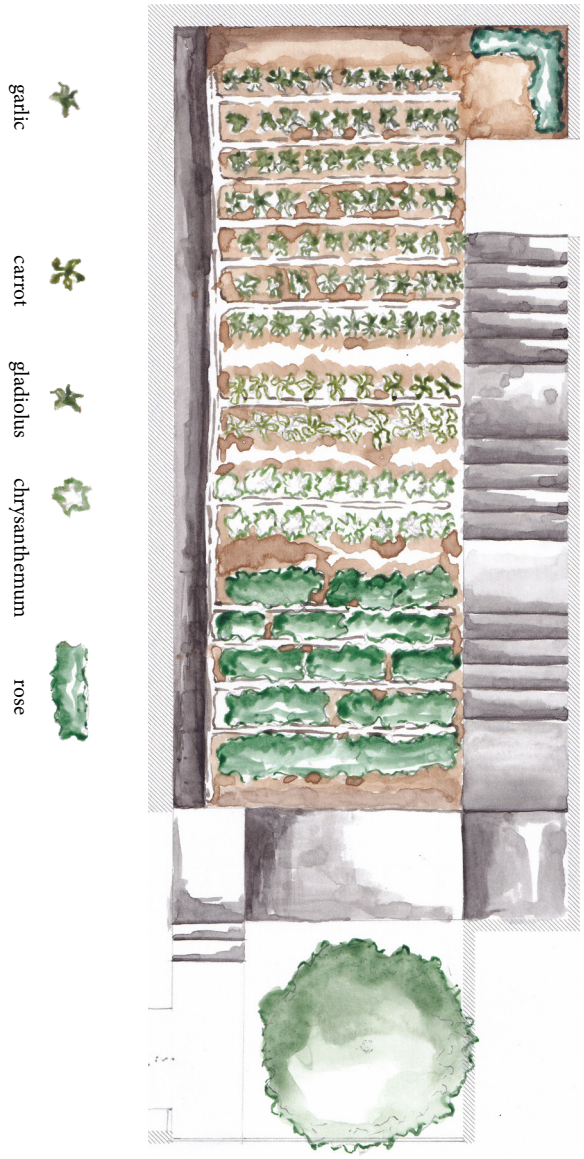


3. Site

The Grandmother's House

How do we carry things forward but also look back? How do we carry things into the future that are not nostalgic, regressive, but allow for adaptations and changes?

The site is my grandmother's house, street and neighborhood, because similarly to the dying technique of stonework, the house requires an accommodation of the past and the future.


garlic
carrot
gladiolus
chrysanthemum
rose

The flower garden and the northern facade of the house are street facing - physically as well as programatically, blurring the edge between what is private and public.

The house in located between two terraced gardens - the flower garden bellow the street level, which then leads you down to the house, which in turn leads you to the vast garden.

The canal, that is used for irrigation, collects underground water and runs through everyone's gardens .


13


13

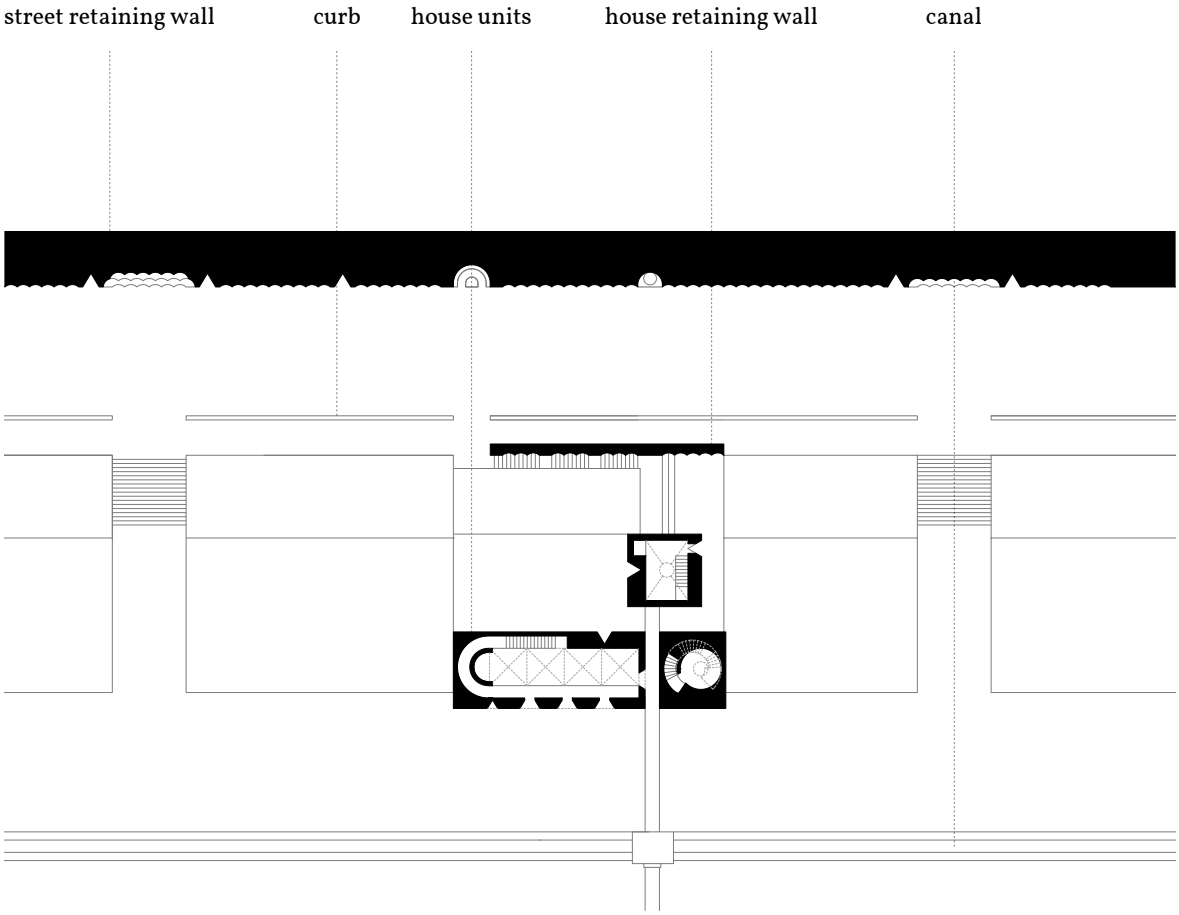
4. Proposal

House of Monuments

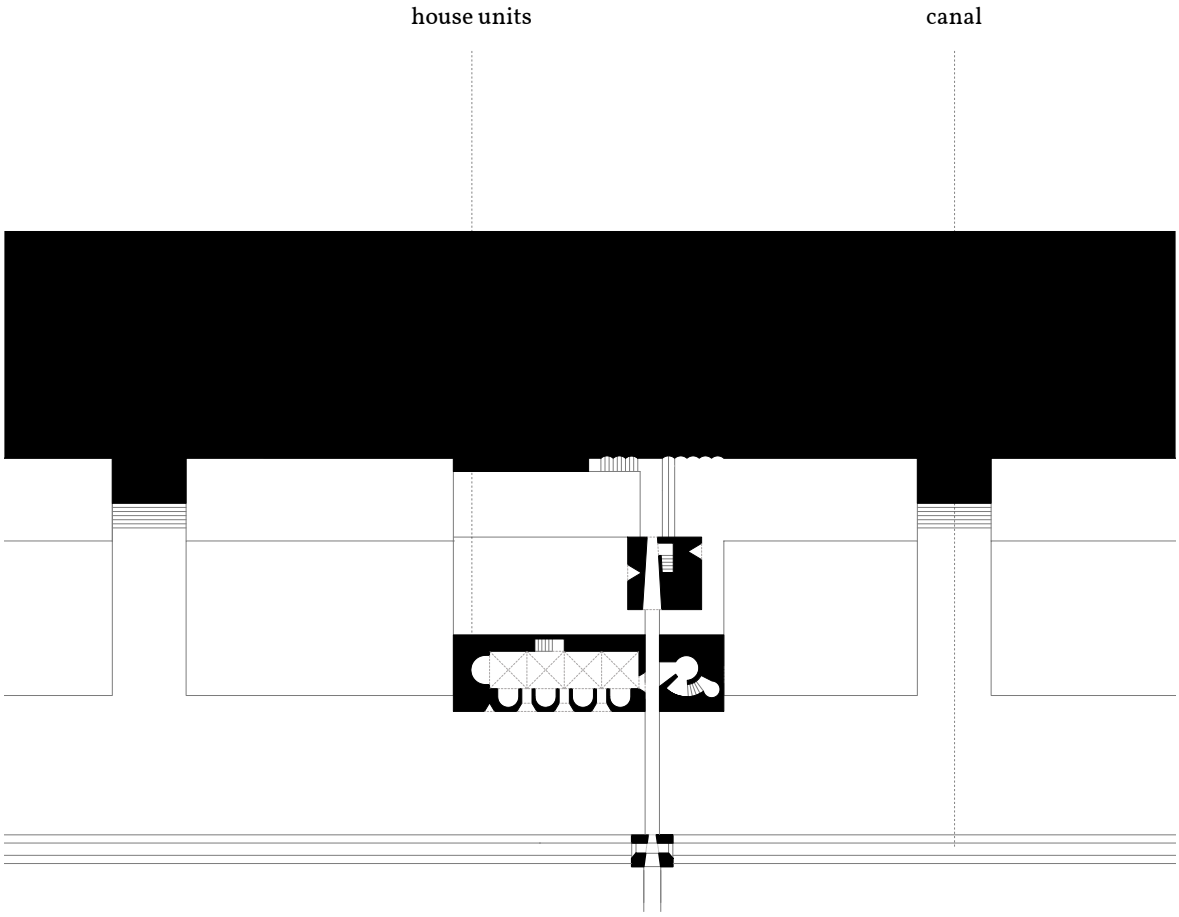
Situated in my hometown of Sisian, in southern Armenia, the project spans the ambiguous seam between the civic and the domestic spheres of my grandmother's house, street, and neighborhood. I'm taking an infrastructural approach, by designing the backbone and allowing the rest to be filled in over time, be partially demolished, and adapted.

The main elements are the street, the retaining walls, the curb, the units that constitute the house, the canal that runs through everyone's gardens. They are placed in relationship to each other and are driven by the need to produce a private that is embedded in the public.

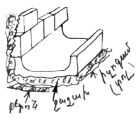
The outcome is a new cultural fabric of stone that runs all the way from the civic to the domestic, continuous from the curb to the hearth. In each of those areas, the monuments I've designed produce deliberate interactions between the collective and individual inhabitants and the techniques of stone building that produce this architecture. Each design intervention results in a singular monument that synthesizes multiple forces, where stone is simultaneously a cultural, structural, spatial and thermal condition.



Street level



Ground level

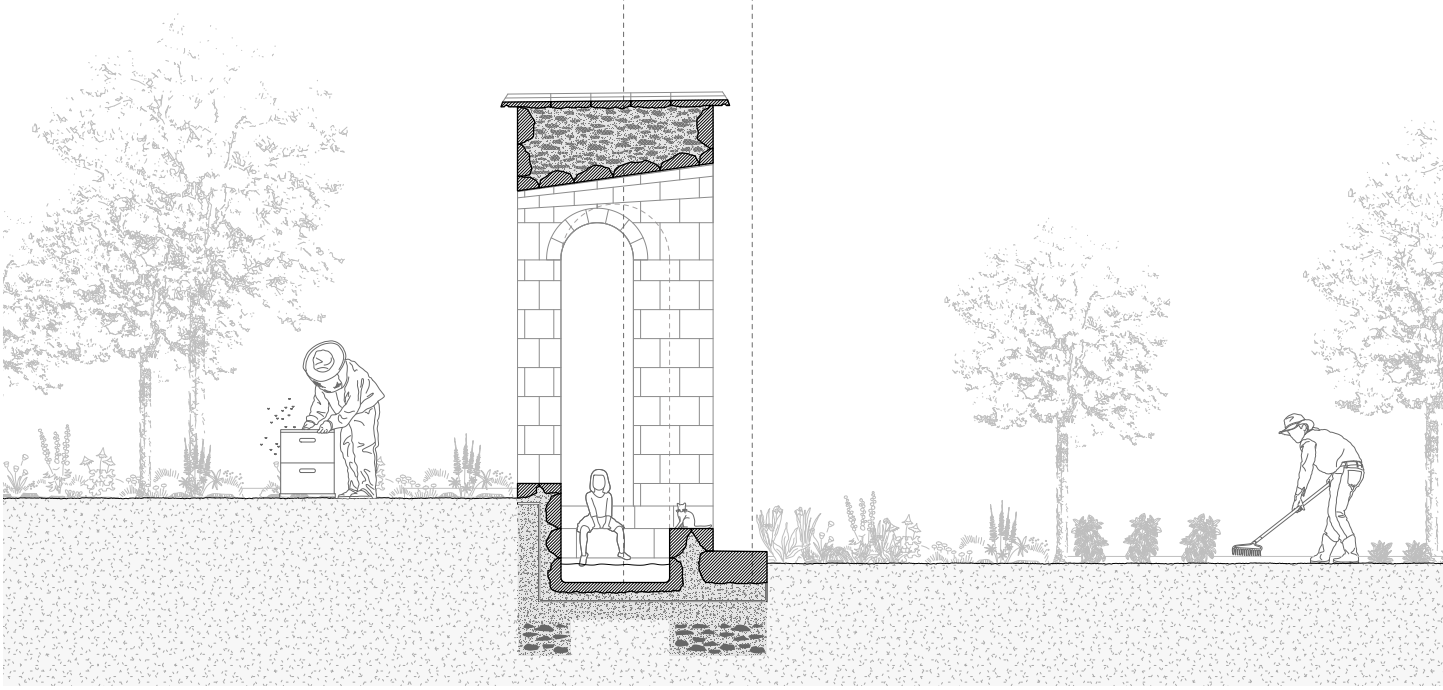


Մի կտոր քարով ջրատարի ամբողջ լայնությամբ, երկար դիմանալու համար:

One piece stone along the width of the canal, so it lasts longer.

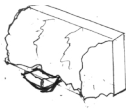
Ջրամեկուսիչ շերտ որտեղ շատ խոնավություն կլինի:

Vapour barrier where there will be a lot of moisture



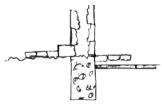
The canal is an infrastructure that, while physically being in the private sphere, is inherently communal enabling the movement of water from one property to the other. The monument above the canal marks a grand gesture, as you ascend from the house into the vast garden. On a hot summer day, you can sit in the sheltered space underneath the arch and dip your feet into the cool water as you help yourself to raspberries that benefit from being near the canal for the higher moisture in the soil.

The canal



Պոչքար սեպաձև, վերևի քարը ուղղելու համար: Բազալտից պիտի լինի պինդ քարից որ չսեղմվի, չարդվի:

Tailstone, wedge shaped for straigtening the stone. Needs to be basalt so it doesn't get crushed.



Հիմքը՝ բուտաքետոն: Շաղախի մեջ լվացած մեծ-մեծ բազալտե քարեր: Իսկ սովորական պատի մեջ միջին չափի 15 -20 Սամ-անոց:

In the footings, washed large basalt pieces are added to the mortar. In a typical wall, the basalt pieces are of average size - 15 -20cm.

Խորությունը կախված է հողի շերտի կառուցվածքից: Կարող է շատ քարոտ լինել, կարող է ավազային լինել:

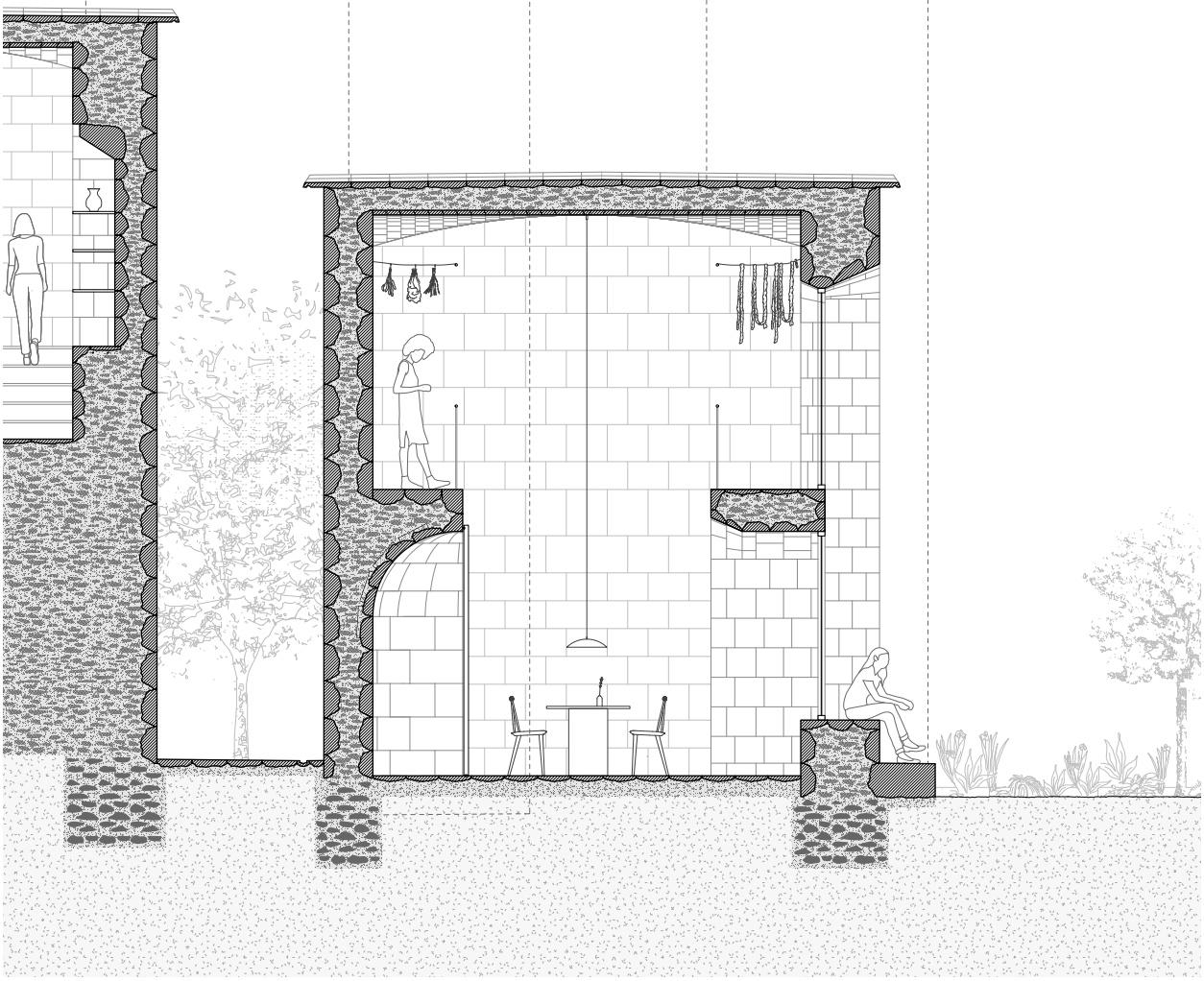
The depth of footing depends on the composition of the soil. It might be rocky, it might also be sandy.

Ծակոտկեն քարեր որպես ջերմամեկուսիչ :

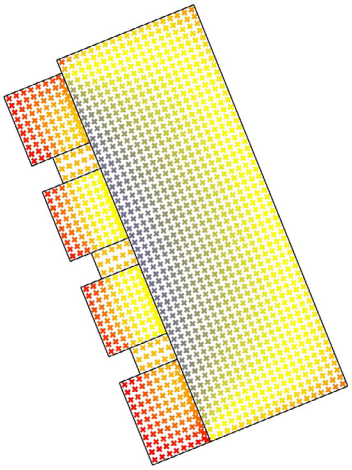
Porous stones for insulation

Ստիլոբատը մի կտոր քարով անկյունաքար է : Պատը նստում է ստիլոբատի վրա :

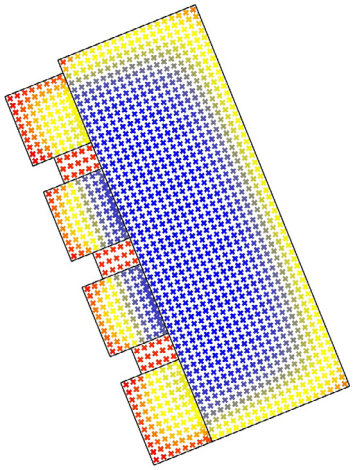
The stilobate is a one piece cornerstone. The wall sits on top of it.



The monument that houses the living room is exploring the potential of stone for inhabitation. The less massive, south-facing facade may become very warm but that warmth would get absorbed at different rates into the deeper parts, creating different micro climates within the space. The outcome is monumentality and mass in appearance, yet differentiation in terms of comfort and domesticity.

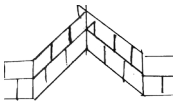


jan 1, 1pm



may 1, 1pm

The living room

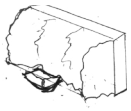


Տանիքի քարը մոտավորապես 15սմ կախված:

The roof tile is hanging by about 15cm.

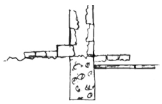
Շաղախի մեջ կճուճ, որպեսզի քեֆիլ լինի տանիքը ու ներքևում արձագանքի:

A ceramic vessel placed faced down to make it lighter and amplify the sound the walkway.



Պոչքար՝ սեպածև, վերևի քարը ուղղելու համար: Բազալտից պիտի լինի պինդ քարից որ չտեղմվի, չարդվի:

Tailstone, wedge shaped for straigtening the stone. Needs to be basalt so it doesn't get crushed.



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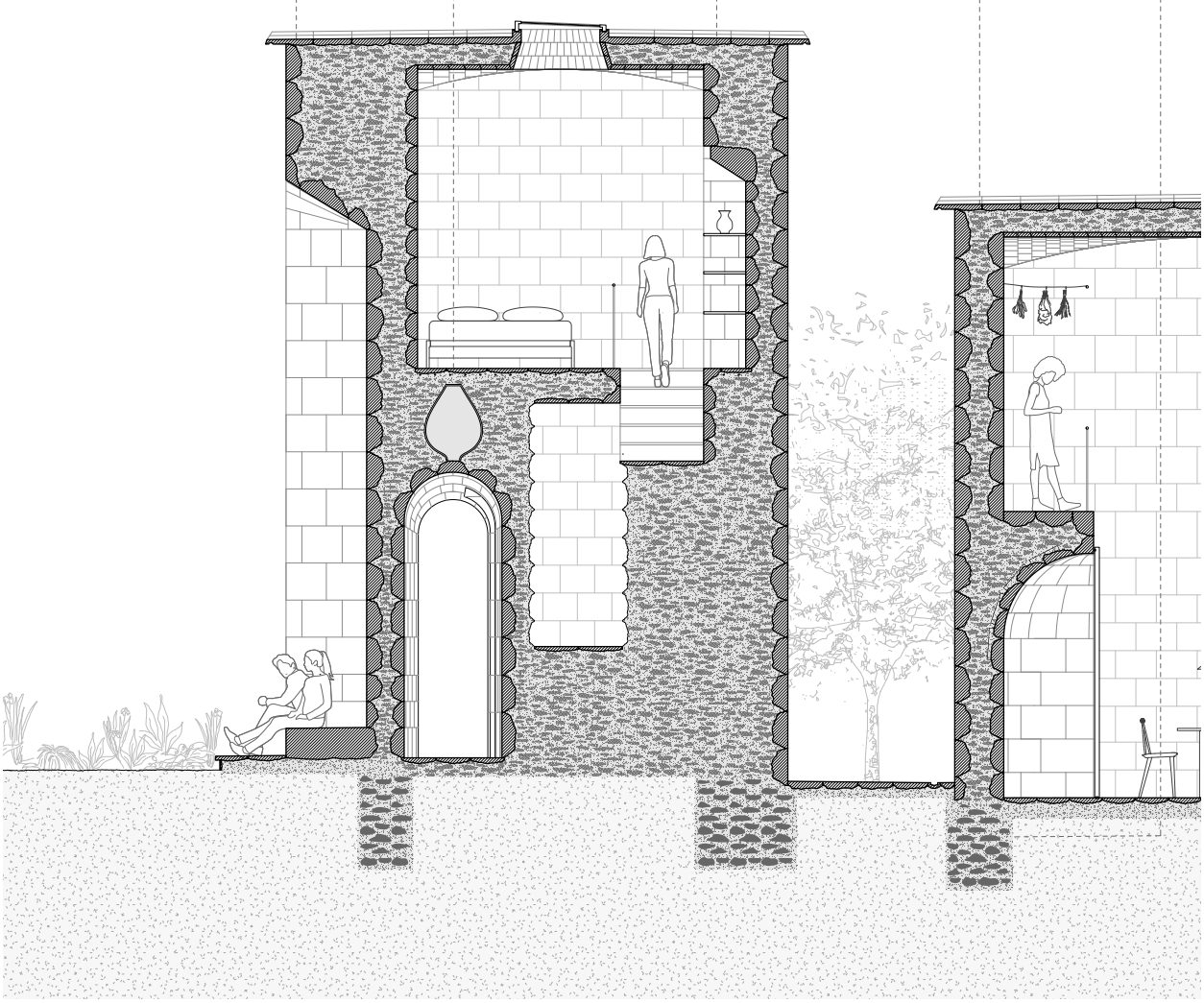
In the footings, washed large basalt pieces are added to the mortar. In a typical wall, the basalt pieces are of average size - 15 -20cm.

Խորությ
հողի շէ
կառուց
շատ քա
կարող

The depth o
depends on
composition
soil. It might
it might also



Adjacent, is a monument where a bedroom is embedded in the second story. You walk through a widening hallway, take the stairs up and arrive at the bedroom which is at the top of the squinch.

Through its design, this monument allows for the mason's technique to be perpetuated, but also it produces a new architecture that places the inhabitants in new relationships to these monumental stoneworks, such as being at top of the squinch.
In other words, I'm trying to design a way in which both the technique of the mason moves ahead of time and the awareness of that technique is made legible to its inhabitants.

The bedroom

Ամրանը 6-10մմ, որպեսզի հնարավոր լինի կեռել:

6-12 mm diameter rebar. No thicker than that, so you can bend it.

Կիսագմբեթի փական

Keystone of half-dome

Կամարի փական

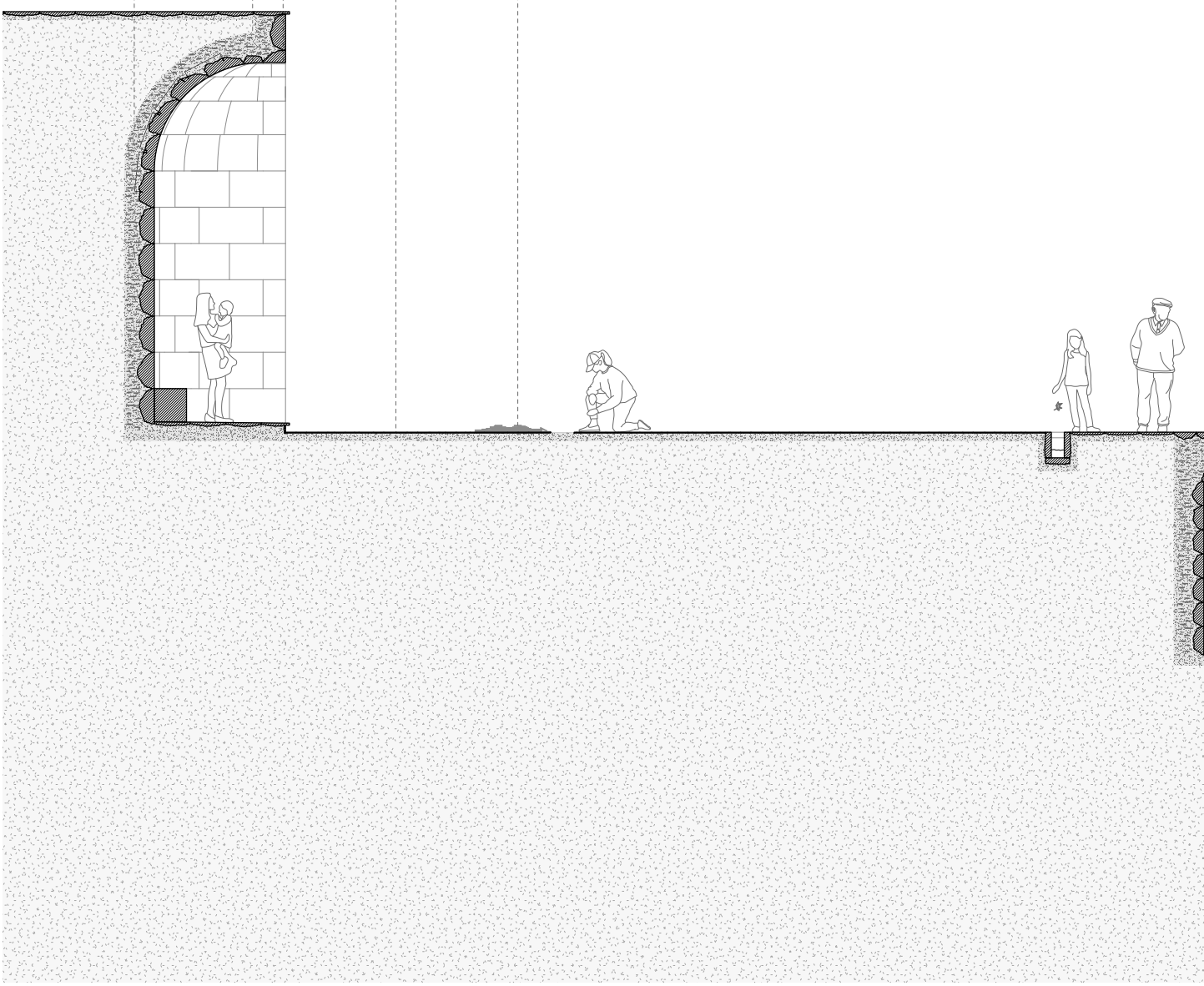
Keystone of arch

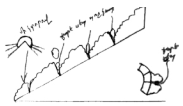
Կրաշաղախ

Lime mortar

Փողոցի սալահատակը ծնացորդ քարի կտորներից:

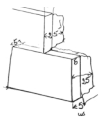
Street pavers from off-cuts





Անձրևաջրերը
չկուտակելու համար
սալաքարերը դրվում են
թեքությամբ:
Ցուրաքանչյուր 1 մետրի
վրա միայն 1սմ,
որպեսզի աննկատ լինի:

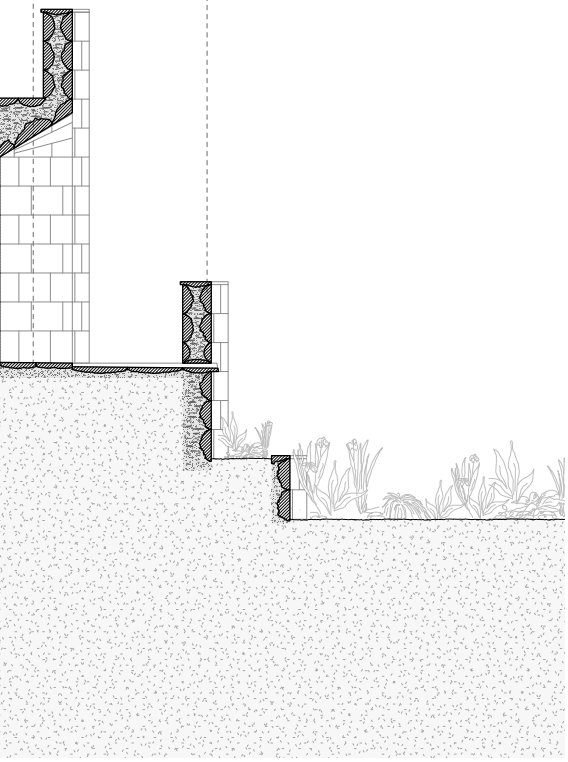
A slight angle for
rainwater drainage.
Only 1cm for every
1meter to keep it
subtle.



Քարի հետևը
կոպտատաշ, որպեսզի
շաղախի հետ ամուր
կապ ստեղծի, իսկ
երեսը՝ սրբատաշ:

The back of the stone
- rough cut to make a
strong bond with the
mortar. The face is
dressed.

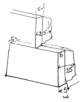
Leaving the house, we are in the street, where we can understand the project not as a tabula rasa replacement of the neighborhood, but a slow and incremental process, where the backbone of the community would be built first and the rest can grow over time, be partially demolished, adapted by the next generations. The construction of this retaining wall, which is a civic/ public infrastructure, but designed with domestic sensibility of scale and attention to detail that allows the pedestrians to inhabit the street, would be enacted over time in order to perpetuate the activity of masons. We see that the masons are building monuments along this wall in a strategic sequence that is scalable and can grow over time, move on to something else, come back and modify it. The artisanal carvers would then come and add their own contributions over time.



The street

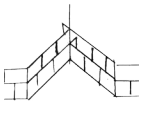
Անձրևաջրերը
չկուտակվելու համար
սալաքարերը դրվում են
թեքությամբ:
Ցուրաքանչյուր 1 մետրի
վրա միայն 1սմ,
որպեսզի աննկատ լինի:

A slight angle for
rainwater drainage.
Only 1cm for every
1meter to keep it
subtle.



Քարի հետևը
կոպտատաշ, որպեսզի
շաղախի հետ ամուր
կապ ստեղծի, իսկ
երեսը սրբատաշ:

The back of the stone
- rough cut to make a
strong bond with the
mortar. The face is
dressed.



Տանիքի քարը՝
մոտավորապես 15սմ
կախված:

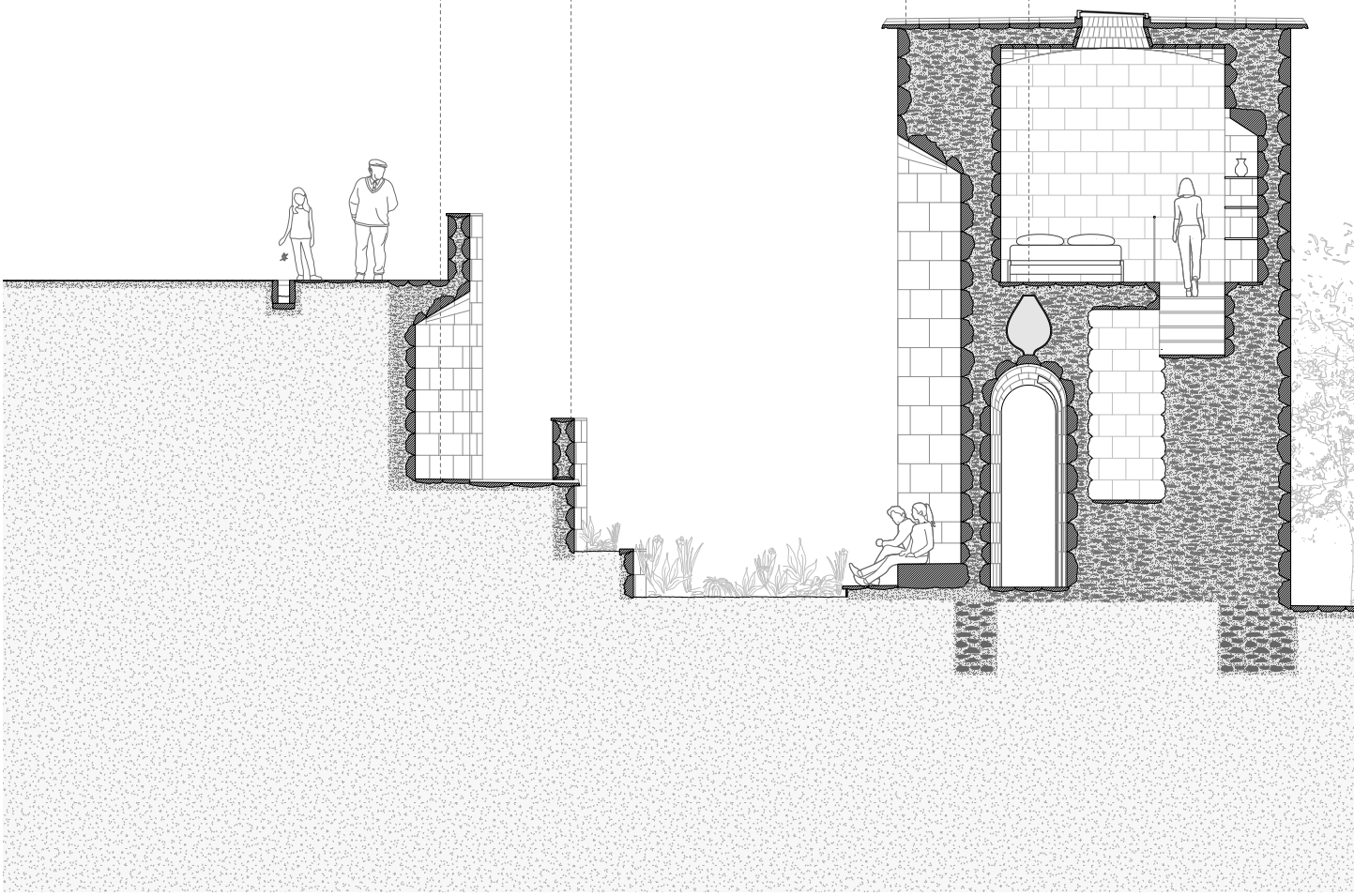
The roof tile is
hanging by about
15cm.

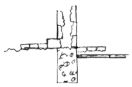
Շաղախի մեջ կճուճ,
որպեսզի թեթև լինի
տանիքը ու ներքևում
արձագանքի:

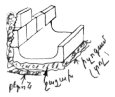
A ceramic vessel placed faced
down to make it tighter and
amplify the sound the walkway.

Պոչքար՝ սեպաձև, վերևի
քարը ուղղելու համար:
Բազալտից պիտի լինի
պինդ քարից որ
չսեղմվի, չարդվի:

Tailstone, wedge
shaped for
straightening the
stone. Needs to be
basalt so it doesn't
get crushed.







Հիմքի բուտաբետոն : Հաղարի մեջ լվացած մեծ - մեծ բազալտե քարեր : Իսկ սովորական պատի մեջ միջին չափսի 15 -20 Սմ-անոց :

In the footings, washed large basalt pieces are added to the mortar. In a typical wall, the basalt pieces are of average size - 15 -20cm.

Հողու խորությունը կախված է հողի շերտի կառուցվածքից: Կարող է շատ քարոտ լինել, կարող է ավազային լինել:

The depth of footing depends on the composition of the soil. It might be rocky, it might also be sandy.

Մակոտկեն քարեր որպես չերմամեկուսիչ :

Porous stones for insulation

Ստիլոբատը մի կտոր քարով անկյունաքար է : Պատը նստում է ստիլոբատի վրա :

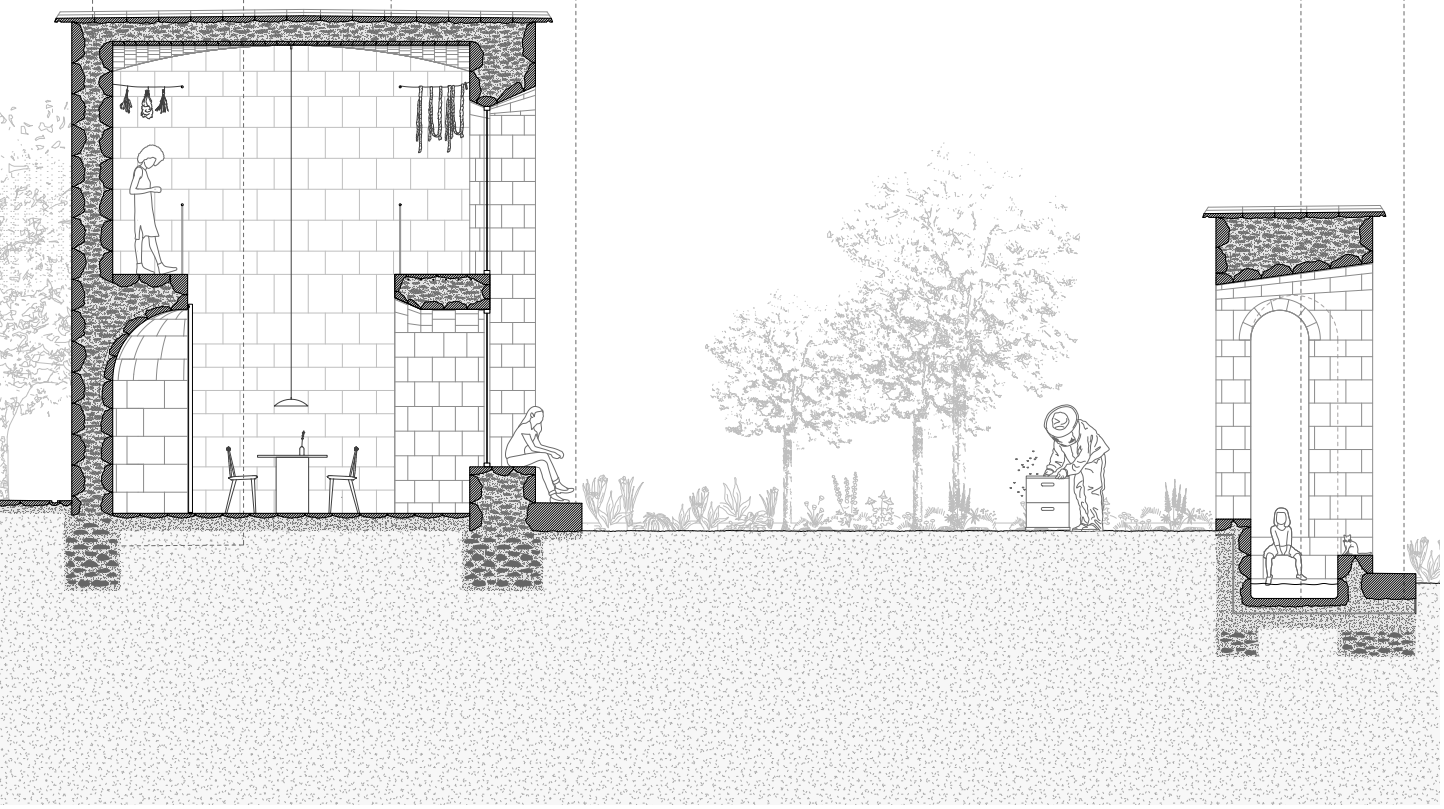
The stilobate is a one piece cornerstone. The wall sits on top of it.

Մի կտոր քարով չրաստարի ամբողջ լայնությամբ . երկար դիմանալու համար :

One piece stone along the width of the canal, so it lasts longer.

Ջրամեկ որտեղ խոնավո

Vapour barri there will be moisture



In this proposal architecture participates in the reconstitution and perpetuation of a culture of stone. The domestic monuments are design innovations that can produce cultural continuity and maintain the existing possibilities.

As we see in the section, all of the different elements are woven together. The outcome is a new cultural fabric of stone - with moments of intensity and punctuation, that runs all the way from the civic to the domestic, continuous from the curb to the canal.

Conclusion

The thesis is a cultural inquiry through the medium of architecture. It is ultimately a conversation. Therefore the next step would be to return to the masons. To maintain a conversation, where I could put forth an architectural thought for a dialogue and the way the project would advance would be participatory.

Ultimately, the provocation of the thesis is an ongoing conversation between architecture as artifact and the embodied skills and techniques that produce the architecture.

Maintaining that dialogue is the aspiration of the thesis – which is to seed a cultural as much as if not more than to build a thing in the world.

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