EVOLUTIONARY HOUSING

FOR POST-WAR RECONSTRUCTION IN

UKRAINE

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INTRODUCTION

Housing plays a crucial role in the well-being and progress of societies, encompassing various aspects such as livelihoods, health, education, security and social cohesion. It serves as a central hub for families and communities, fostering a sense of pride, cultural identity, and social connections.

Dwelling holds significant political and economic value that making it a vital asset. However, housing is also highly vulnerable so that its destruction or loss caused by conflict or natural disasters has profound and visible consequences..

In recent years (2022-2023), Ukraine has experienced extensive damage, mainly due to the Russian full-scale invasion and its aftermath. This period has led to a severe crisis in various spheres, including housing.

The visible effects of this destruction, displacement, and dispossession highlight the urgent need to address the post-war housing of the affected population.

Housing deprivation covers more than just the physical aspect; it also entails a loss of dignity and privacy. It can lead to psychological stress, disrupt cultural identity, destabilize social structures, threaten accepted social norms, compromise security, and cause significant negative economic consequences.

Recognizing the multifaceted importance of housing within the Ukrainian context, this thesis aims to carefully examine the current state of affairs and suggest a potential approach for the reconstruction of private houses in Ukraine.

1

WAR IN UKRAINE

KYIV ON FEBRUARY 24, 2022

traffic jam on the way out from the capital of Ukraine

«Ukraine begins with you»

Vyacheslav Chornovil
Ukrainian politician, Soviet dissident

In particular, at 03:40 a.m. on February 24, 2022, all citizens of Ukraine woke up in horror. A full-scale invasion by the neighboring state of Russia has begun in many directions across the borders of the country. This situation has led to dire circumstances, creating a genuine crisis for both the civilian and military populations. A real humanitarian disaster has occurred.

The war has brought about a series of catastrophic events for Ukrainians, compelling them to reassess their lives from a new perspective. This process has led to a reevaluation of values, as it becomes evident, especially in times of danger, that the paramount value is one's own life and well-being.

According to Andrushchenko, T. (2022) "Spiritual and aesthetic values are currently undergoing a significant reevaluation. Some of them, which seemed important before the war, now receded into the background, and vice versa, we began to value some everyday things more. Helping loved ones, their smiles, supporting each other, volunteering are important, because they make us feel that each of us is not alone. Awareness of unity helps the people to withstand any difficulties. Mutual aid breeds indomitability. War is a horror. No one can argue with this axiom or argue that it does not."

In other words, waking up the next day is already a great achievement, that satisfying basic needs and having a cover over one's head is a great luck. Many people have lost everything and are forced to survive in other, safer areas.

This crisis is undoubtedly multifaceted, covering housing, social and environmental aspects. From an architectural point of view, this now presents a major challenge, requiring the creation of pathways for the population to recapture aspects of their pre-conflict lives in the next decades.

Next, the main areas that suffered and are still suffering (as of 2023) from the Russian invasion will be considered, namely the infrastructure, environment and population of Ukraine.

This will help to get acquainted with the situation in general, for the further development of methods and strategies in order to the situation in the field of housing architecture in the post-war period.

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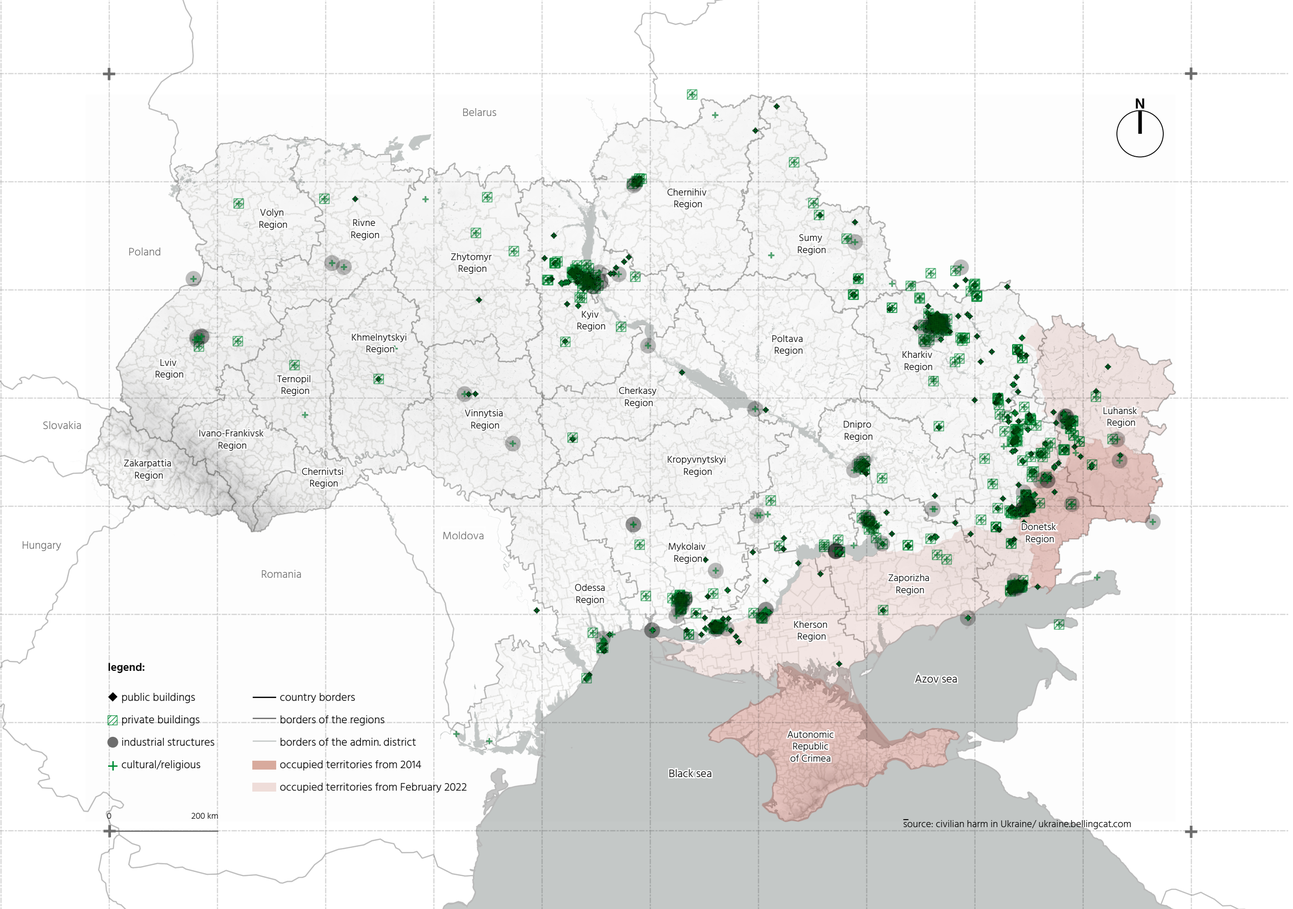
photo by EPA



INFRASTRUCTURE

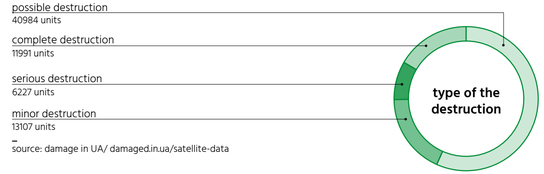
Infrastructure sector in Ukraine has been severely impacted by the active shelling of cities, resulting in significant damage to housing and administrative buildings. More than 50% of the housing stock in numerous cities and towns has been destroyed or damaged. Regions such as Kharkiv, Mykolaiv, Kherson, Donetsk, Luhansk, Chernihiv, Kyiv have been particularly affected, with 90% damage to its dwelling stock.

According to the annual report by the Kyiv School of Economy (2023), which provides insightful analysis, the documented direct damage to residential and non-residential real estate, along with other infrastructure, since the onset of the full-scale Russian military invasion surpasses $143.8 billion in terms of replacement cost.

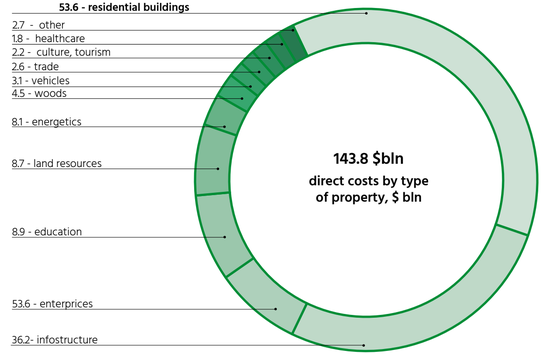
Of the total losses, the largest share corresponds to residential buildings, accounting for 37.3% or $53.6 billion. Infrastructure - 25.2% or $36.2 billion of the overall losses, business sector -$11.3 billion, agricultural sector - $8.7 billion. Additionally, the cumulative direct losses borne by all sectors approximate $13.69 billion.

As of February 24, 2023, preliminary data from regional military administrations reveals that approximately 153,860 buildings have been destroyed or damaged. These include 136,000 private houses, 17.5 thousand multi-apartment buildings, and 0.3 thousand dormitories. The total area affected amounts to 83.1 million square meters hat is equal to 8.2% of Ukraine's housing stock area.
The consequences extend to around 1.3 million households impacting an estimated 3.2 million individuals.

source: kyiv school of economics/ kse.ua



source: damage in UA/ damaged.in.ua/satellite-data



source: kyiv school of economics/ kse.ua

* assessment of destruction and damage in Ukraine is currently a difficult task due to the ongoing conflict and the occupation of some territories by Russia; a comprehensive evaluation of the extent of damage can only be conducted once hostilities on Ukrainian territory will cease;
the assessment of Ukraine's private sector damage emphasizes the serious challenge that will have to be faced in the post-war period.

photo by Kyiv Regional Military Administration

← **Huliaipole, Zaporizhzhia region**
photo by Governor of Zaporizhzhia region

↓ **Orikhiv, Zaporizhzhia region**
photo by facebook.com/MNS.GOV.UA

↑ **Vovchansk city, Kharkiv region**
photo by facebook.com/MNS.GOV.UA

↗ **Pokrovsk city, Donetsk region**
photo by facebook.com/MNS.GOV.UA

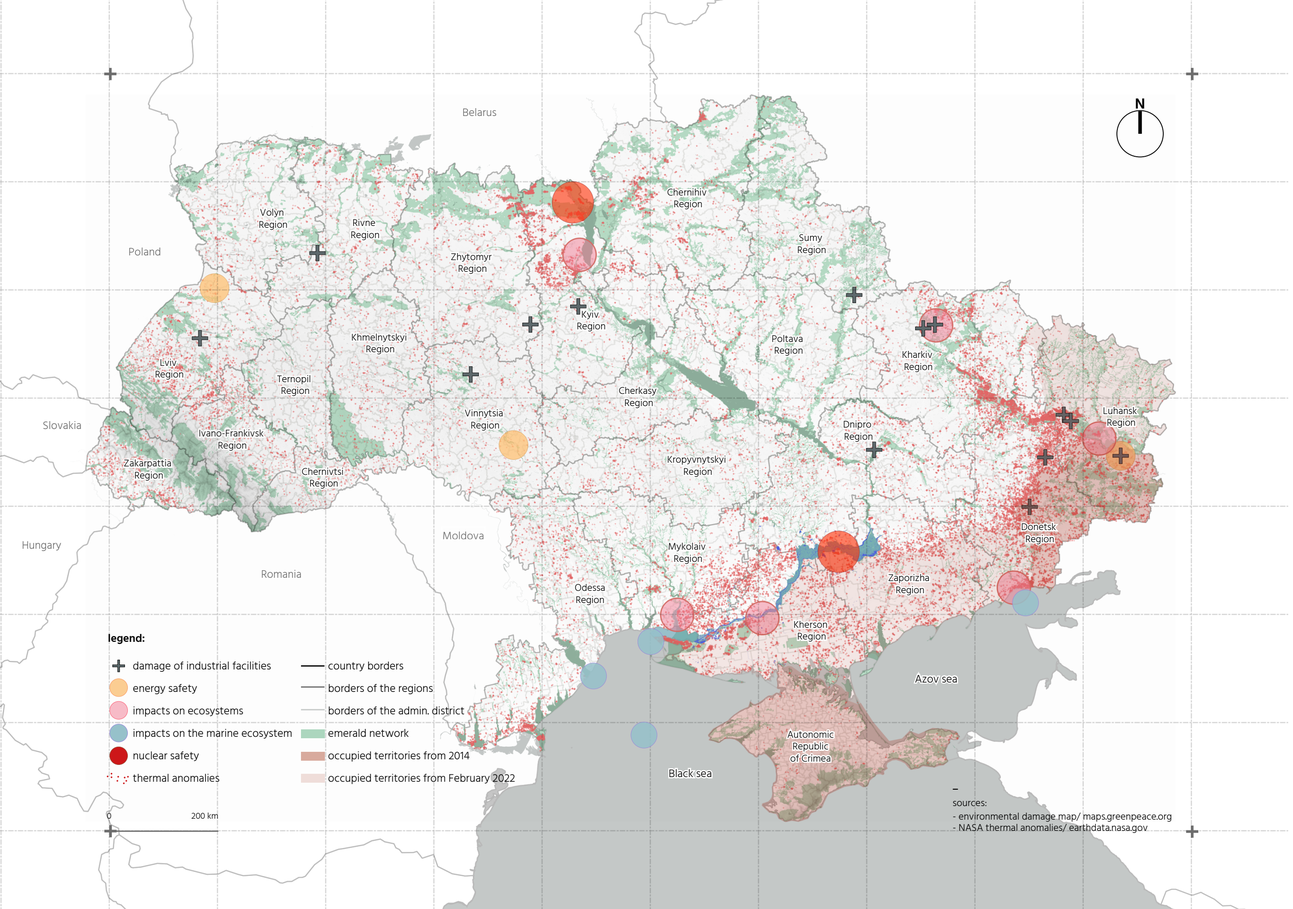
→ **Borodyanka, Kyiv region**
photo by Vadim Ghirda

↘ **Izum city, Kharkiv region**
photos by facebook.com/MNS.GOV.UA

↓ **Kherson region**
photos by facebook.com/MNS.GOV.UA

↑ **Zaporizhzhia region**
photo by Ministry of Internal Affairs (Ukraine)

Huliaipole, Zaporizhzhia region →
photo by Governor of Zaporizhzhia region



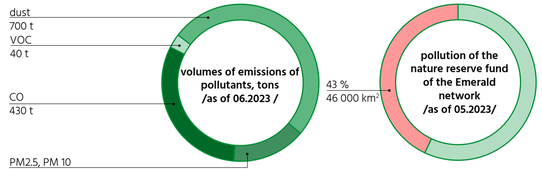
ENVIRONMENT

Beyond the destruction of essential infrastructure, there is an additional apparent crisis stemming from the ongoing military activities can haunt Ukraine for years – environmental damage. From shelling of chemical plants to forests burned by rockets, the consequences will be felt not only by the ecosystems of Ukraine, but also by its people.

The scale of damage caused by the war to the environment in Ukraine is already extremely high. According to Vlasyuk, N. (2022), the total number of environmental violations entered into the single register is 260 cases. Among the most dangerous incidents were fires at oil storage facilities, explosions of tanks with chemicals and destruction of water vessels in the Black Sea. The operational headquarters of the State Environmental Inspection of Ukraine entered these events into a single register due to their connection with military operations and the possibility of contamination of atmospheric air, water resources and soil with hazardous substances.

The head of the All-Ukrainian Environmental League (2023) writes that shelling and occupation increase the risk of toxic waste emissions from Ukrainian industrial enterprises. The largest number are in the regions of Donetsk, Dnipropetrovsk, Zaporizhzhia, Kharkiv and Lviv.

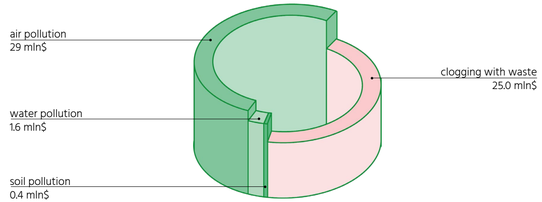
Russia's invasion affects 20% of Ukraine's natural areas, including 812 protected sites and 0.9 million hectares. About 160 areas in the Emerald network, spanning 2.9 million hectares, are at risk. The war in Ukraine endangers food markets and ecosystems by shrinking territories through landmines and military actions.



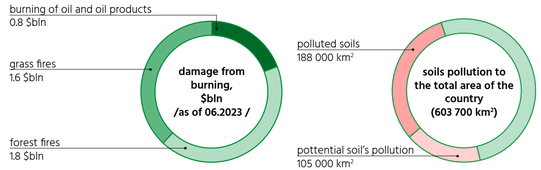
source: kyiv school of economics/ kse.ua

source: kyiv school of economics/ kse.ua

approximate calculations of damages from contamination during the Russian-Ukrainian war, calculated by the State Environmental Inspection, $ mln /as of 07. 2023/



source: official resource of the Ministry of Environmental Protection and Natural Resources of Ukraine/ ecozagroza.gov.ua/



*excluding Kakhovska dam disaster
source: kyiv school of economics/ kse.ua

source: kyiv school of economics/ kse.ua

* environmental problems should be taken into account for further evaluation of territories, their safety and/or possible threats around;
ecological problems create a lack of materials, decreasing public health and common basic comfort, which generate a field for particular post-war strategies and approaches

photo by UAnimals

Consequences after Kakhovska dam explosion, Kherson region

photos by facebook.com/MNS.GOV.UA

Burned 10 hectares of wheat fields, Odesa region

photos by facebook.com/MNS.GOV.UA

Explosive objects in water bodies, Sumy region

photo by facebook.com/MNS.GOV.UA

Soil disturbance in the Red forest, Chernobyl zone

photo by greenpeace.org

Explosive objects at forest areas, Mykolaiv region

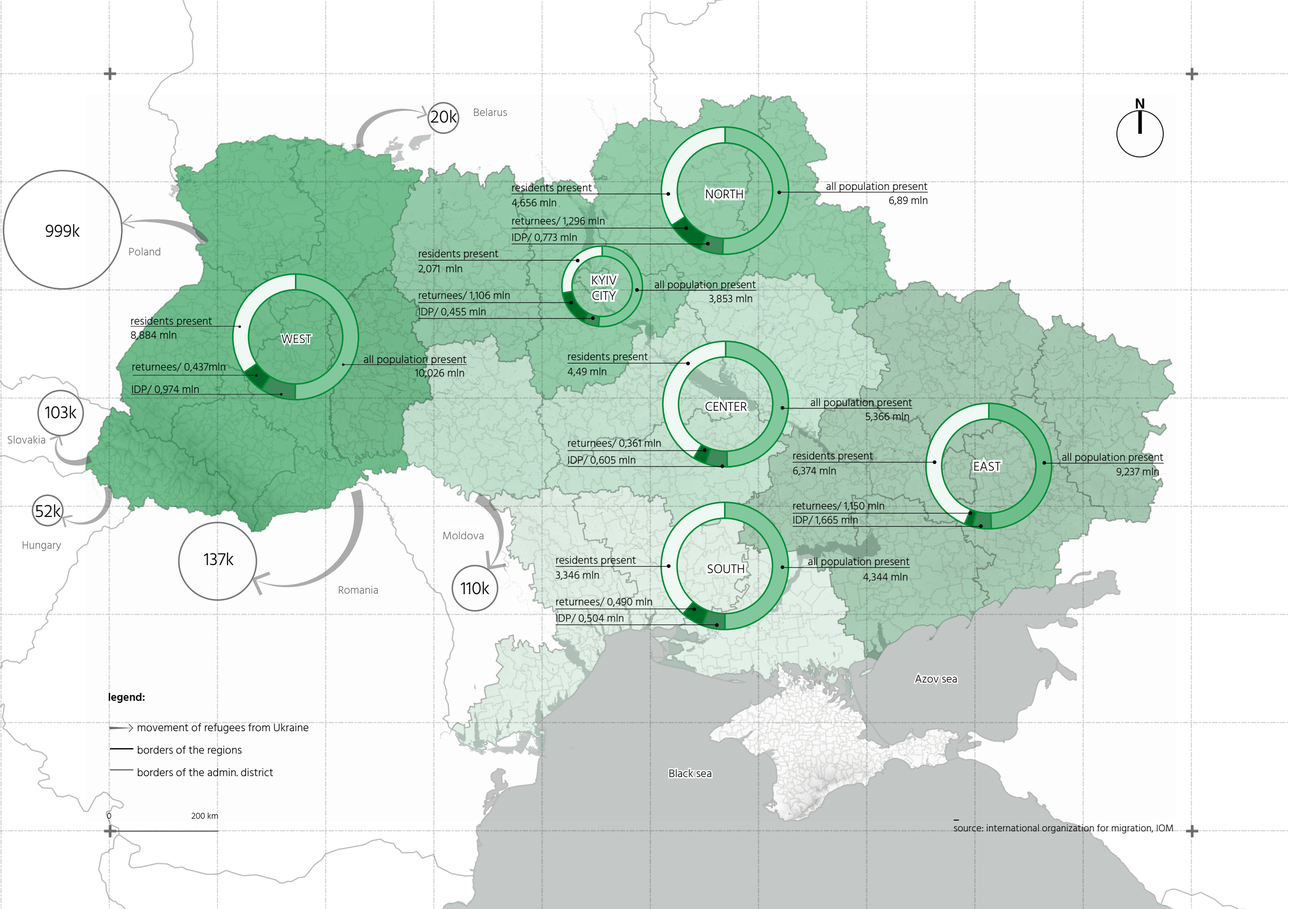
photo by facebook.com/MNS.GOV.UA

Burning of oil depot, Lviv region

photo by facebook.com/MNS.GOV.UA

Burned 20 hectares of forest area, Mykolaiv region

photo by facebook.com/MNS.GOV.UA



source: international organization for migration, IOM

POPULATION

The conflict between Russia and Ukraine resulted in a significant number of Ukrainians leaving their homes to protect the safety of their families, especially children, in response to the increasing threat posed by the Russian forces.

After the start of the war on February 24, 2022, a modern Ukrainian family is forced to face a new reality, which leads to making unexpected decisions, mostly related to the deterioration of their everyday life and separation from loved ones.

During the first month of the full-scale war, 3.6 million people left Ukraine. According to the International Organization for Migration, another 6.5 million left their place of permanent residence and moved within the country. During the first days, kilometer-long queues formed at the border checkpoints to the countries of the European Union with which Ukraine borders, primarily to Poland. Up to 150,000 people crossed the border every day.

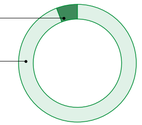
In addition to emigration, Ukraine faced mass internal migration. According to the Ministry of Social Policy, slightly less than 4.9 million people have the status of internally displaced persons (60% are women, 40% are men).

The UN reports (2023) that due to the war, 9177 people died and another 15993 were injured. Children became victims in 535 cases. UN observers record more than 25,000 victims among the civilian population. Among them, 61%-men and 39%-women. Among children, 57.2%-boys and 42.8%- girls.

refugees from Ukraine recorded beyond Europe
0,364 mln

refugees from Ukraine recorded in Europe
5,967 mln

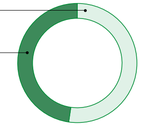
source: united nations human rights/ ohchr.org



total people affected by displacement
19,3 mln

people in need
17,6 mln

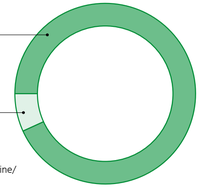
source: international organization for migration, IOM/ iom.int



people with damaged housing
2.3 mln

people with completely destroyed housing
0.17 mln

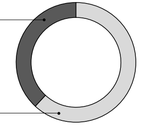
source: ministry of reintegration of the temporarily occupied territories of Ukraine/ minre.gov.ua/en/



casualties
9 177

injured people
15 993

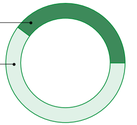
source: united nations human rights/ ohchr.org, as 19 October 2023



returnees
3 mln

IDP
8 mln

source: united nations human rights/ ohchr.org



INTERVIEWS

responses from 3 Ukrainian citizens who have different resident statuses after 24.02.2022.
The comments about their current lifestyle, how the situation affects them and how they see their future in in different aspects

Yana, student-architect
26 years old
from: Kyiv, Ukraine
current location: Lisbon, Portugal
status: refugee

"

The full-scale invasion forced me to move abroad, and after a journey that took about one and a half weeks via the Kyiv-Lviv-Krakow-Lisbon route, I arrived in Lisbon, my final destination. The first six months of my life in Lisbon were emotionally challenging, as I found myself in close quarters with family I hadn't lived with for a long time. However, amidst the backdrop of war and uncertainty, the charm of Lisbon, its vibrant lifestyle, diverse architecture, efficient transportation, etc., stirred a sense of euphoria within me. It marked the beginning of a new chapter, and my body and mind were fully engaged in adapting to this fresh environment.

Looking back, I recall that I had a high level of adrenaline but felt a profound calmness. This was likely due to the stark differences in Lisbon's lifestyle, urban architecture and its colorful palettes, all of which stood in sharp contrast to what I was used to. The people I met and the city's innovation in beauty and comfort played a significant role in balancing my emotional state. It's worth noting that my cousin, who lived in Lisbon, handled most household matters, which meant she met more stress than I did.

In Kyiv, my previous home, I resided in a restricted-access modernist district, the last of its kind in the former Soviet Union. It featured large proportions, broad streets, and sprawling buildings with a repetitive design. Even after living there my whole life, some streets remained indistinguishable to me. I was bothered by the time-consuming planning required for trips, given the imperfect transportation system and the absence of a subway.

The next district I lived in was also modernist, built 20-30 years earlier in the '70s. It offered a different experience with smaller-scale buildings and ample greenery between nine-story structures, giving the impression of living in a garden oasis. This district was surrounded by a river channel, the Dnipro River, and a lake, which further enhanced the sense of living in a peaceful oasis.

I appreciated the popularity of home improvement in Kyiv, particularly in my area. The district was built with economic efficiency in mind, resulting in fast and budget-friendly construction. However, it didn't account for the city's average annual temperature conditions. As a result, nearly 95% of balconies were individually glazed, each uniquely designed since there were no regulations governing this. It was similar to tight residential quarters where people built on top of one another, with superstructure balconies being a common sight.

What I loved about Ukraine was that its life infrastructure catered to locals, not tourists. While this had its drawbacks, I considered it an essential aspect. In contrast, Lisbon was appealing with its European culture and amenities, but I couldn't help but notice how the influx of tourists affected the local landscape and culture.

I admired the informality and accessibility for young people in Kyiv regarding owning real estate or renting housing. Personally, I felt a strong connection to Ukrainian culture and its way of living. Another distinction was that in Lisbon, retirees spent a lot of time outdoors, whereas in Kyiv, most of them preferred to stay at home.

Living in Lisbon for a year and a half, I have come to feel much safer, particularly from a gender perspective. The city especially at night, gives me a sense of security I didn't experience in Kyiv.

Regarding life post-war in Ukraine, I contemplate splitting my time between both countries. However, every return to Ukraine should be a chance to immerse myself in authentic Ukrainian life, language, culture, and people. The decision between returning to a familiar life or continuing as a foreigner in an unfamiliar world remains uncertain, and doubt lingers.

Creating a family, finding a good job, economic stability, and personal safety are my priorities. But above all, my desire is to feel safe. I want to avoid occupation or similar tragic circumstances at all costs.

The individual housing style in Ukraine has always fascinated me. I appreciate homes built by people for themselves and believe it's essential to preserve this individuality rather than homogenizing the urban landscape. I am not a fan of «perfect city» projects where everything looks the same.

To achieve this, I believe a single company could organize and provide training materials for the process. However, it's crucial to cultivate a sense of responsibility among the average consumer. Thus, a platform offering resources, knowledge, education, and technical support would help popularize this idea and facilitate its implementation in our society.

"

Danylo, business analyst
27 years old
from: Kyiv, Ukraine
current location: Kyiv, Ukraine
status: resident

"

During the war, I faced some of my biggest challenges. One of them is closed borders (after the full-scale invasion on 24.02.2022, according to the Ukrainian legislation, during martial law, all men are prohibited from leaving Ukraine, with some exceptions).

Because now I am at the age when I have the health and financial capacity to travel, I have the desire and energy, but there is no opportunity to discover new countries, cultures, lifestyles, cuisine, etc. The lack of this has a very strong effect on my psyche.

The other two challenges are more serious, namely the fear of rockets flying at my home and the fear of being sent to the frontline. Both these options are fatal.
And what scares me the most is that the war is long-lasting, and I would like to return to my peaceful past life as soon as possible.

If we talk about my daily life, it has not changed a lot, the only aspects that affect my day are the curfews and the moment during shelling, when I have to run to underground. It causes me anxiety sometimes, especially when I hear shelling and explosions nearby.

In the future, I would like to see a prosperous country without war and with a decend and affordable housing. But if we consider a scenario with a constant threat from the so-called Russian Federation, then it would be useful to have reinforced new houses with modern shelters.

"

Alex, CRM admin
26 years old
from: Crimea, Ukraine
current location: Kyiv, Ukraine
status: IDP (from 2014)

"

The office where I work has switched to remote work; my daily routine is completely dependent on shelling and air raids.

It's actually very exhausting, especially this summer (2023) there was a period of shelling almost every night that ended at 5-6 am.

We didn't sleep for weeks. That is, you spend the night in the metro or in the corridor, and then in the morning you are tired out and try to work. I feel all this like a bad dream that has not end. And what is really scaring about this: I am used to it.

Sometimes I spend time outside the city, in the house with my parents. I feel a little better there, because it is calmer in general and I can sleep in the basement. By the way, even before the full-scale invasion, I was always in favor of building a basement/bomb shelter in private houses.

And in general, I notice that construction sites in Kyiv and beyond its borders are continued, but much more slowly. And so it is with everything, because we are trying to somehow continue to live a normal life.

"

THE WORK OF VOLUNTEERS OF THE «DISTRICT #1» FOUNDATION

Gostomel city

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photo by districtone.foundation

In conclusion, the crisis caused by Russian's military activities on the territory of Ukraine has had a profound impact on all scopes of Ukrainian life. The economy, infrastructure, environment, and social sphere have been affected by the war, so for approaching the solution of these problems, it was important to consider all aspects of the crisis.

Unfortunately, this war has far-reaching consequences that impact many areas of life. It is crutial that in the future specialists from various fields join forces to solve this crisis. The field of housing architecture also plays an important role in the recovery and support of the population in this difficult time.

Many people were forced to leave their homes and even emigrated abroad, or lost their homes due to the destruction caused by military operations. However, creating affordable housing or creating conditions for obtaining housing can be one of the key factors in encouraging people to return and rebuild their lives in Ukraine.

Providing dwelling for those affected by the invasion, reconstructing destroyed buildings, rebuilding infrastructure and supporting vulnerable populations are challenging and important tasks. In addition, the environmental crisis arising from war also requires careful study and intervention to prevent further environmental disasters.

In order to achieve successful recovery and support for those affected by the war in Ukraine, one can take into account the experience of other countries that have also experienced similar crises. For example, countries that have been involved in similar conflicts or wars have developed recovery and support strategies that include reintegration of victims into society, reconstruction of housing, and rehabilitation of infrastructure.

Examples include European countries that survived and experienced armed conflicts, the lessons they learned in rebuilding and supporting their citizens after the war can be useful for Ukraine.

It will be considered in the next chapter, as a real experience and example for the restoration of housing in Ukraine in the post-war period.

2

RECONSTRUCTION

METHOD & APROACHES

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photo by birdinflight.com

This part on reconstruction aims to reveal a comprehensive approach to post-war residential reconstruction, based on theoretical foundations and structured methods. Reconstruction, as an important stage in the restoration of the housing stock after conflicts, requires not only the physical restoration of buildings, but also taking into account psychosocial and economic dimensions.

This chapter is devoted to the study of various practices and effective strategies that can be used in the process of reconstruction of residential objects in the conditions of the post-war period. Considering various theoretical approaches, we will try to synthesize them to create a methodology that takes into account the specifics of the situation in Ukraine.

A key aspect of the chapter will be the consideration of post-war or post-disaster reconstruction methods, in particular, their particularities. We hope to apply them to the Ukrainian reality, ensuring proper adaptation and effectiveness of the recovery of the private sector.

In this context, reconstruction is considered not only as a physical transformation of buildings, but also as an opportunity to create a new socio-cultural environment. A detailed review of theoretical and practical aspects will allow us to determine optimal strategies and alternative approaches for the implementation of the reconstruction project in the conditions of post-war recovery.

In order to systematize information and for the further selection of the approach, it was decided to refer to the classification from the study of Barakat S., (2003) in the field of housing restoration in conditions of wars, conflicts and natural disasters.

The author analyzed different approaches, including temporary and transitional housing, housing repair, constructing new housing and settlements, “building-yard” approach and finance facilitation. There are also mentioned two main methods of the implementation like contractor model and self-build model, which can be expanded to a cooperative reconstruction.

This theoretical classification is based on real experience and has its advantages and disadvantages, which are systematically described in the scheme.

Author deeply examines the experience of different communities and their approaches to reconstruction, paying special attention to the social and cultural aspects of this process. Such an emphasis on the socio-cultural part helps in our case to establish a qualitative framework within the scope of the thesis for the future project, and to make it appropriate for Ukrainian realities as well.

It is also important to mention that, in general, interaction with volunteer and public organizations, consideration of individual needs and characteristics of communities, as well as the development of a sustainable and effective approach to housing reconstruction in crisis conditions are an integral part of the future implementation of the project.

approaches

temporary and transitional housing

- usually prefabricated, imported and designed for global use;
- intended for diverse cultures and climates;
- often turn into permanent, poor-quality settlement;
- the cost could be more than permanent housing;
- transitioning families through emergency, temporary, than to permanent residences
- heightens trauma and bother recovery

housing repair

- the most cost-effective and rapid way to offer sufficient housing;
- less distressing for survivors;
- depending on damage scale and skills, individuals can self-repair for a quick return to normalcy, or contractors, aided by funds, can rehabilitate houses;
- repair costs are usually confined to essential works ensuring habitability

constructing new housing and settlements

- time-consuming;
- should involve full local authority participation, potentially committing them to partial or full costs;
- the risk of a mistake for rural areas, especially if city-based architects/engineers with a different understanding of housing are involved

“building-yard” approach

- affected communities can rebuild their homes independently or with local builders;
- external assistance should focus on ensuring affordable or free local access to building materials and skills-best suited for rural and suburban areas where self-building is common;
- slow results make it challenging to justify for funding agencies and target beneficiaries

finance facilitation

- similar to the building yard approach
- finance facilitation assumes affected communities can independently plan and manage rebuilding;
- providing finance and facilitating loans for rebuilding, enhancing community-initiated processes without parallel interventions

methods of implementation

contractor model

- done by professional construction companies the easiest and quickest way to provide housing;
- ‘one-size-fits-all’ approach

self-build model

- done by self-help basis or as a joint community reconstruction programme;
- meet the needs of individual families;
- cheaper compare to contractor-build model;
- restoring a sense of pride and well-being in people who have been through a trauma

cooperative reconstruction

- alternative to self-help housing is to mobilise a community;
- reconstruction is undertaken for the entire community;
- guarantees help for vulnerable people

Examples of different methods and approaches after WWII

erected prefab houses across the UK after WWII
photo by startsat60.com

self-build dwelling by Walter Segal method, London, 60s-80s
photo by themodernhouse.com

emergency village Smeetsland, Netherlands, 1940
photo from Archive Hans Grootenhuijs

reconstruction of the historic center of Warsaw, Poland
photos by insider.com

construction of the new massif in Kyiv, 1958
photos by babel.ua

In order of the preliminary research conducted in the first chapter and the methods of housing reconstruction after conflicts and natural disasters in the second chapter, it becomes obvious that the issue of reconstruction is an integral part of modern humanitarian recovery in Ukraine. In particular, the work of Barakat S., (2003) provides a valuable contribution to the theoretical classification of methods, and also emphasizes the importance of taking into account socio-cultural aspects in the reconstruction process.

The experience of housing construction after the Second World War shows the diversity that has been described before. This indicates that the housing crisis at that time was very acute, urgent and timely, that is why there were so many different types of housing reconstruction or new dwelling construction. It is possible that all these approaches have the right to exist in the case of post-war times in Ukraine. In the post-World War II era, Ukraine, previously annexed to the USSR, experienced a lack of individuality in housing matters. Decisions regarding where and how people lived were determined by the Soviet state machinery, which operated under a centralized system. This resulted in a notable absence of individual choice or expression in residential matters.

However, when analyzing the Ukrainian present, it becomes obvious that in the future a large part of housing will be built «from scratch» due to the complete destruction in many front-line cities, caused by military actions that are going on the terriroties. 2This approach is necessary to restore the infrastructure and create housing for the population.
In our thesis, we aim to focus on an alternative method, namely the self-build method, considering it as a sustainable and human-oriented approach to housing construction. Taking into account the socio-cultural features of Ukrainian society, we see in self-construction an opportunity to ensure not only the effective restoration of housing, but also to promote the involvement of citizens in active participation in this process. Because even if we consider the time frame relatively not far from today, namely the years of Ukraine's independence (since 1991), we can find examples of self-building in different parts of the country.

Next, we will consider Ukrainian families, as well as conduct an analysis of the questionnaire, which will be included in our work. We plan to find out how Ukrainian residents are ready to participate in the construction of their own housing, to determine their preferences and inclinations. This will allow us to draw conclusions about the suitability of an alternative method of self-construction in the conditions of the Ukrainian reality and develop a design proposal for the project.

2

FAMILY

A PORTRAIT OF DIVERSITY

«PEASANT FAMILY» BY TARAS SHEVCHENKO, 1843

«Ukraina, Ukraina!
Mother, mother dearest!
When I but recall your fate
My heart is all weeping!»

from the poem «The night of Taras», 1838 by Ukrainian poet, artist, public and political figure Taras Shevchenko

"War destroys the home and family. Without the home there is not much left of the family. Without family one lives in liminal permanence.". . ."All of that – environment, house, things in the house and we – exists entangled into a poetic single form to design familiar experience or what is called: home."

Jesenko Tesan, sociologist, 2021

The obvious and specific unit for which housing is oriented is the family. But, if the family is a specific structure that does not necessarily consist only of parents and children, then what are the peculiarities of the Ukrainian family?

This chapter is dedicated to the study of the Ukrainian family, its characteristics and characters or «personas» (the public image of one's personality, the social role that one adopts), and the challenges it faces today.

In this chapter, we will consider official statistics regarding the Ukrainian family, its size, composition, and trends. However, for a deeper understanding of the situation and the formation of a full-fledged map of the Ukrainian family, we decided not to limit ourselves to numerical indicators from official statistics. Our goal is to understand how real people experience and perceive today's situation as well in the context of building a new home or restoring an old one.

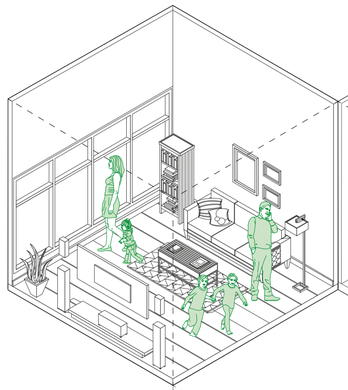
Therefore, in addition to analyzing statistical data, we conducted a small survey that covered 160 different people from Ukraine. This is not a mass survey, but it provides us with valuable information that can be analyzed and used to create a deeper understanding of the situation. The variety of responses and perspectives of the survey participants helps us see a broader picture of Ukrainians.

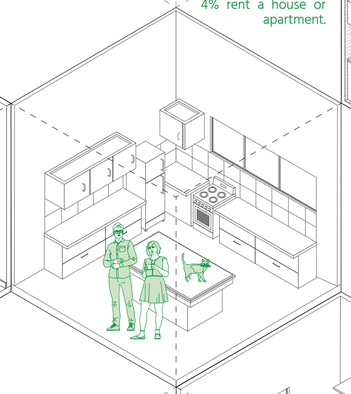
The task is to see the true face of Ukrainians through the voices of its members. And this makes the approach more human and deep, because a family is not just a statistic, it is a collection of life stories, feelings and dreams.

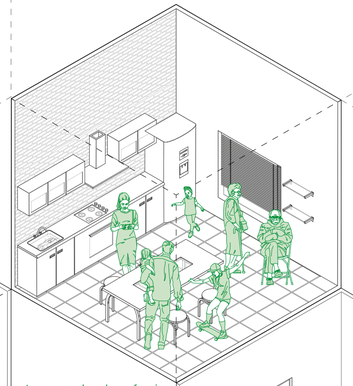
PERSONAS

Ukranian family

According to official statistics, there are over 14.9 million families in Ukraine. The modern Ukrainian family and its functions are characterized by different trends that affect the changes and development of relations in society as a whole.



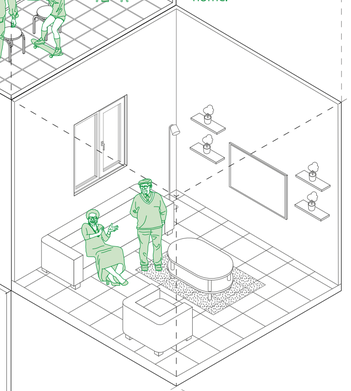


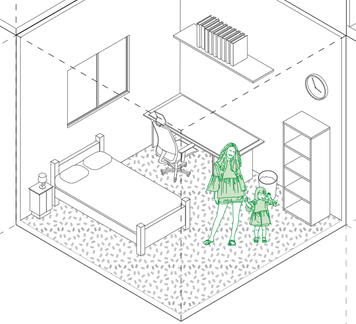


The majority of rural and urban families, have their own housing (95%). And only 4% rent a house or apartment.

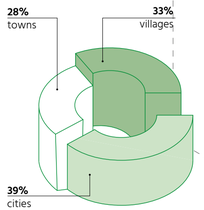
Extended family members are also often an important part of Ukrainian family life. It is common for family members to live close to one another and to maintain close relationships, even as children grow up and move out of the family home.

In general, urban families tend to have a more progressive outlook, while rural families often have a more traditional and conservative way of living.

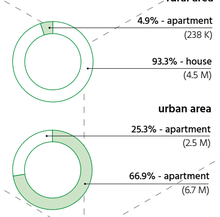




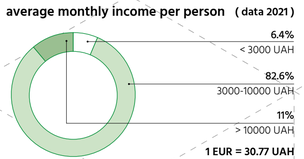
family locality



housing

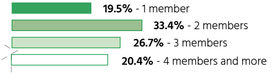


average monthly income per person (data 2021)

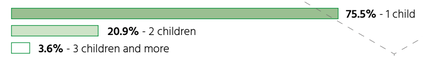


1 EUR = 30.77 UAH

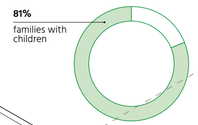
number of family members



number of children in families



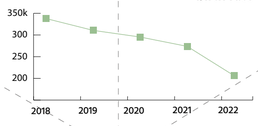
average number of children



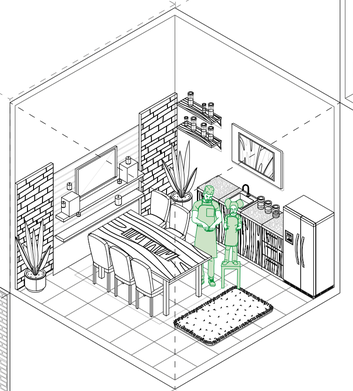
1.5
in rural areas

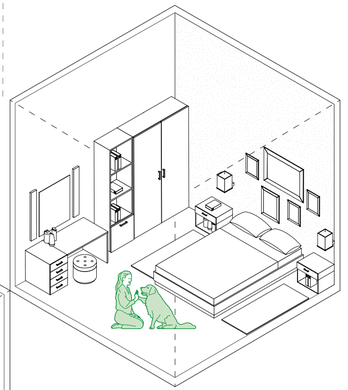
1.2
in urban areas

birth rate

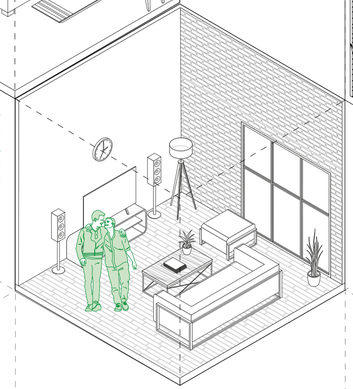


More than a third of Ukrainian families are families consisting of only two people.
These can be childless couples, couples whose children have grown up and single mothers ot fathers with one child.



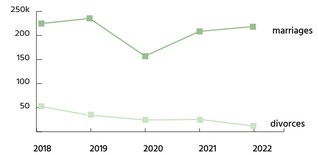


Therefore, Ukranian family of 3 people has a toral income of 30-40K UAH. About half of this income is spent on food, about 15% on utility bills, 5% on transportation, 4% on medical expenses etc.



In fact, during the war the number of marriages in Ukraine has significantly increased and the number of divorces has decreased, despite stress and forced separation from loved ones.

marriages & divorces



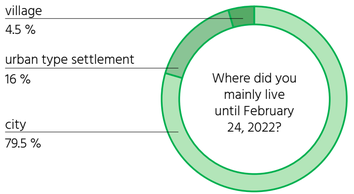
source:

The State Statistics Service
https://www.ukrstat.gov.ua/

Ministry of Justice of Ukraine
https://minjust.gov.ua/actual-info/stat_info

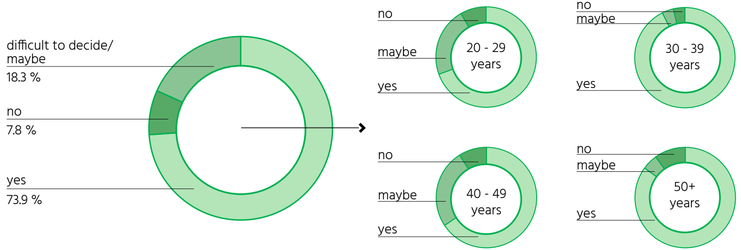
SURVEY

the processed responses of Ukrainian citizens (around 160 people) were made using an online questionnaire about their thoughts and preferences in the private housing sector



Has your home or the home of your family been damaged due to Russian-Ukrainian war?

Are you interested in rebuilding or building a new house of your own in Ukraine in the future?



* main responds of open questions

MOTIVATION

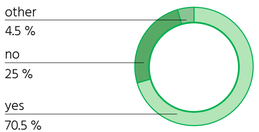
- Ukraine's victory in the war, safety
- desire to have a comfortable house
- sufficient financial status
- sufficient amount of free time
-real examples with real costs
-available resources, financial savings

OBSTACLES

- war
- unstable economic situation
- few implemented examples
- free time
- corruption and laws
- bureaucracy

Do you have experience in self-construction?

Have you considered building your own home if you had access to the necessary resources and guidance?



Would you be interested in getting a guide or guide to building a sustainable home yourself?

Would you be interested in participating in workshops or training sessions related to sustainable construction?

The diagrams show us the output of the participation of around 160 Ukrainians in the survey. The main aim was to study the adequacy of the proposed work.

In the questionnaire participated people of different ages, mostly those who used to live in the cities, some of them also have damaged houses due to the Russian-Ukrainian war (17,9%).

The part about creating a new house in Ukraine in the future shows that the majority of people are interested in the implementation, but it should also be taken into account that the people of the age category of 20-29 and 40-49 have sufficient percentage of doubt.

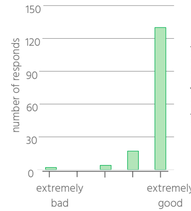
Obstacles and motivation are related to each other in the case of building a new house, especially in current war conditions and desire of safety, the same with the present unstable economic situation in Ukraine and the ability to have a sufficient financial level. Also significant part of the answers is related to having a real example of the project.

In the case of real experience of self-building only 1/3 has it. Still, on the other hand, the majority is interested in self-building if there is a necessary guideline and participation in the relative workshop.

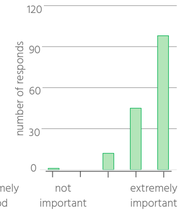
Similar situation with the proposal for sustainable houses. The majority is ready to do sustainable and ecological homes, even if they have just general knowledge about it.

The analogous situation with materials, where is a lot of people are ready to use sustainable materials, even partly. But from the graph of the preferences of materials it is clear that more popular are those, which are already known and mass-used.

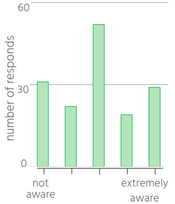
How do you feel about sustainable/ecological buildings



How important is sustainability in your home to you?



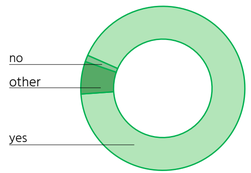
Are you aware of sustainable building practices?



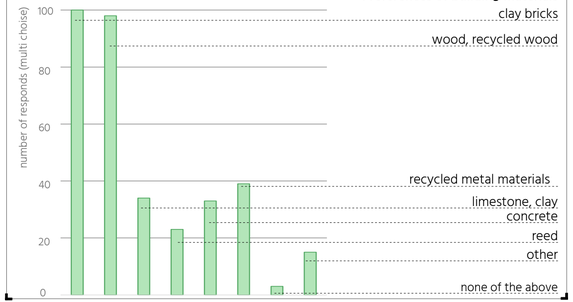
Are you ready to use environmentally friendly or local materials to build your home?

other :
ceramic blocks, foam concrete, arbolite, sip panels, gas block, aerated concrete

other :
- partly
- maybe
- depends on prices, availability and availability for ordering



Preferences of building materials



3

PLOT

-
photo by Google Earth and Maxar

"We are people who only know the land! It is black and our hands have become black from it, but it is still holy."

from the novel «Land», 1902 by Ukrainian
modernist writer and feminist
Olga Kobylyanska

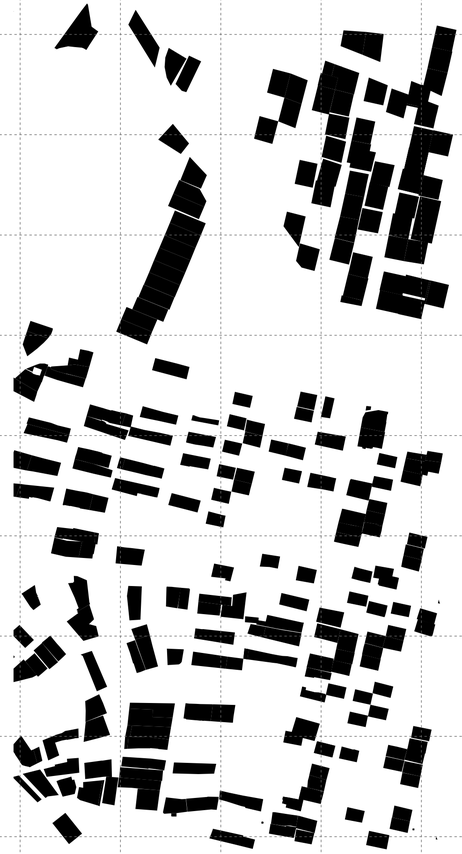
A plot of land is not only a place for housing construction, but also the creation of a special environment for family happiness and development.

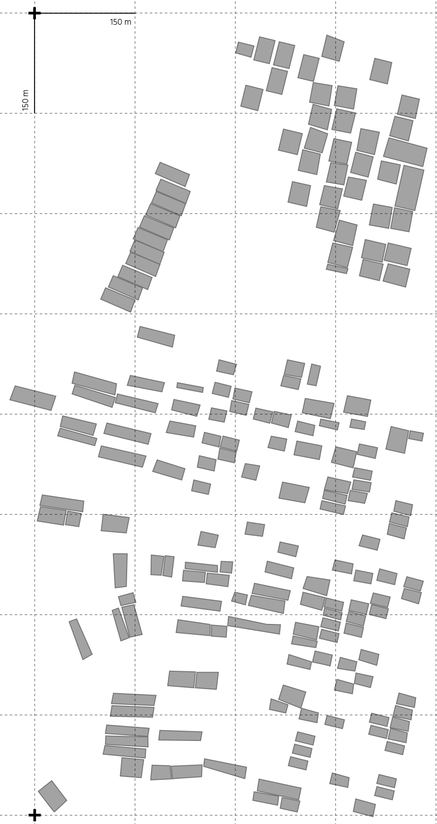
Plots in Ukraine are more than just pieace of land. They are important symbols that reflect the individuality and ambitions of each family. As written by Kostrytsia N. (2015) according to the belief of the ancient Ukrainians, the earth (land) was considered not just a place of residence, but also marked as a transitional territory between eternal worlds, which include life and death, good and evil. In this context, the cultural experience of common perception of the land as a key element of the surrounding world and the basis of the national landscape, the way of management and, accordingly, general well-being, is clearly revealed.

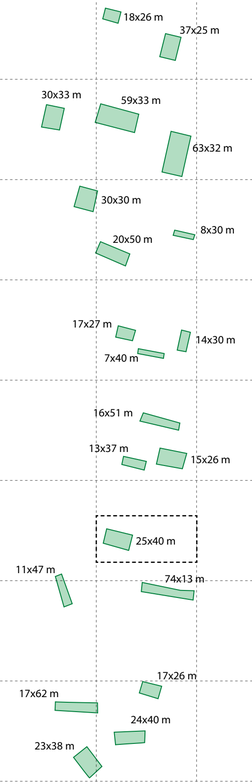
The chapter about the plots is important for understanding the beginning of the process of creating or restoring a «family nest». Without the piece of land is impossible to create your future house. Therefore, opening this topic, we will consider various aspects of land plots in Ukraine. We will find out what they are, what activities can be conducted on them and what opportunities they open up for their owners. Legislation and regulations related to land ownership is also a significant topic for the research.

CADASTRAL ANALYSIS

source: open data of the land cadastre of Ukraine, kadastr.live



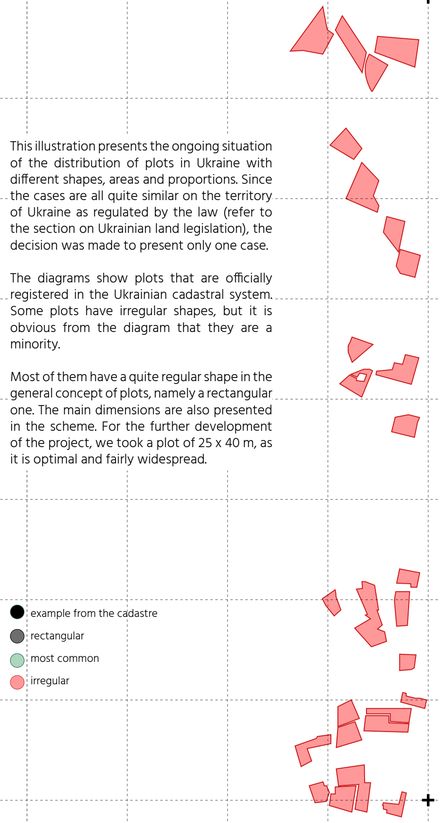




This illustration presents the ongoing situation of the distribution of plots in Ukraine with different shapes, areas and proportions. Since the cases are all quite similar on the territory of Ukraine as regulated by the law (refer to the section on Ukrainian land legislation), the decision was made to present only one case.

The diagrams show plots that are officially registered in the Ukrainian cadastral system. Some plots have irregular shapes, but it is obvious from the diagram that they are a minority.

Most of them have a quite regular shape in the general concept of plots, namely a rectangular one. The main dimensions are also presented in the scheme. For the further development of the project, we took a plot of 25 x 40 m, as it is optimal and fairly widespread.

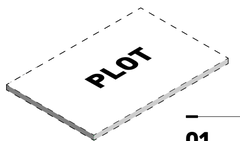


PLOT ACQUISITION

steps and possible solutions for obtaining the land plot in Ukraine

Acquiring land in Ukraine involves specific rules and requirements, which can vary based on the type of land and the purpose of acquisition.

In the case of the free acquisition of the plot, the main challenge is the finding and selection of the available, and then applying for ownership through the relevant authority.



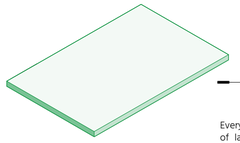
01 **02**

According to the Land Code of Ukraine(art.121) , a plot can be obtained in 3 ways: purchase, lease and free purchase from the state.

type of acquistion

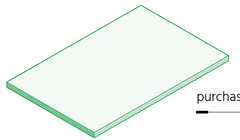
own land plot

land acquisition

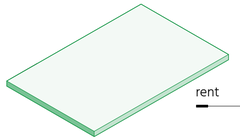


03

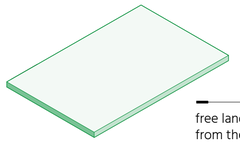
Every Ukrainian can get 6 plots of land for various purposes into private ownership for free once for each type of use (part 4 of Article 116).



purchase



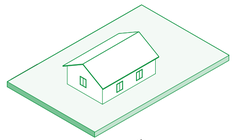
rent



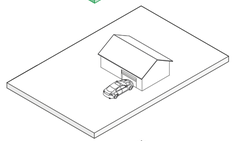
free land from the government

type of land activity

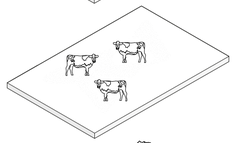
house construction



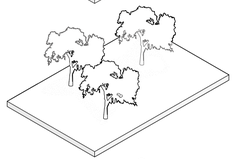
garage construction



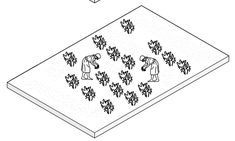
agricultural use



gardens



farming



size

dacha construction - up to 1000 m^2

04

Article 121 of the Land Code defines restrictions for the maximum size of a land plot.

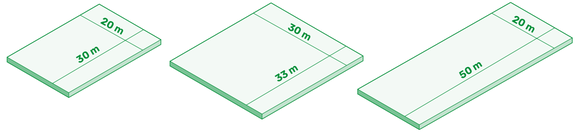
residential buildings and utility buildings construction

up to 100 m^2

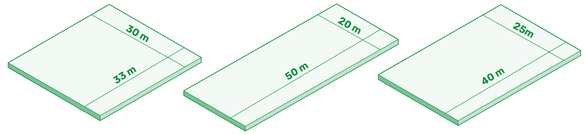
up to 2000 m^2

up to 1200 m^2

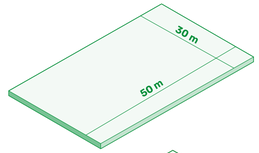
variable



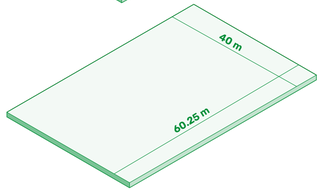
in cities - up to 1000 m2

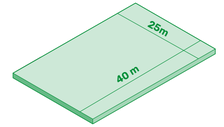


in towns-
up to 1500 m2



in villages-
up to 2500 m2





the most common size of the plot - **25x40 m**

Ukrainian citizens, legal entities registered in Ukraine, and stateless individuals with permanent residence in Ukraine generally have the right to acquire agricultural land. However, there was a moratorium on the sale of agricultural land, which meant agricultural land could not be sold, only leased.

It's crucial for anyone interested in acquiring land in Ukraine to conduct thorough due diligence, seek legal assistance, and comply with all local regulations. Land acquisition regulations may vary in different regions, and it's essential to consult local government offices and legal experts for the most up-to-date and accurate information regarding land acquisition in Ukraine

source: The Land Code of Ukraine
Information of the Verkhovna Rada of Ukraine (VVR), 2002, No. 3-4, Article 27

ORGANIZATION
of the plot

The concept of a yard covers housing, farm buildings and a small production site adjacent to them. Together with the garden and vegetable garden, such a yard formed a homestead. The structure of the homestead, its size, configuration, location in the settlement depended on both geographical and socio-economic factors. However, in the most cases the concept of the plot arrangement is similar in the majority of the regions with different deviations.

homestead

1. house
2. water well with flower beds
3. backyard
4. vegetable gardens, greenhouse, beehives etc.
5. parking place

garages and utility buildings

6. barn

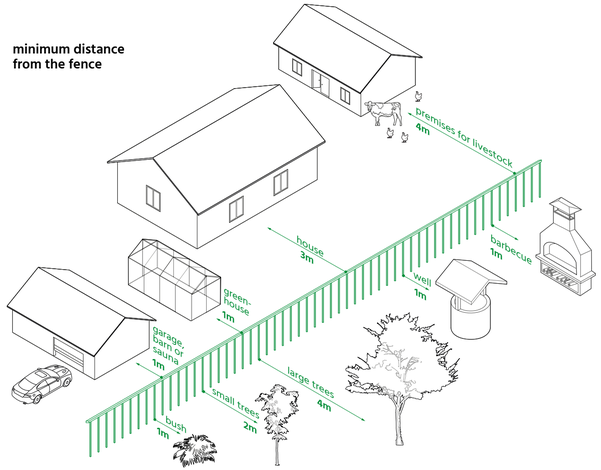
gardening

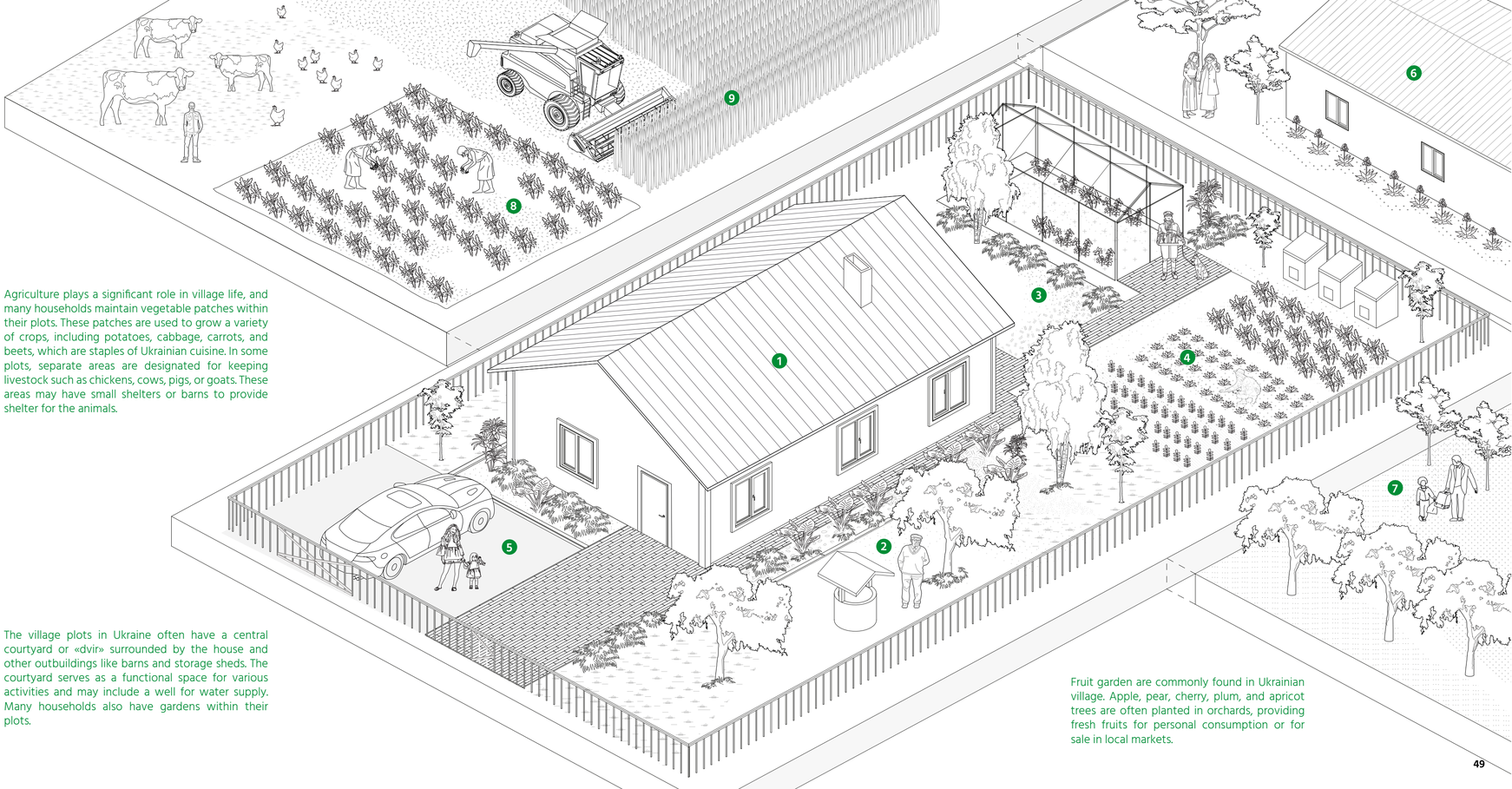
7. fruit garden

agricultural site

8. farming: vegetable pathes, domestic livestock etc.
9. field work

minimum distance from the fence





Agriculture plays a significant role in village life, and many households maintain vegetable patches within their plots. These patches are used to grow a variety of crops, including potatoes, cabbage, carrots, and beets, which are staples of Ukrainian cuisine. In some plots, separate areas are designated for keeping livestock such as chickens, cows, pigs, or goats. These areas may have small shelters or barns to provide shelter for the animals.

The village plots in Ukraine often have a central courtyard or «dvir» surrounded by the house and other outbuildings like barns and storage sheds. The courtyard serves as a functional space for various activities and may include a well for water supply. Many households also have gardens within their plots.

Fruit garden are commonly found in Ukrainian village. Apple, pear, cherry, plum, and apricot trees are often planted in orchards, providing fresh fruits for personal consumption or for sale in local markets.

4

CLIMATE SENSITIVITY

IN BUILDING DESIGN

-
photo by Balbek Bureau

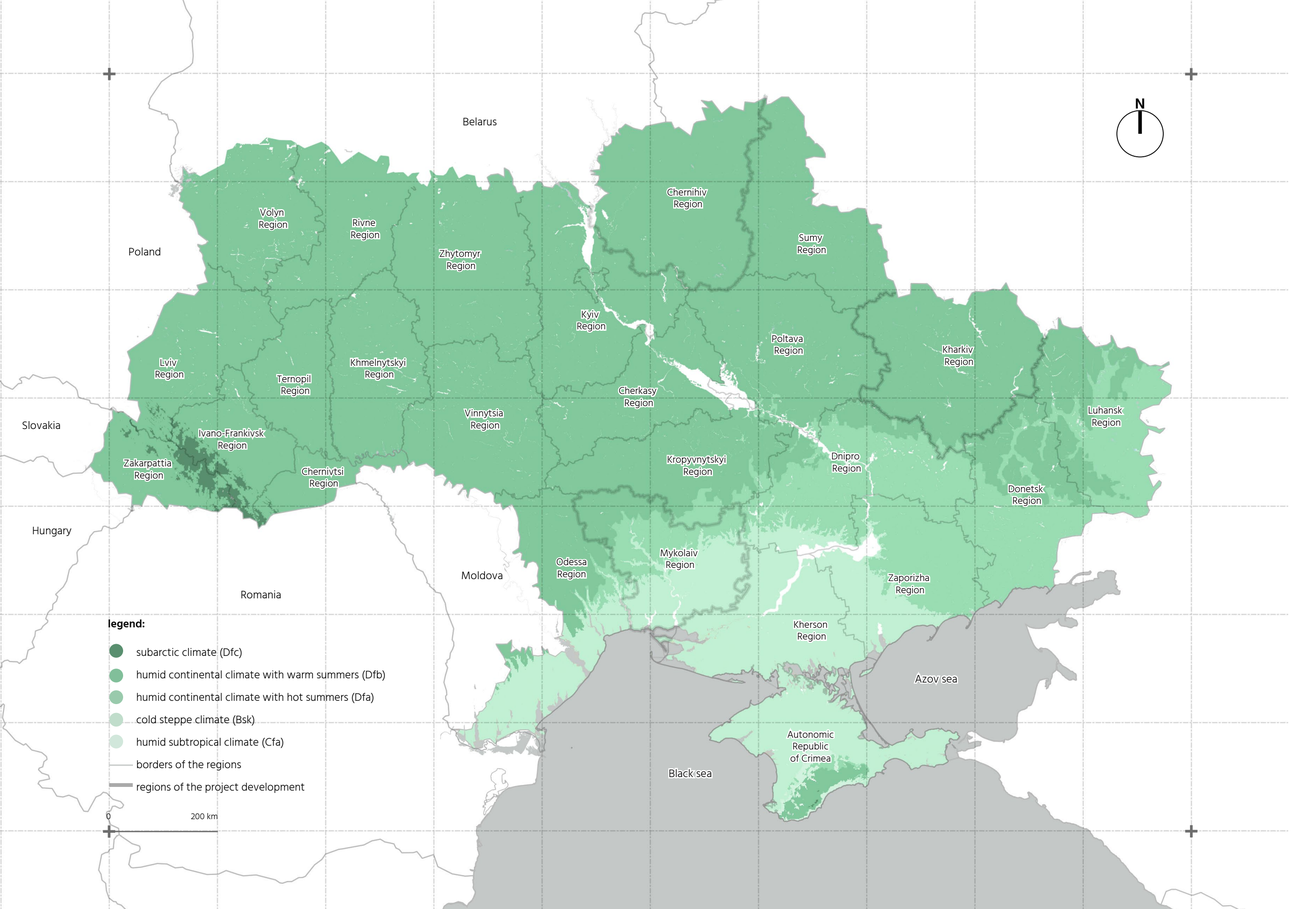
"The task of a person is to provide the greatest possible benefit to others."

Volodymyr Vernadsky
Ukrainian scientist and philosopher

In this chapter, we unravel the climate of Ukraine and its importance for the formation of traditional folk architecture. The climate not only determines the customs and daily rhythm of life, but also has a direct influence on the architectural solutions that arise in different regions of Ukraine.

The lands of Ukraine are subject to significant climatic variations, from the cold north to the warm southern coast. This variety of natural conditions and changes over the centuries prompted the development and adaptation of architectural solutions that take into account climatic features. We consider how traditional Ukrainian architecture adapted to climatic conditions and what was used for this.

We will focus special attention on three regions of Ukraine, which are located in different climatic zones and, unfortunately, have a sufficiently high level of destruction due to the war. Given these practical challenges, we will also consider the characteristic architectural features of these regions. This data is a step towards the further development of the architectural project, as it helps to take into account the unique features that must be taken into account in the design process, ensuring a harmonious interaction with the environment and cultural heritage.



CLIMATE OF UKRAINE

The climate in Ukraine is diverse and has significant differences depending on the area. According to Köppen's classification of climates in the country, there are at least 7 types of climate, which are traditionally grouped into four climate zones: continental climate (D), temperate climate (C), dry climate (B) and polar climate (E)).

The borders between different climatic regions are unclear and flow smoothly from one type to another, which is due to the country's large territory and mostly flat topography. The climate of Ukraine is constantly changing due to global warming. The continental climate zone, which covers most of the territory of Ukraine, is significantly reduced in size every year and is replaced by a moderate and dry climate that extends only to the south of the country. The polar climate zone occurs exclusively on the highest peaks of the Ukrainian Carpathians.

projected future conditions (2071–2100) under climate change

–

source: Köppen-Geiger climate classification

greater regions in Ukraine

climate data for greater regions of Ukraine per year/ avarage

source: www.worlddata.info

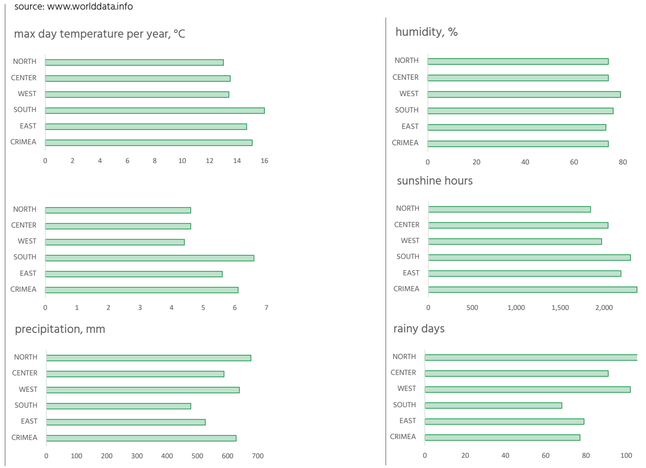
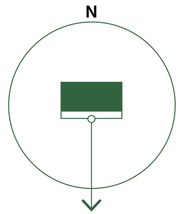


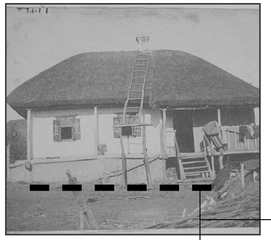
photo by Prokudin-Gorskiy, 1910s



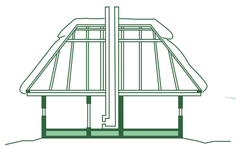
south orientation

buffer zone

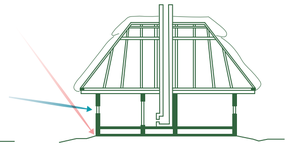
source: profilbaru.com



archive photo

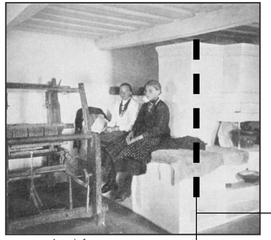


thermal barrier

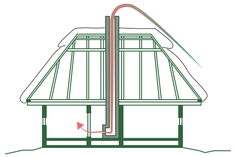


summer & winter radiation

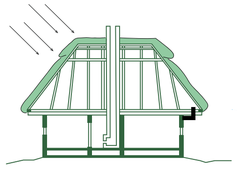
source: rozmova.wordpress.com



source: pslava.info



heating & cooling



rain & snow protection

archive photo

schemes by Sarara W. ,"Bioclimatic principles in vernacular architecture", 2018

VERNACULAR TECHNIQUES & BIOCLIMATIC STRATEGIES

It is important to approach traditional Ukrainian architecture using a variety of strategies and techniques that can be integrated and adapted in the context of modernity. Exploring this heritage can lead to the production of valuable innovative approaches.

Refering to reserch of Sarara, W (2018), Ukrainian vernacular architecture like central European architecture adapts to the region's climate, which experiences significant seasonal variations. Houses combine northern features like compact design, insulated walls, and sloped roofs with southern elements like sun protection through overhangs. Orientation is often determined by the sun's path, with the longer facade facing, south in areas with calm prevailing winds.
Houses typically have stone foundations or raised stone basements, creating a thermal buffer zone. Heating comes from hearths or kitchen stoves in the center or living room. When not in use, chimneys act as wind-catchers, for cooling.

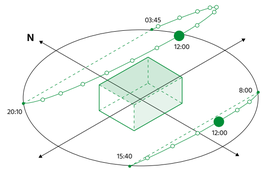
Buffer zones like hallways prevent cold air from entering when opening doors. Few windows, mostly facing south for heat and light, are used, while north façades remain windowless for pantries.

Sloped roofs with varying angles and thatch or wood materials protect against precipitation. The space beneath the roof acts as an insulating buffer zone from cold and wind.

Next, 3 Ukrainian regions, their climatic features and examples of modern rural architecture where elements of traditional architecture have been preserved will be considered.

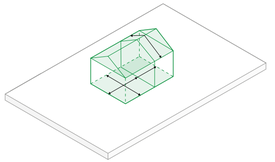
further overall project design solutions

sun & wind orientation



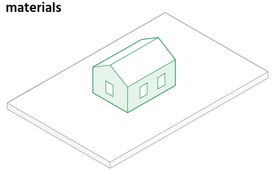
- buildings should be designed with their longer sides facing south to maximize exposure to sunlight during the colder months, reducing heating needs

building shape



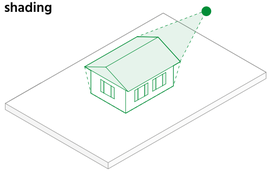
- in order to make the building energy efficient, it can be protected from the prevailing winds

materials



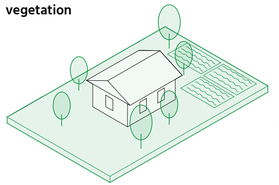
- using materials local materials with high thermal masshelps regulate indoor temperatures by absorbing and releasing heat slowly

shading



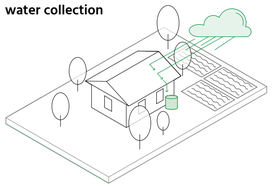
- employing external shading devices like eaves, awnings, or pergolas can prevent excessive solar heat gain in the summer while allowing sunlight in during the winter

vegetation



- deciduous trees can be used to provide shading in the summer and allow sunlight to enter in the winter.

water collection



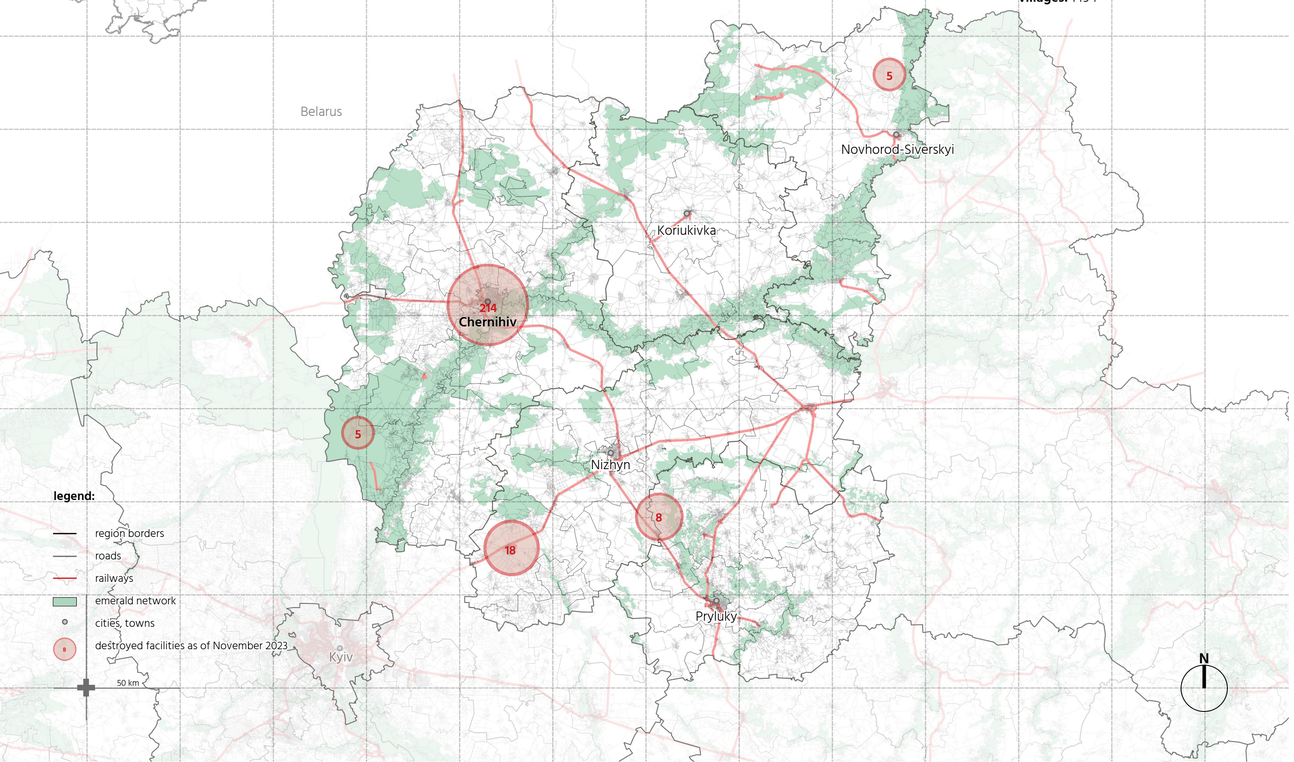
- collecting rainwater for non-potable uses, such as irrigation or toilet flushing, can reduce water consumption and strain on municipal water supplies.

CHERNIHIV REGION

general information:

location: North Ukraine
administrative center: Chernihiv
largest cities: Chernihiv, Nizhyn, Pryluky
territory: 31 903 km²
population: 959 315 (2022)

districts: 22
cities (total): 44
regional cities: 3
urban-type settlements: 34
villages: 1494



CLIMATE OF CHERNIHIV REGION

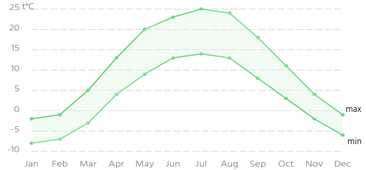
In Ukraine's far north, the Chernihiv region covers 31,903 km²

Climate:
-the average annual temperature is 6 °C/8 °C
-the coldest month- January, with an average of -6 °C/ -7°C, July- the hottest with an average of 19°C/20°C
-snow cover stabilizes from late Nov-Dec till Feb-Mar at 8-16 cm in avarage
-total annual precipitation ranges from 594-676 mm, peaking in Jun-Jul, dropping in Jan-Mar.
-west and south winds at 3-4 m/s are common.
-maintains 75-80% humidity annually, with 20-44 days per year below 30%.

Its unique location leads to extreme weather: winter brings winds, ice, and fog, while summer delivers heavy rain, thunderstorms, and hail.

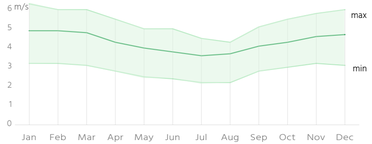
climate:

average, high and low temperature



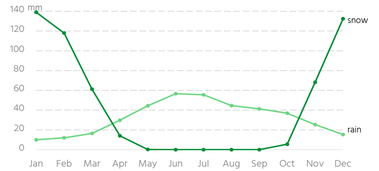
-moderate continental climate with cold winters and warm summers (Dfb)

wind speed



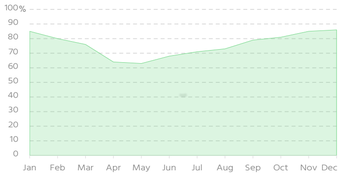
-the windier part of the year: October-April

average, monthly snowfall and rainfall



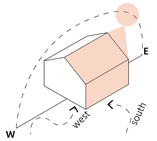
- rainy period: February- December (10 months)
- snowy period: November - April (5.2 months)

relative humidity



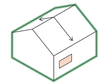
- average annual percentage of humidity: 76%;
December- the most humid month (88%)
May- the least humid month (64%)

passive strategies for the region:



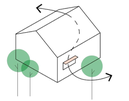
-orientation: maximization of south-facing for passive solar heating

-prevailing winds should be taken into accout for future development



-shape and openings (roofs with steeper slopes, high-performance windows)

-envelope to absorb and store heat effectively, prevent moisture's entering the building



-natural ventilation
-windbreaks: trees, shrubs
-external shading devices

- **possible building local materials:**

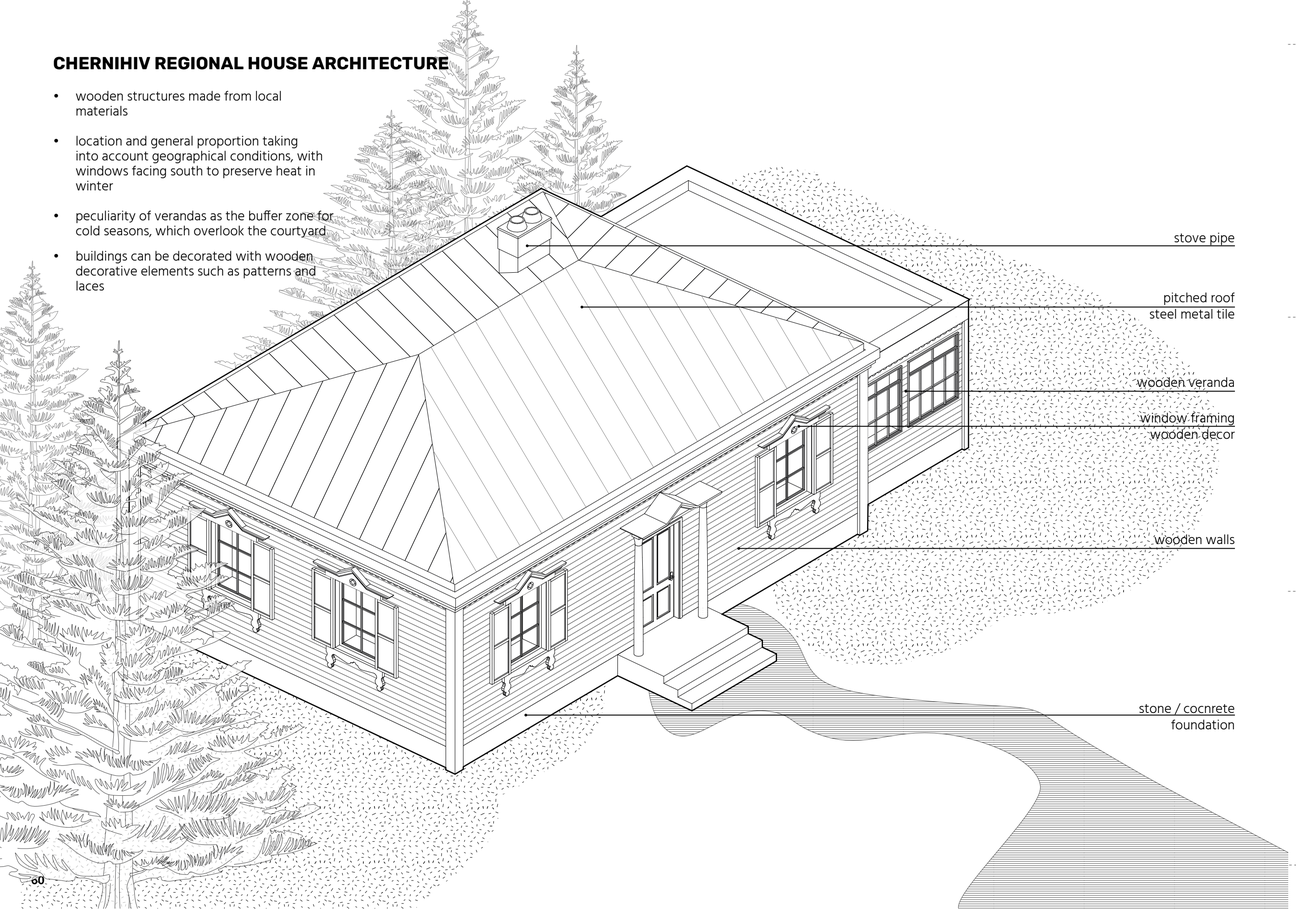
-wood (framing/ cladding/ interior finishes)
-clay (adobe bricks)
-limestone, sandstone (constructions)
-straw, reed (insulation)
_____
-concrete (20th century)

structures:

-timber frame construction
-stone construction
-brickwork
-concrete block construction

CHERNIHIV REGIONAL HOUSE ARCHITECTURE

- wooden structures made from local materials
- location and general proportion taking into account geographical conditions, with windows facing south to preserve heat in winter
- peculiarity of verandas as the buffer zone for cold seasons, which overlook the courtyard
- buildings can be decorated with wooden decorative elements such as patterns and laces



← **Chernihiv city**
photo by birdinflight.com →

↓ **Novhorod-Siverskyi town, Chernihiv region**
photo by "List of sights of Novgorod-Siversky District"

Novhorod-Siverskyi town, Chernihiv region
photo from archive of the sale advertisement ↘

↑ **Chernihiv city**
photo by birdinflight.com

Novhorod-Siverskyi town, Chernihiv region
photo from "List of sights of Novgorod-Siversky District" →

↓ **Village in Pryluky town area, Chernihiv region**
archive photo (1921)

← **Village in Pryluky town area, Chernihiv region**
photo from archive of the advertisement for sale

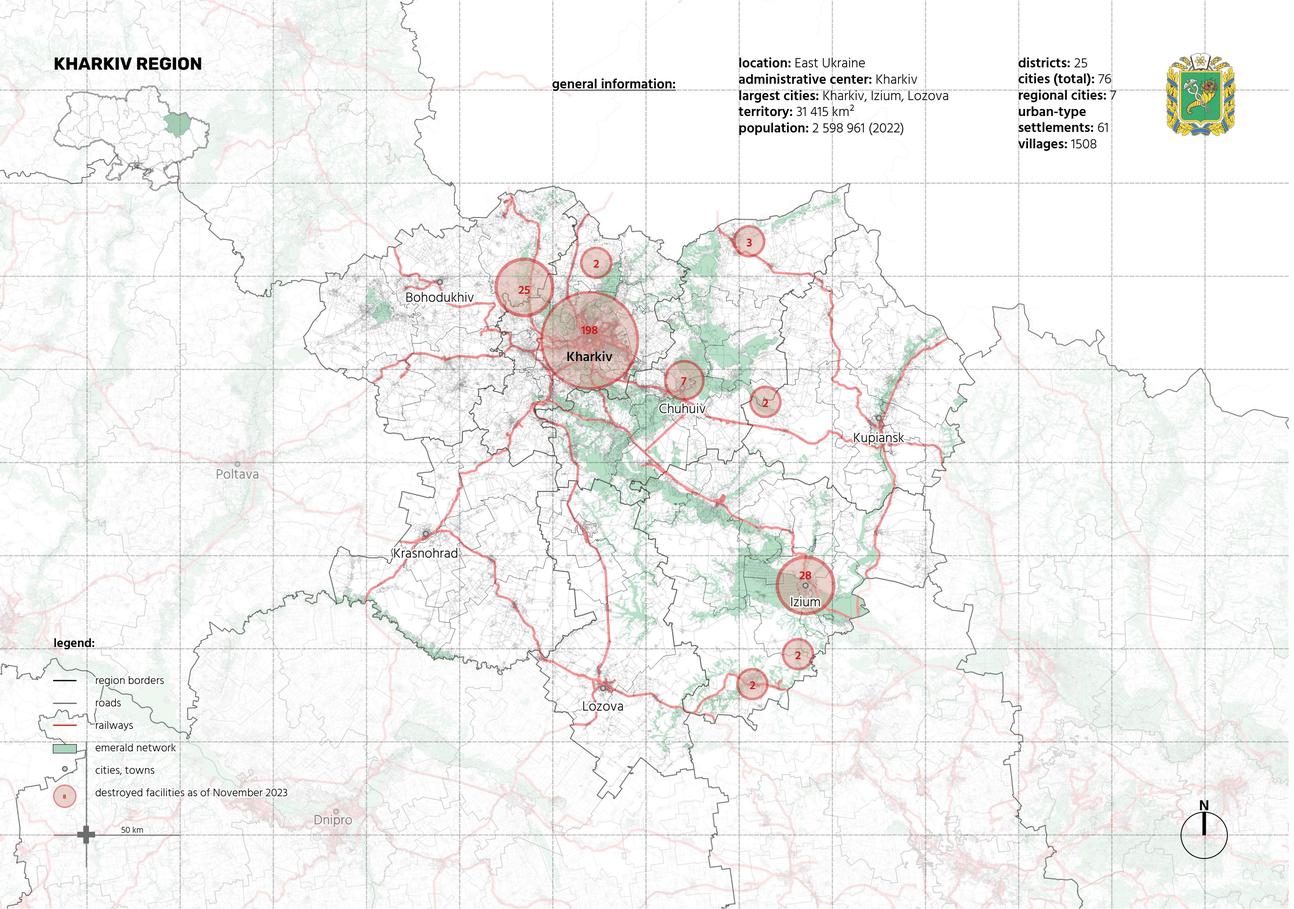
Village in Novhorod-Siverskyi town area, Chernihiv region
photo from archive of the advertisement for sale →

KHARKIV REGION

general information:

location: East Ukraine
administrative center: Kharkiv
largest cities: Kharkiv, Izium, Lozova
territory: 31 415 km²
population: 2 598 961 (2022)

districts: 25
cities (total): 76
regional cities: 7
urban-type settlements: 61
villages: 1508



legend:

- region borders
- roads
- railways
- emerald network
- cities, towns
- destroyed facilities as of November 2023

CLIMATE OF KHARKIV REGION

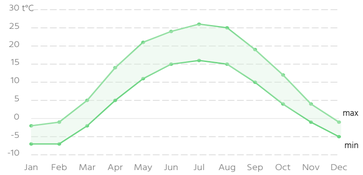
Kharkiv region covers 31 415 km in the east of Ukraine.

Climate:
-the average annual temperature is 8 °C
-the coldest month- January, with an average of -7°C, July- the hottest with an average of 20°C
-snow cover stabilizes from late Nov-Dec till Feb-Mar at 7-14 cm in avarage
-total annual precipitation ranges from 457–569 mm, peaking in Jun, dropping in Jan-Feb.
-west and east winds at 4 m/s are common
-relative humidity with a pronounced minimum in May (up to 60%) and a maximum in winter (Dec-Jan up to 85%)

The region's climate varies from north to south, with the northeast being the coldest and the southeast the warmest, but temperature differences are slight.

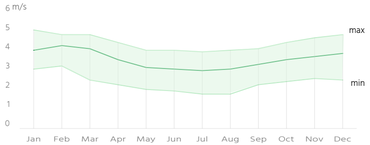
climate:

average, high and low temperature



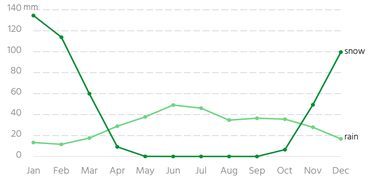
-moderate continental climate with cold winters and warm summers (Dfb)

wind speed



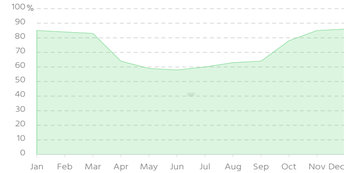
-the windier part of the year: November-April

average, monthly snowfall and rainfall



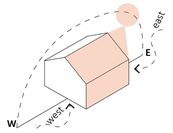
- rain falls throughout the year; the most rainy: June
- snowy period: November-April (5.1 months)

relative humidity



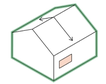
- average annual percentage of humidity: 72%;
December - the most himid month (87%)
May - the least humid month (57%)

passive strategies for the region:



-orientation: maximization of south-facing for passive solar heating

-prevailing winds should be taken into accout for future development



-shape and openings (roofs with steeper slopes, high-performance windows)
-envelope to absorb and store heat effectively, prevent moisture's entering the building, reflective roofing materials

-natural ventilation
-windbreaks: trees, shrubs
-external shading devices

- **possible building local materials:**

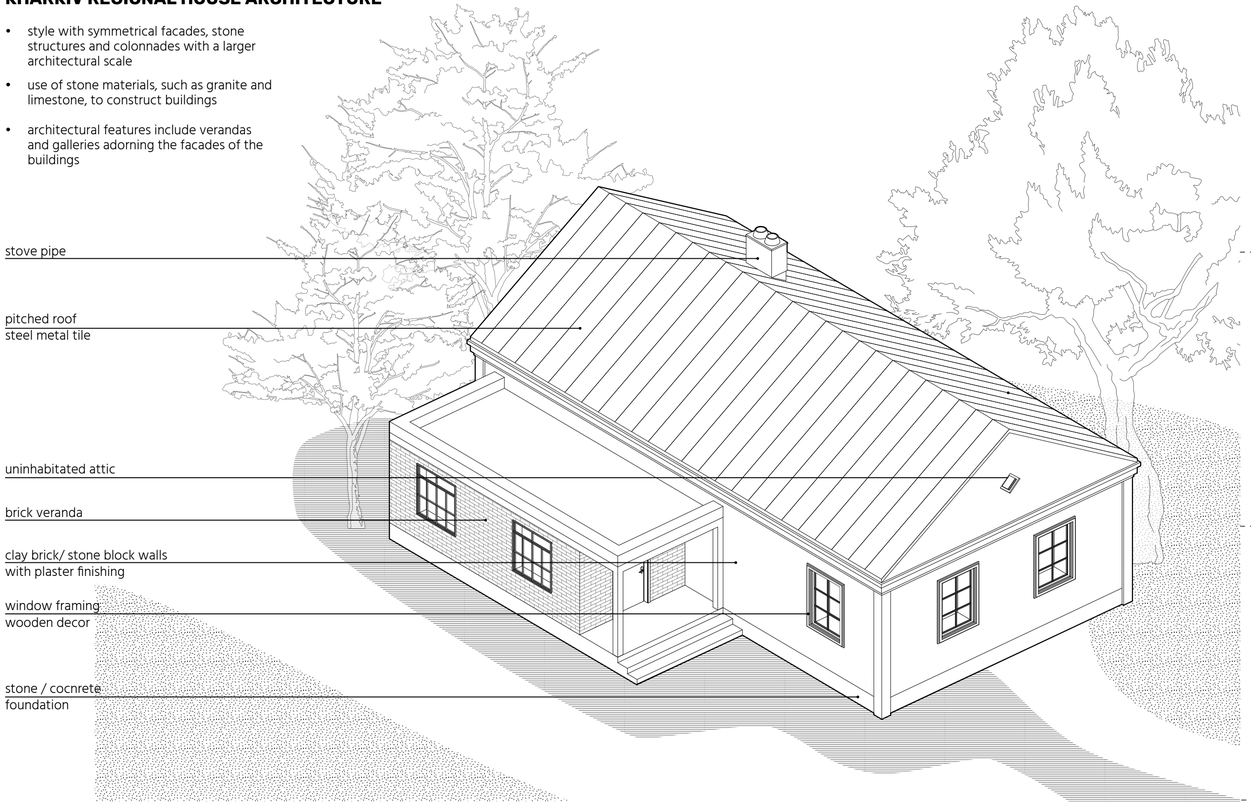
-timber (framing/ cladding/ interior finish)
-clay (bricks)
-limestone, sandstone (constructions)
-straw, reed (insulation)
_____
-concrete (20th century)

structures:

-timber frame construction
-stone construction
-brickwork
-concrete block construction

KHARKIV REGIONAL HOUSE ARCHITECTURE

- style with symmetrical facades, stone structures and colonnades with a larger architectural scale
- use of stone materials, such as granite and limestone, to construct buildings
- architectural features include verandas and galleries adorning the facades of the buildings



← **Pysarivka village, Zolochiv community, Bogodukhiv district, Kharkiv region**
photo from facebook group of museum "Ukrainian Sloboda"

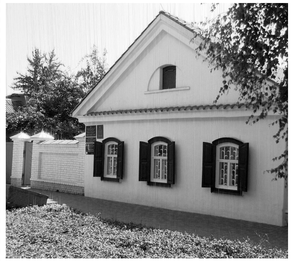
Bohodukhiv town, Kharkiv region →↘
photo from archive of the sale advertisement

↓ **Chuhuiv town, Kharkiv region**
photo from "Art-memorial Museum of I. Repin", repin.in.ua/en

↑ **Izium town, Kharkiv region**
photo from archive of the sale advertisement

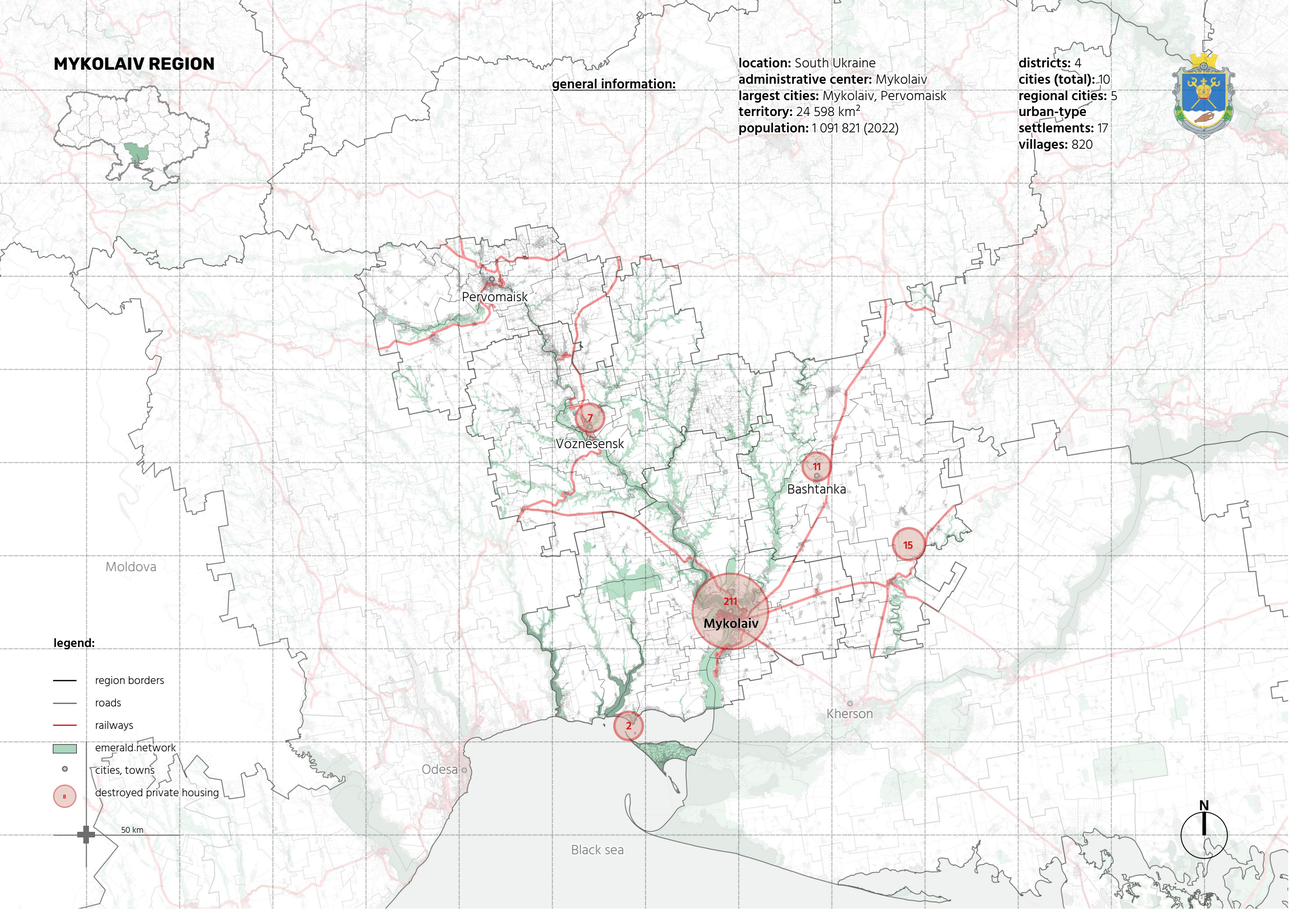
Pysarivka village, Zolochiv community, Bogodukhiv district, Kharkiv region →
photo from facebook.com, group of museum "Ukrainian Sloboda"

↓ **Krasnohrad town, Kharkiv region**
photo from archive of the sale advertisement



← **Murafa village, in Bogodukhiv district, Kharkiv region**
photo from uk.wikipedia.org

Kupiansk town, Kharkiv region →
photo from archive of the sale advertisement



CLIMATE OF MYKOLAIV REGION

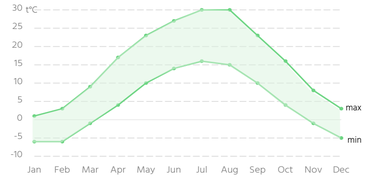
Mykolaiv region covers 24 598 km2 in the south of Ukraine.

Climate:
-the average annual temperature is 8 °C
-the coldest month- January, with an average of -7°C, July- the hottest with an average of 20°C
-snow cover stabilizes from late Nov-Dec till Feb-Mar at 9-11 cm in avarage
-total annual precipitation ranges is 330mm (South) and 450mm (North), peaking in Jun, dropping in Jan-Feb
-south and east winds at 4 m/s are common
-relative humidity with a pronounced minimum in May (up to 72%) and a maximum in winter (Dec up to 86%)

The region borders on three sides of the world with other regions of Ukraine, and in the south its territory occupies several hundred kilometers of the coastline of the Black Sea and its estuaries.

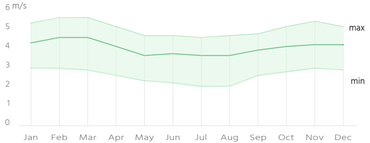
climate:

average, high and low temperature



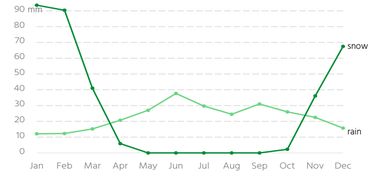
-continental climate, steppe climate with cold winters and hot summers (Dfb, Dfa, Bsk)

wind speed



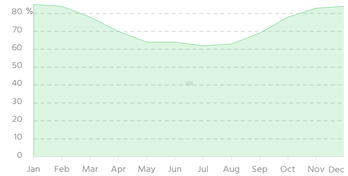
-the windier part of the year: October-April

average, monthly snowfall and rainfall



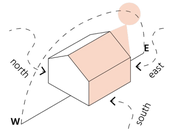
- rainy period: from February to January (11 months)
- snowy period: November - March (4.6 months)

relative humidity



- average of annual percentage of humidity: 74%;
December- the most humid month (87%),
May- the least humid month (62%)

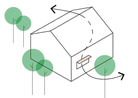
passive strategies for the region:



-orientation: maximization of south-facing for passive solar heating

-prevailing winds should be taken into accout for future development

-shape and openings (roofs with steeper slopes, high-performance windows)
-envelope to absorb and store heat effectively, prevent moisture's entering the building, reflective roofing materials



-natural ventilation
-windbreaks: trees, shrubs
-external shading devices

possible building local materials:

-wood (framing/ cladding/ interior finishes)
-clay (adobe bricks)
-limestone, sandstone (constructions)
-straw, reed (insulation)

-concrete (20th century)

structures:

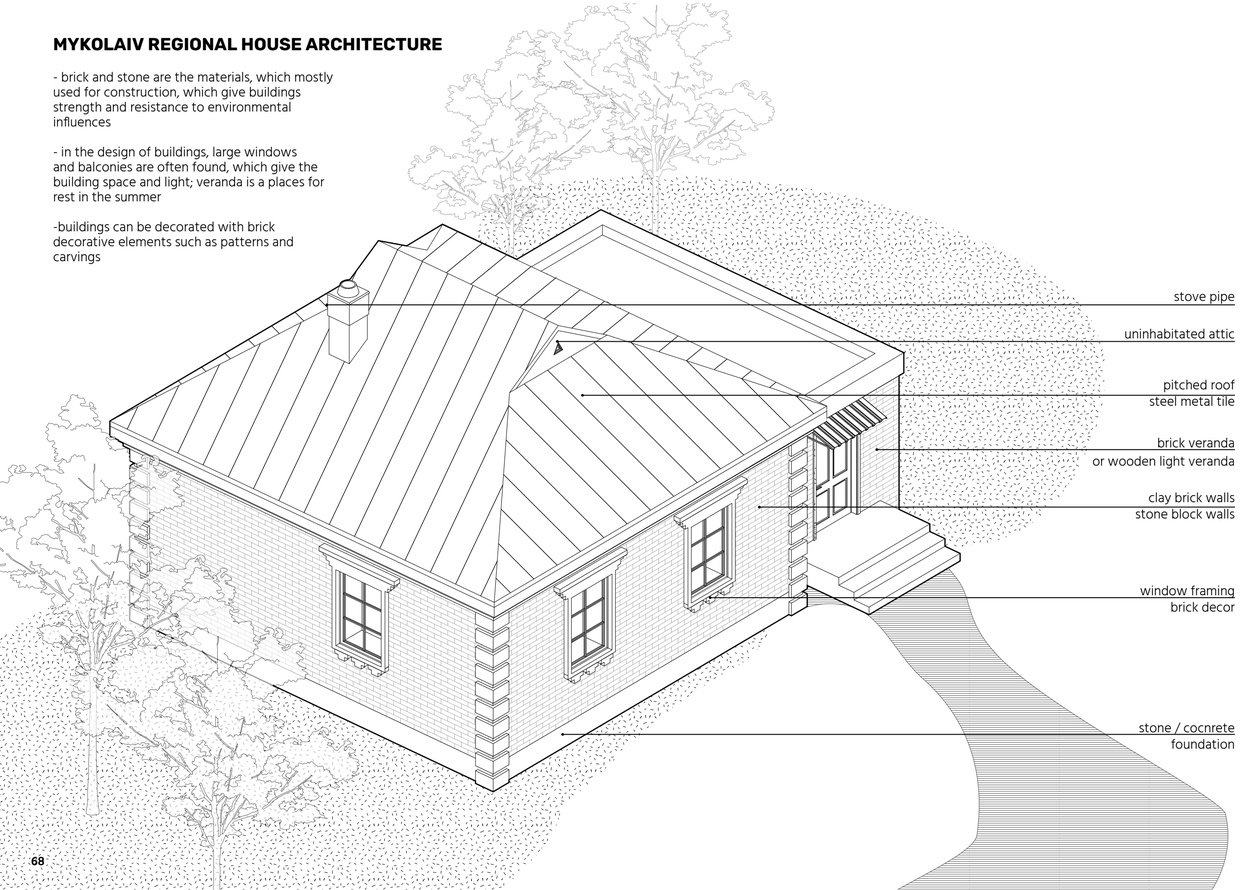
-timber frame construction
-stone construction
-brickwork
-concrete block construction

MYKOLAIV REGIONAL HOUSE ARCHITECTURE

- brick and stone are the materials, which mostly used for construction, which give buildings strength and resistance to environmental influences

- in the design of buildings, large windows and balconies are often found, which give the building space and light; veranda is a places for rest in the summer

-buildings can be decorated with brick decorative elements such as patterns and carvings



← **Mykolaiv city**
photo by archmykolaiv.com

Myhia village, Mykolaiv region →
photo from archive of the sale advertisement

Pervomaisk town, Mykolaiv region
photo from archive of the sale advertisement
↓ ↘

↑ **Mykolaiv city**
photo by archmykolaiv.com

Pervomaisk town, Mykolaiv region →
photo from archive of the sale advertisement

↓ **Bashtanka town, Mykolaiv region**
photo from archive of the sale advertisement

← **Voznesensk town, Mykolaiv region** →
photo from archive of the sale advertisement

5

BUILDING RESOURCES

MATERIALS & ELEMENTS

-
source: pokrovgzk.com.ua

"The task of a person is to provide the greatest possible benefit to others."

© Volodymyr Vernadsky

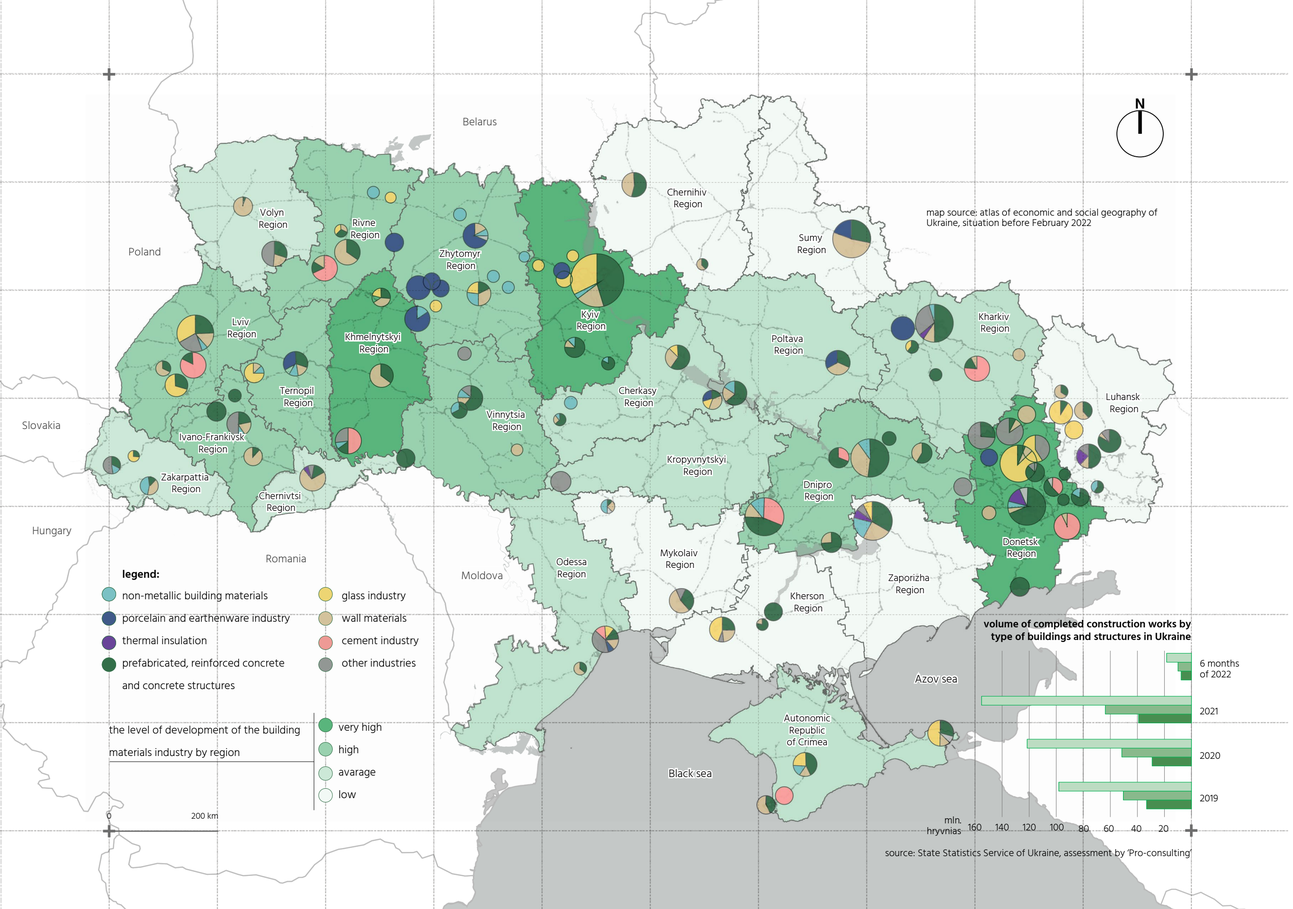
This chapter on building materials, land use, soils and foundations aims to reveal important aspects related to possible sustainable construction in Ukraine.

Building materials and methods of their use play an important role in our gradual efforts to reduce carbon dioxide emissions and preserve the environment. In the conditions of post-war revival and deepening development of environmental awareness, it is extremely important to be attentive to local resources and materials that are available for construction. This means exploring the possibilities of using forests for wooden building elements, using local materials to reduce carbon dioxide during transport and production, etc.

In light of global warming and environmental challenges associated with wartime events, we must adapt our construction methods and choice of materials to preserve Ukraine's diverse and valuable nature.

Approaches to the construction of foundations should also be individualized, since our country is distinguished by a variety of soils and climatic zones.

In this chapter, we consider to take into account environmental aspects and natural resources.

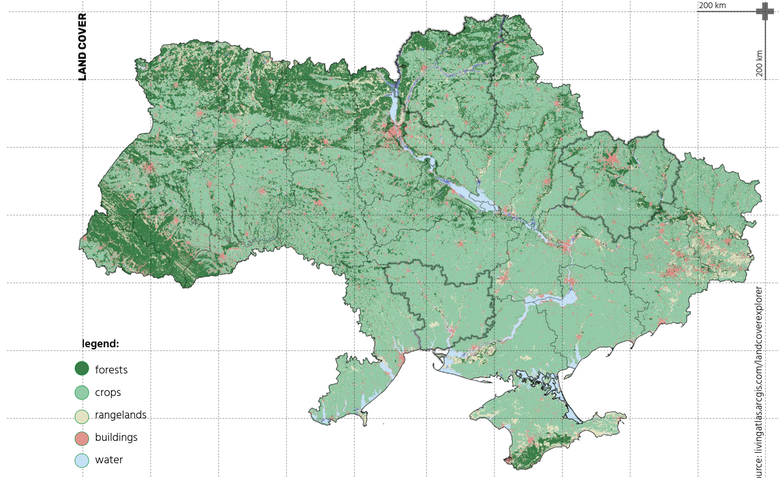


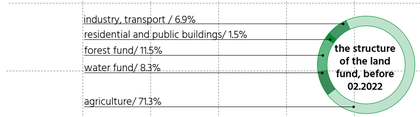
MATERIALS

In pre-war times, Ukraine produced a variety of building materials, such as various types of cement, colored ceramic tiles, ceramic sanitary ware, glass products for heat and sound insulation, glass blocks, components made of dense and porous silicate concrete, as well as polymer building materials and many other similar products.

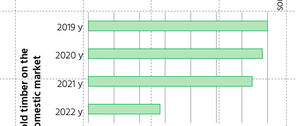
In 2020, forests in Ukraine amounted to 10.4 million hectares, of which 9.6 million hectares were covered with forest vegetation. Over the past 50 years, the supply of wood has tripled. Reforestation occurs through restoration of former forest and afforestation of degraded lands. Most forests in Ukraine have a limited raw material base, with the dominant tree species being pine, beech, oak and spruce. Harvesting of forest resources satisfied about a third of the needs of the national economy.

The charts show the significant industrial decline that occurred in 2022 due to the war.





source: atlas of economic and social geography of Ukraine



source: public report of the head of the state forest resources agency of ukraine for 2019-2022

FOUNDATIONS

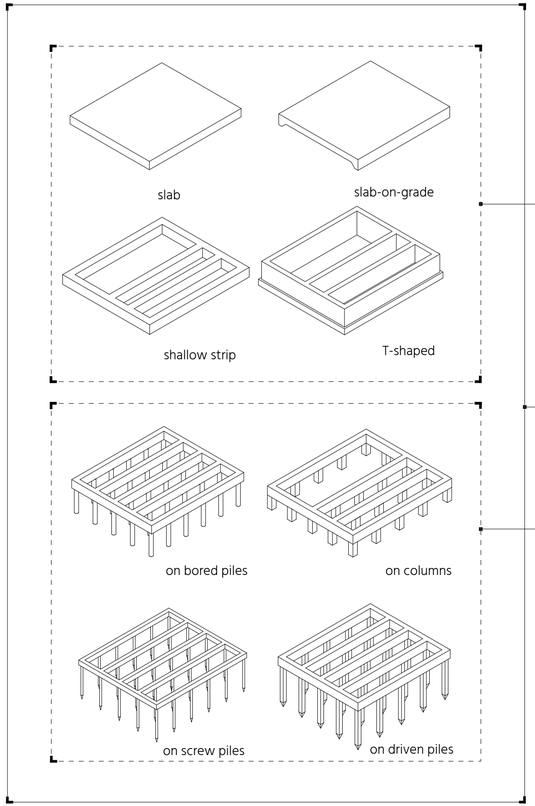
Foundations play a key role in the reliability and stability of buildings. Ukrainian construction practice uses different types of foundations depending on the geological conditions and purpose of buildings.

The strip foundation is one of the common types, it provides an even distribution of the load for the stability of smaller and medium-sized buildings

The slab foundation is a flat structure that distributes the load evenly, ideal for large buildings.

Pile foundation - pillars (piles) are driven deep into the soil for support, used on unstable soils or with high groundwater levels.

Columnar foundation - vertical pillars are used as a support, used to raise buildings above ground level.



- sandy
- clay-sandy
- subsandy
- sandy and light loam
- coarse-grained and light loamy
- dusty-light loamy
- sandy-medium loam
- coarse-grained-medium loamy
- dusty-medium loamy

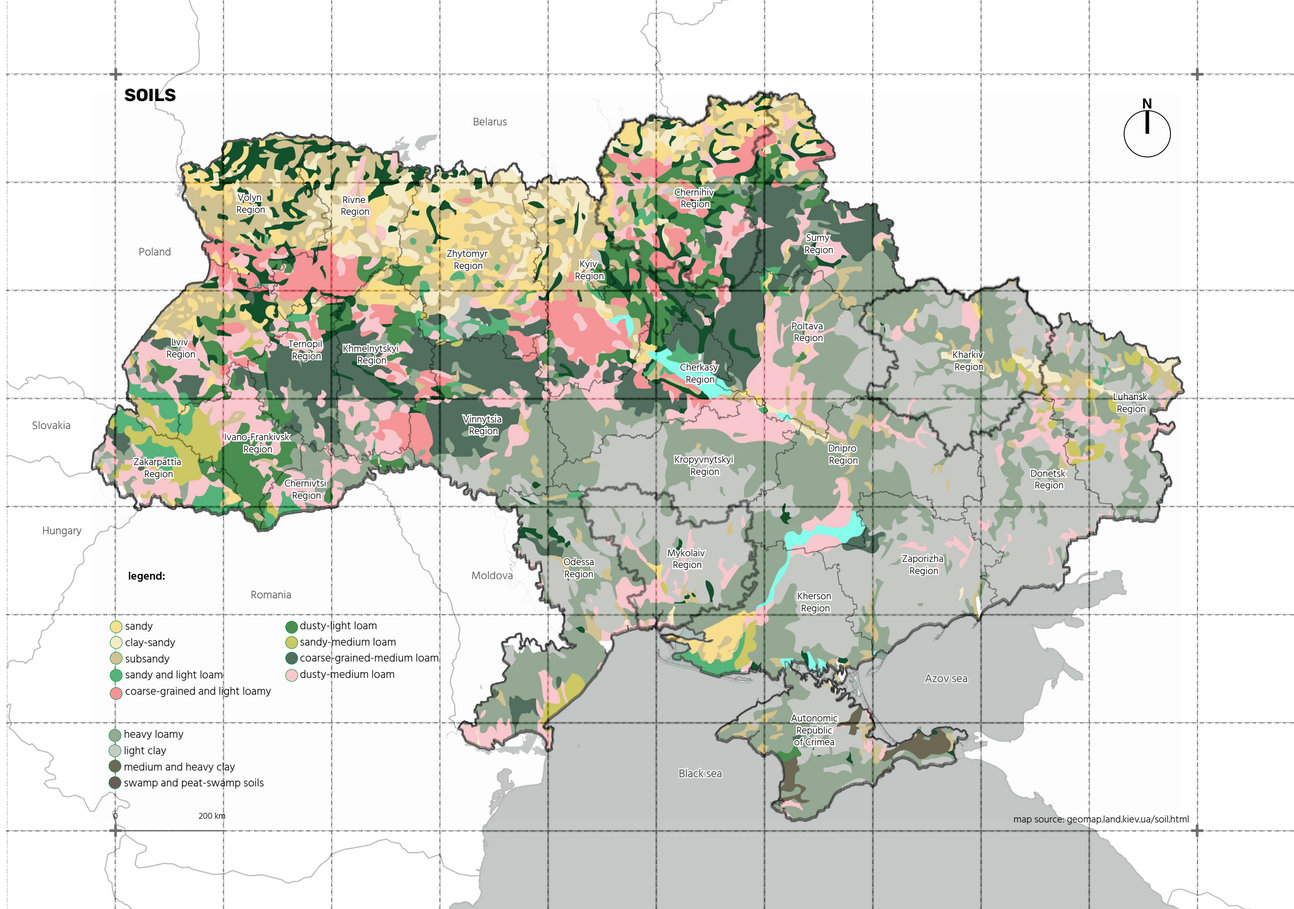
- heavy loamy
- light clay
- medium and heavy clay

- swamp and peat-swamp soils

sources:

foundationhandbook.ornl.gov

Basics and foundations, summary of lectures; Kharkiv National University of Urban Economy



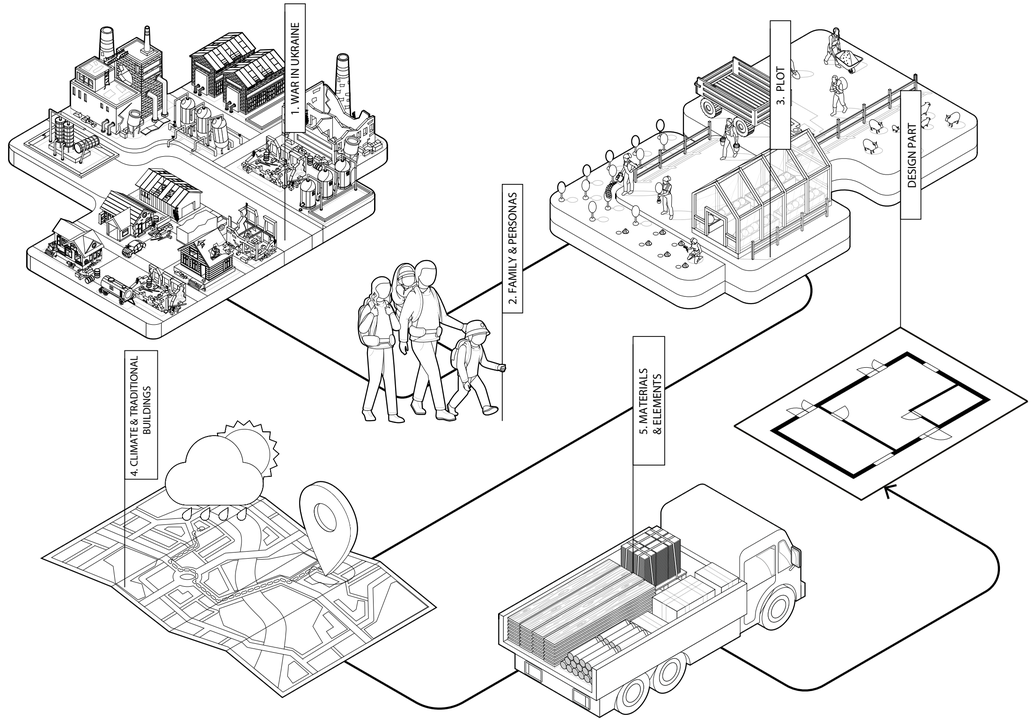
SUMMING UP

In the final conclusion of this part, it can be compared to a narrative where each chapter is a separate stage of our journey of building a new home.

We initiated our journey by researching the events of war, their impact on buildings, the environment, family groups and their housing needs. Next, we focused our attention on what we needed to create a new place. Namely, they considered the procedure for obtaining land plots and the activities that can be conducted on them.

In the course of our research, we got acquainted in detail with the principles of architectural design and its compliance with climatic conditions. We carefully considered the characteristics of different regions of Ukraine that will be chosen for the implementation of our project, taking into account their characteristics and needs for adaptation to specific climatic conditions. The last stage of the research was the analysis of the local production of building materials, since one of the central goals of this project is the development of a sustainable approach to self-construction.

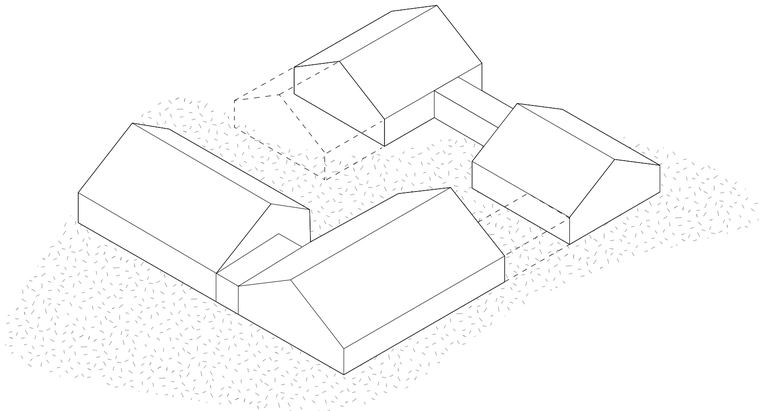
As a result, we advance to the next key stage in the implementation of our project - the design part. The principle goal of this stage is to create a simple and adaptive design that takes into account the accumulated knowledge and remains accessible for construction even by those with limited experience in the field. As the survey showed, people are still ready to fight for their future comfort and even for this to learn something new in construction, so we focus our attention not on the mass stamping of a typical project, but on a more humane approach, where there is an opportunity to choose what is more taken care of. We develop our project taking into account all the aspects that were studied during this reserch, and move towards our main goal - creating housing that satisfies the individual needs and capabilities of Ukrainians.



6

PROJECT PART

DESIGN & CONSTRUCTION OPTIONS



Here we start to develop the design part of our project, which includes several important aspects. We begin with the possible organization of the site, which is directly related to further construction. It is important to carefully consider all possibilities and limitations in order to ensure maximum functionality and convenience when placing a house on a plot of land.

Next, our project involves considering the possible evolution of the house. Namely, the development of possible additions and extensions that can be performed later, after main volume of the house is done. With the development of the family or changing needs, situations may arise when it is necessary to expand the living space. We will consider various options and design solutions for such situations to make the house as adaptable as possible.

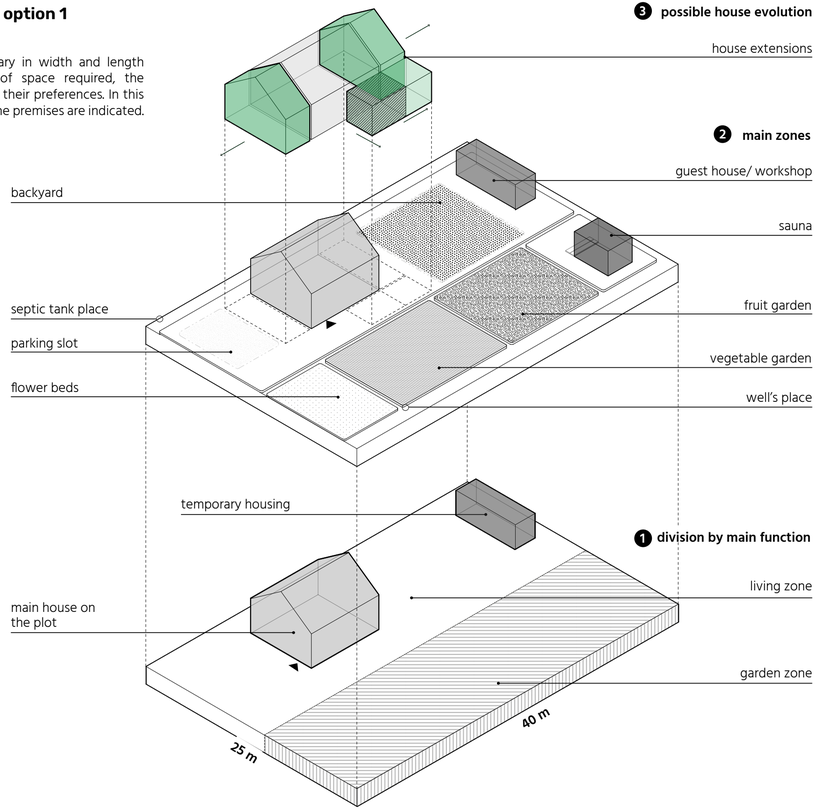
Next part of our work is the development of detailed drawings and plans that allow us to bring our project to life. We take into account all the accumulated knowledge and recommendations, and try to ensure the maximum efficiency and ergonomics of the space.

Our goal is to create housing that perfectly meet the needs and capabilities of modern families, integrating practicality and comfort into their everyday life.

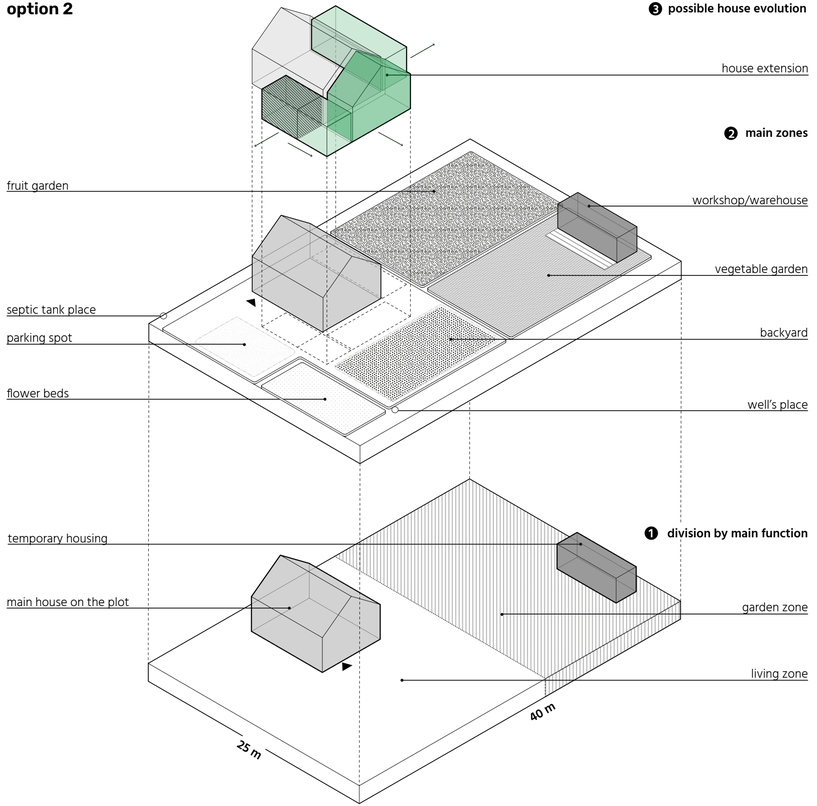
PLOT ZONES

option 1

The size of the house can vary in width and length depending on the amount of space required, the composition of the family and their preferences. In this scheme, the optimal areas of the premises are indicated.

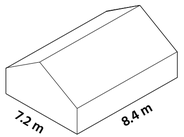


option 2

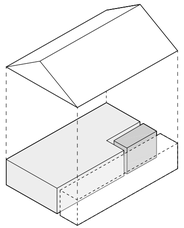


HOUSE EVOLUTION

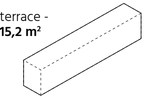
general planning solution



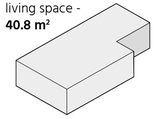
total area - **60.5 m²**



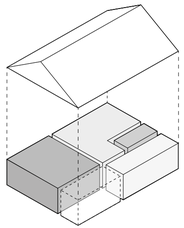
1 terrace - **15,2 m²**



2 living space - **40.8 m²**



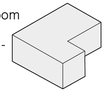
3 bathroom - **4,5 m²**



4 terrace - **6,2 m²**

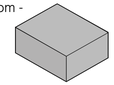
5 veranda - **9 m²**

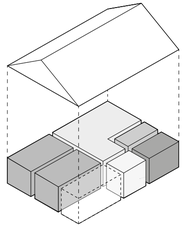
6 living room and kitchen - **20.8 m²**



3 bathroom - **4.5 m²**

8 bedroom - **20 m²**

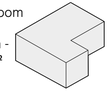




4 terrace - **6,2 m²**

9 hall - **3 m²**

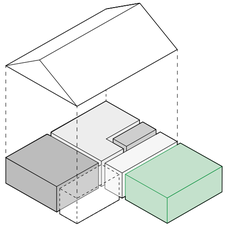
6 living room and kitchen - **20.8 m²**



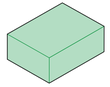
3 bathroom - **4.5 m²**

10 bedroom - **10 m²** **x 2**

11 storage - **4.6 m²**

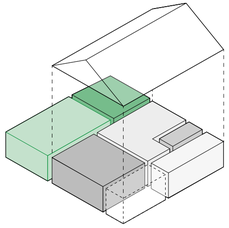


12 room - **12 m²**

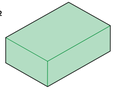


total area - **72.5 m²**

developed options

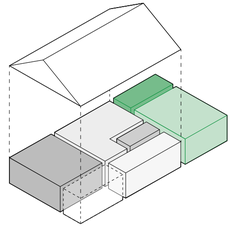


12 room - **15.8 m²**

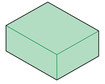


13 dining room - **9.3 m²**

total area - **85.6 m²**

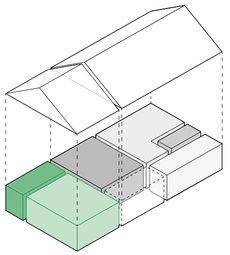


12 room - **14 m²**

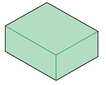


14 dining room - **6 m²**

total area - **80.5 m²**



12 room - **14 m²**

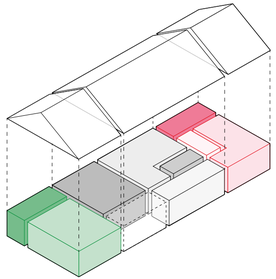


14 dining room - **6 m²**

total area - **80.5 m²**

* The size of the house can vary in width and length depending on the amount of space required, the composition of the family and their preferences. In this scheme, the optimal areas of the premises are indicated.

future extension

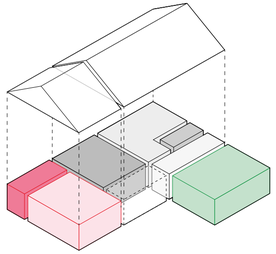


15 bathroom - **4.5 m²**

14 hallway - **6 m²**

16 room - **14 m²**

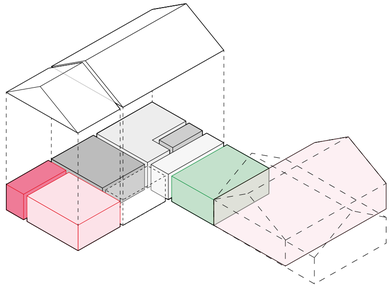
total area - **100.5 m²**



17 room - **14 m²**

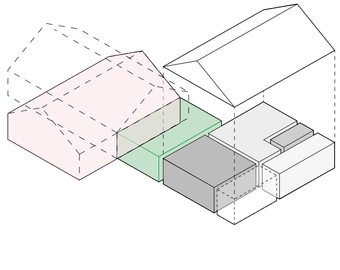
14 hallway - **6 m²**

total area - **92.5 m²**



18 additional house > **60 m²**

total area > **150 m²**



18 additional house > **60 m²**

total area > **150 m²**

Tailored to accommodate varying needs and preferences, our design concept envisions a flexible design solution. At its core, we have carefully developed the initial general module of optimal dimensions of 7.2x8.4 m. This core serves as the foundation from which the house can organically expand in size and functionality, adapting seamlessly to the evolving requirements of its occupants. By tailoring the size and functionality of the house to the specific requirements of individuals, our approach ensures a seamless blend of practicality and aesthetics.

In this innovative approach, individuals have the freedom to select from diverse layout options right from the outset. Alternatively, should the need arise, they can easily attach additional blocks at a later stage. This flexibility empowers residents to create their living spaces, ensuring that their homes grow with them, embodying a perfect blend of versatility and personalized comfort.

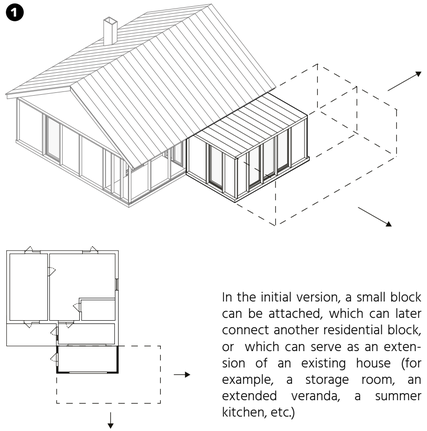
Thus, by providing a harmonious blend of versatility and individual comfort, our design concept ensures that residents not only find a house but a true home that evolves alongside their lives, embodying the perfect synergy of innovation and personal expression.

EVOLUTIONARY FUTURE OF HOUSING

option 1

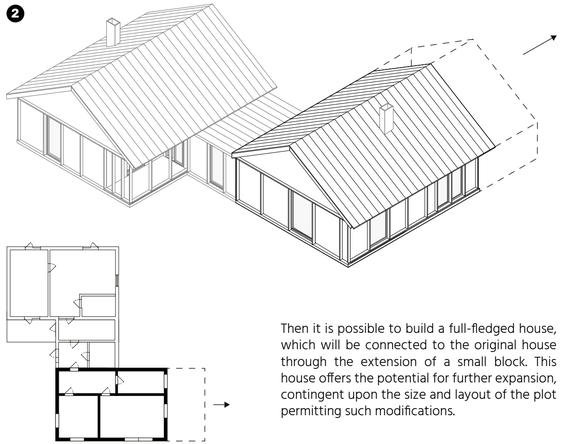
This proposal is based on the concept of an extension to the entrance part of the building. Such a solution is possible only if there is sufficient space in front of the house on the plot.

1



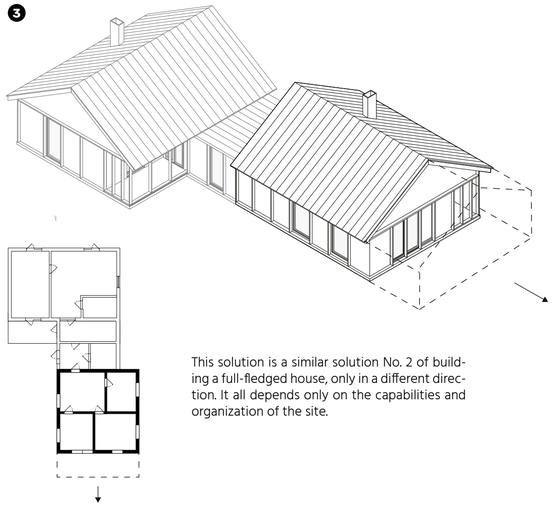
In the initial version, a small block can be attached, which can later connect another residential block, or which can serve as an extension of an existing house (for example, a storage room, an extended veranda, a summer kitchen, etc.)

2



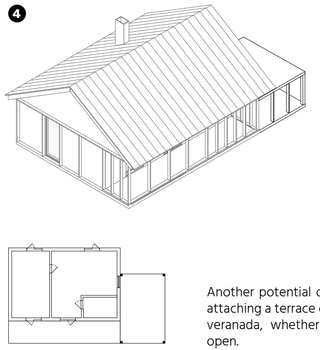
Then it is possible to build a full-fledged house, which will be connected to the original house through the extension of a small block. This house offers the potential for further expansion, contingent upon the size and layout of the plot permitting such modifications.

3



This solution is a similar solution No. 2 of building a full-fledged house, only in a different direction. It all depends only on the capabilities and organization of the site.

4

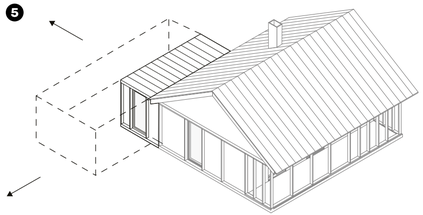


Another potential option involves attaching a terrace connected to a veranada, whether concealed or open.

option 2

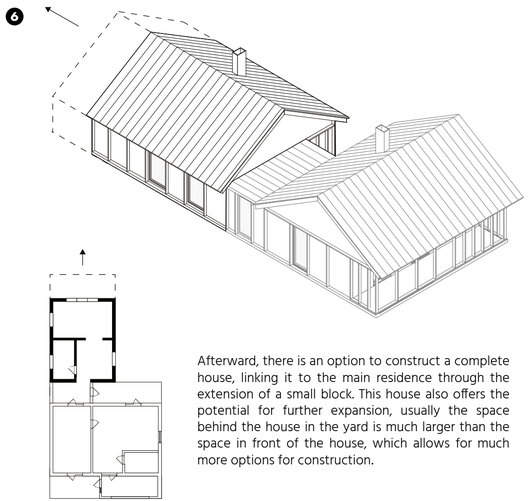
The proposal revolves around extending the backyard section of the structure. This option is viable given an ample space available behind the existing house on the plot.

5



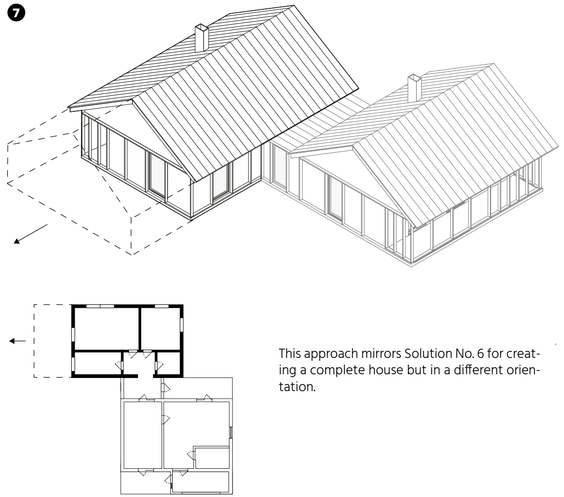
Firstly, a compact module can be affixed, providing the option to link to another residential unit or function as an expansion of an existing dwelling (such as a living room, storage space, etc.).

6



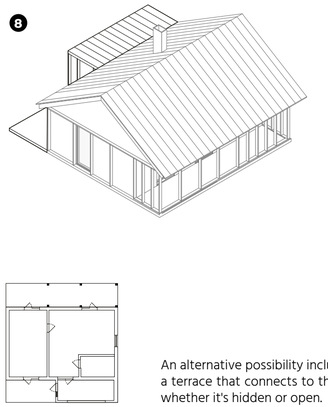
Afterward, there is an option to construct a complete house, linking it to the main residence through the extension of a small block. This house also offers the potential for further expansion, usually the space behind the house in the yard is much larger than the space in front of the house, which allows for much more options for construction.

7



This approach mirrors Solution No. 6 for creating a complete house but in a different orientation.

8

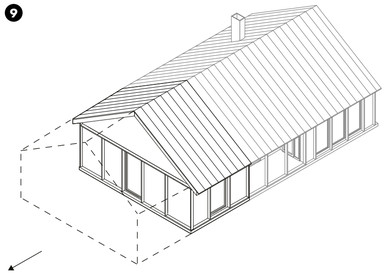


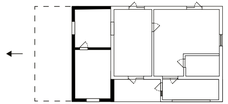
An alternative possibility includes adding a terrace that connects to the backyard, whether it's hidden or open.

option 3

This proposal suggests the incorporation of additional blocks on the sides of the house.

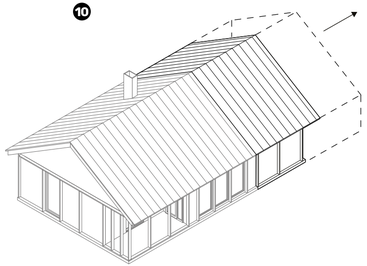
9

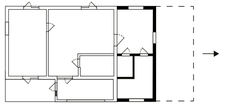




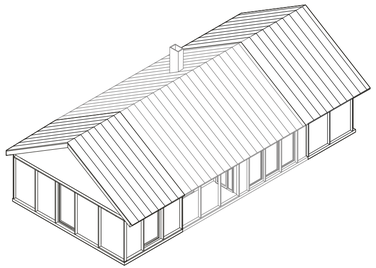
In the cases 9 and 10, an additional residential module can be attached to one of the sides of the building (it can be as one room, or a full-fledged residential module with a kitchen, bathroom and living rooms).

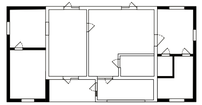
10





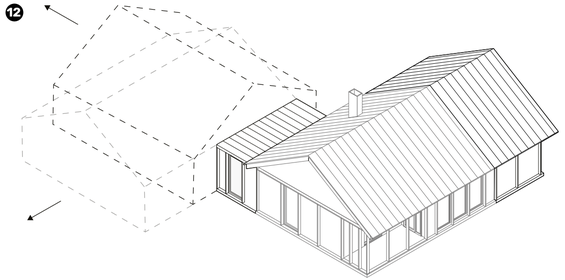
11

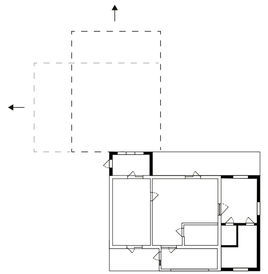




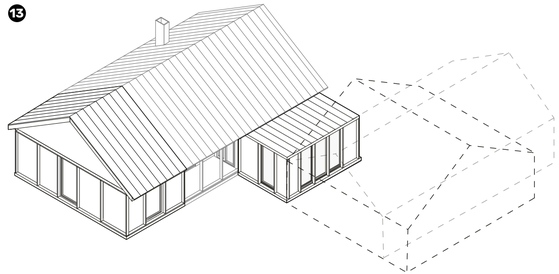
This approach involves adding blocks on both sides of the house.

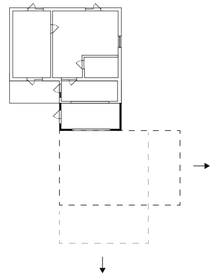
12





13





Examples No. 12 and 13 illustrate scenarios where a house extension can occur in multiple directions. This expansion choice is viable for sufficiently spacious plots.

CONSTRUCTION OPTIONS

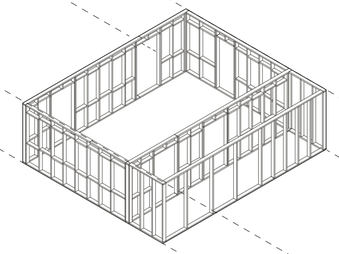
Construction practices and techniques in Ukraine exhibit significant diversity, shaped by a myriad of factors including regional preferences, available resources, and project requirements. Within this diversity, two primary categories emerge: lightweight construction and heavyweight construction.

In the realm of lightweight construction, timber-frame technologies are mainly used, at the same time, technologies for the manufacture of prefabricated wooden structures are also becoming more widespread. In contrast, heavyweight construction methods hold sway in the form of masonry and precast reinforced concrete techniques. These robust techniques are well-suited for structures requiring substantial strength and durability, ensuring the integrity of buildings in diverse environments and applications.

The rich tapestry of construction practices in Ukraine reflects the nation's adaptability, blending time-honored techniques with cutting-edge innovations to create a vibrant architectural landscape.

*** It is important to note that in rural areas, construction practices might vary based on local resources, building traditions, and the preferences of the homeowners. Since rural areas are often more remote, modern construction materials and methods might be less accessible or used primarily in larger towns and cities.**

LIGHTWEIGHT
construction

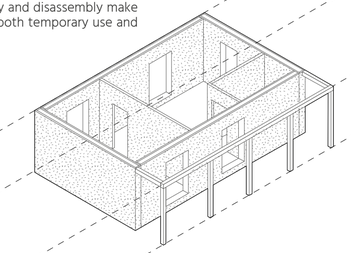


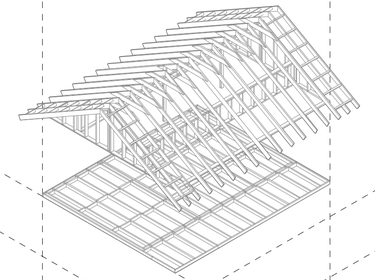
timber-frame structure

is used in the most forested regions in Ukraine particularlyin the northern part. It is often popular in rural and suburban settings where the availability of local timber resources make it a practical choice. Pine and spruce are commonly used for the structural frame, while other local materials such as straw or reed can be used for insulation. This technique offers several advantages, including environmental sustainability, energy efficiency, and cost-effectiveness.

prefabricated timber structure

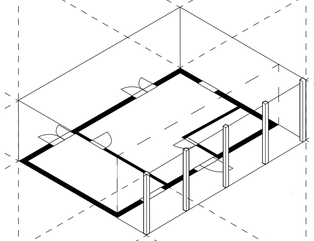
has gained popularity all over the world, including Ukraine, due to its efficiency, speed of construction, design flexibility, environmental friendliness and profitability, and is more used in the north of Ukraine due to the availability of construction resources. In addition, quick assembly and disassembly make this technique more convenient for both temporary use and long-term housing.



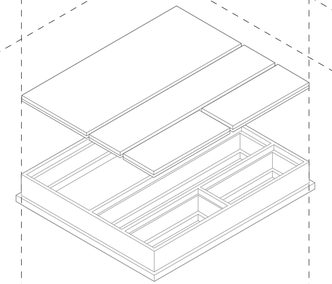


roof

upper-slab



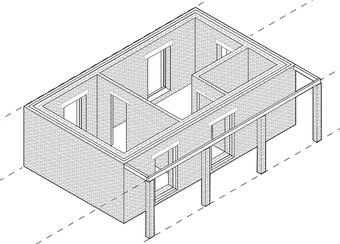
planning solution



slab

foundation

HEAVYWEIGHT
construction

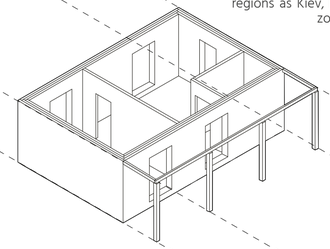


masonry structure

is a popular construction technique in the North of Ukraine due to the abundance of clay in the region. The fired clay bricks are stacked and bonded together with mortar to create walls and other structural elements. Brick houses are known for their durability, thermal insulation, and aesthetic appeal, making them a popular choice for private residences.

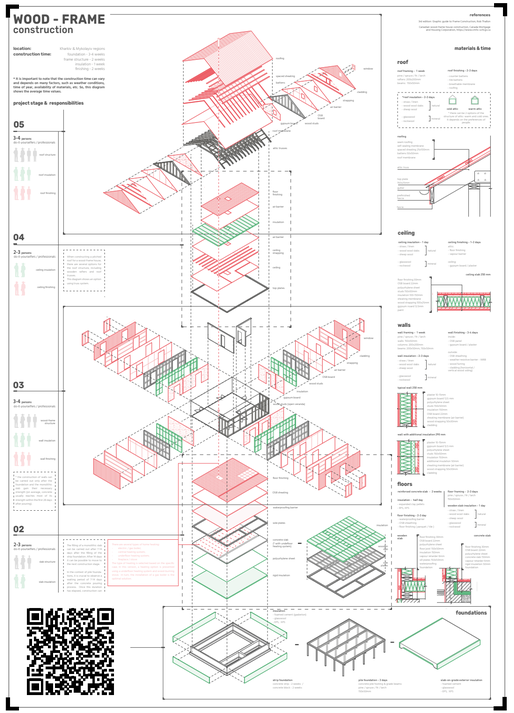
precast concrete structure

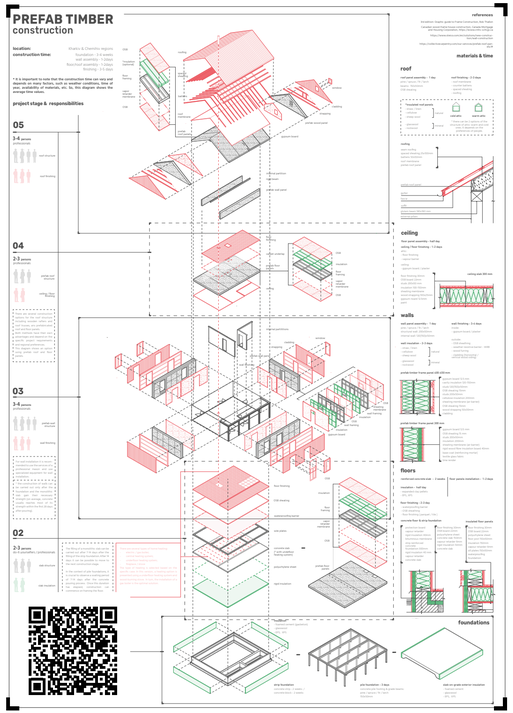
is widely used in Ukraine, both for private and public construction projects. This method has a number of advantages, such as increased economic efficiency, improved quality control and reduced construction time. This type of construction technique is more popular in such regions as Kiev, Kharkiv, Lviv and Odessa, as well as in the seismic zones of the Carpathian region and near the Black Sea.



LIFGTWEIGHT CONSTRUCTION

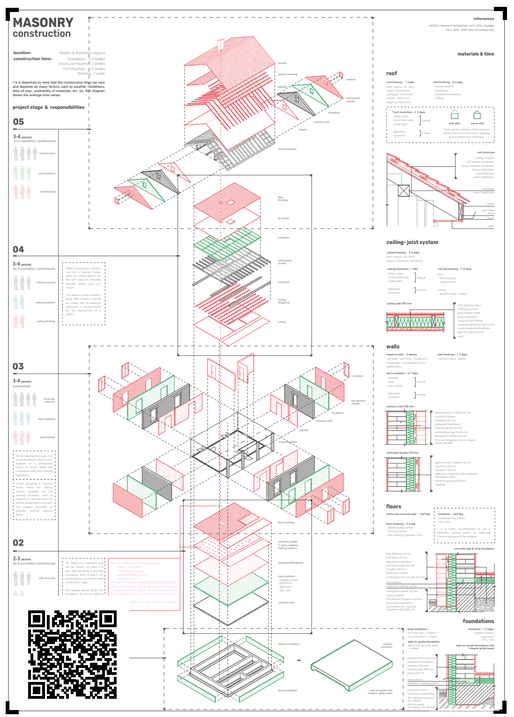
structural schemes

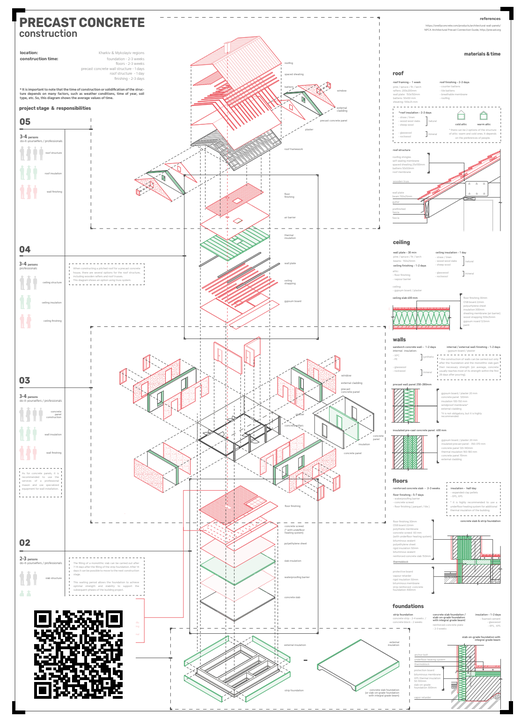




HEAVYWEIGHT CONSTRUCTION

structural schemes





WOOD - FRAME
construction

location: Kharkiv & Mykolayiv regions

construction time:
foundation - 3-4 weeks
frame structure - 2 weeks
insulation - 1 week
finishing - 2 weeks

*** It is important to note that the construction time can vary and depends on many factors, such as weather conditions, time of year, availability of materials, etc. So, this diagram shows the average time values.**

materials & time

references

3rd edition: Graphic guide to Frame Construction, Rob Thallon

Canadian wood-frame house construction, Canada Mortgage and Housing Corporation, https://www.cmhc-schl.gc.ca

Foundation Design Handbook, https://foundationhandbook.ornl.gov/handbook/toc.shtml

02

2-3 persons
do-it-yourselfers / professionals

slab structure

slab insulation

floor finishung

The filling of a monolithic slab can be carried out after 7-14 days after the filling of the strip foundation. After 14 days it can be possible to move to the next construction stage.

In the context of pile foundations, it is crucial to observe a waiting period of 7-14 days after the concrete pouring process. Once this duration has elapsed, construction can commence on framing the floor.

floors

reinforced concrete slab - 2 weeks

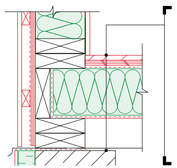
insulation - half day
- expanded clay pellets
- EPS, XPS

floor finishing - 2-3 day
- waterproofing barrier
- OSB sheathing
- floor finishing (parquet / tile)

floor framing - 2-3 days
pine / spruce / fir / larch
150x50mm

wooden slab insulation - 1 day
- straw / linen
- wood wool slabs — natural
- sheep wool
- glasswool
- rockwool — mineral

floor framing



floor finishing 30mm
OSB board 22mm
polyurhylene sheet
floor joist 150x50mm
insulation 150mm
vapour retarder 6mm
sill plates 150x50mm
waterproofing
foundation

01

3-4 persons
do-it-yourselfers / professionals

foundation construction

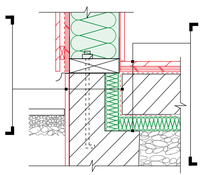
insulation of the foundation

foundations

strip foundation

concrete strip - 2 weeks /
concrete block - 2 weeks

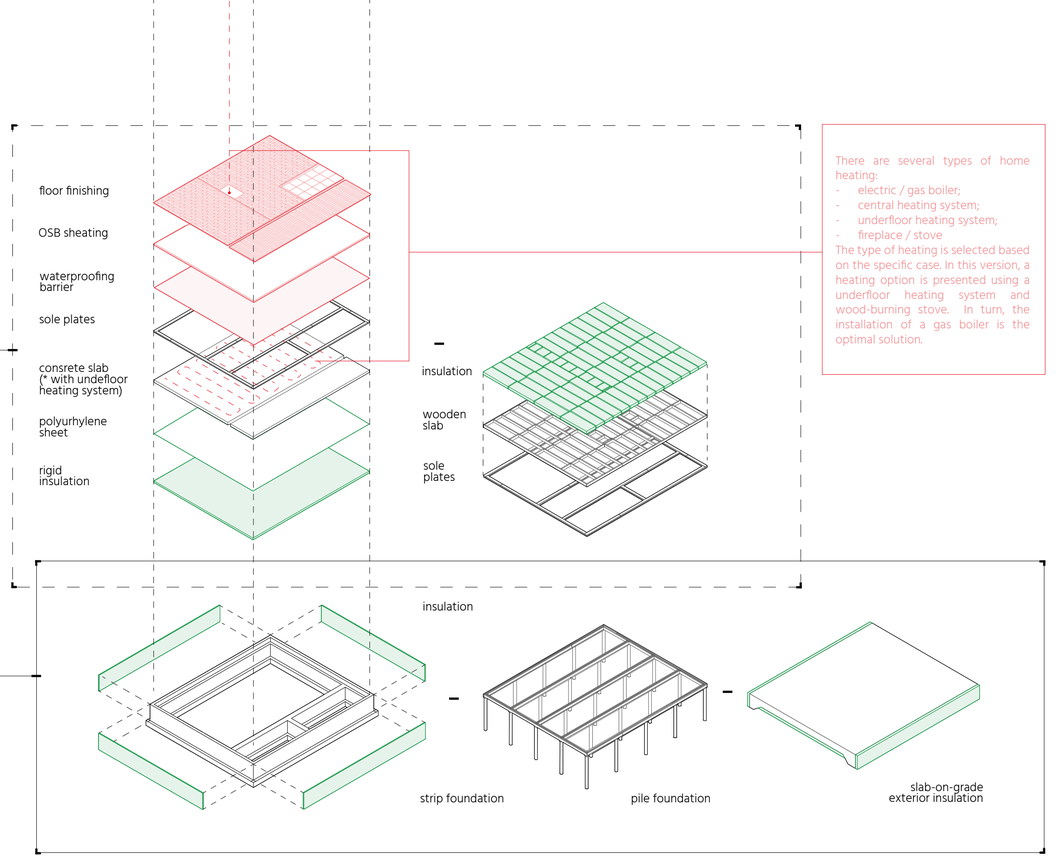
insulation - half day
- foamed cement (gasbeton)
- glasswool
- EPS, XPS



protection board 20mm
strip concrete foundation
anchor bolts
rigid insulation 50mm
vapour retarder 6mm
concrete slab

concrete slab

floor finishing 30mm
OSB board 22mm
polyurhylene sheet
concrete slab 150mm
vapour retarder 6mm
rigid insulation 50mm
foundation



There are several types of home heating:
- electric / gas boiler;
- central heating system;
- underfloor heating system;
- fireplace / stove

The type of heating is selected based on the specific case. In this version, a heating option is presented using a underfloor heating system and wood-burning stove. In turn, the installation of a gas boiler is the optimal solution.

project stage & responsibilities

03

3-4 persons
do-it-yourselfers / professionals

wood-frame structure

wall insulation

wall finishing

* the construction of walls can be carried out only after the foundation and the monolithic slab gain their necessary strength (on average, concrete usually reaches most of its strength within the first 28 days after pouring).

materials & time

walls

wall framing - 1 week

pine / spruce / fir / larch
walls: 150x50mm
columns: 200x200mm
beams: 200x50mm, 150x50mm

wall insulation - 2-3 days

- straw / linen
- wood wool slabs
- sheep wool

natural

- glasswool
- rockwool

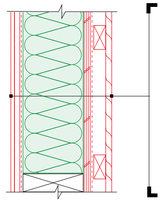
mineral

wall finishing - 3-4 days

inside:
- OSB panel
- gypsum board / plaster

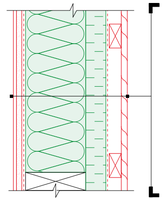
outside:
- OSB sheathing
- weather resistive barrier - WRB
- wood furring
- cladding (horizontal / vertical wood siding)

typical wall 250 mm

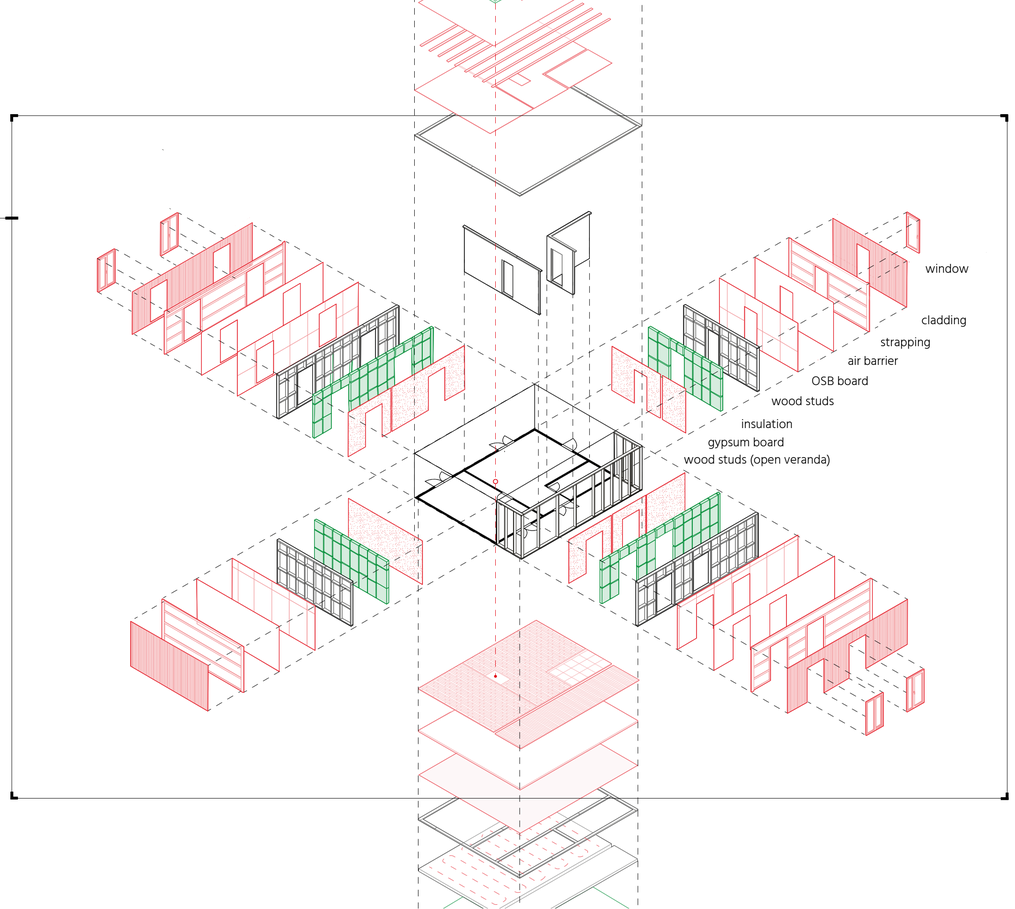


plaster 10-15mm
gypsum board 12.5 mm
polyurhylene sheet
studs 150x50mm
isulation 150mm
OSB board 22mm
sheating membrane (air barrier)
wood strapping 50x30mm
cladding

wall with additional insulation 290 mm



plaster 10-15mm
gypsum board 12.5 mm
polyurhylene sheet
studs 150x50mm
insulation 150mm
additional insulation 50mm
sheating membrane (air barrier)
wood strapping 50x30mm
cladding



project stage & responsibilities

materials & time

05

3-4 persons
do-it-yourselfers / professionals

roof structure

roof insulation

roof finishing

cold attic **warm attic**

* there can be 2 options of the structure of attic: warm and cold ones. It depends on the preferences of people.

When constructing a pitched roof for a wood-frame house, there are several options for the roof structure, including wooden rafters and roof trusses. This diagram shows an option using truss system.

roof

roof framing - 1 week
pine / spruce / fir / larch
rafters: 200x200mm
beams: 150x50mm

***roof insulation - 2-3 days**
- straw / linen
- wood wool slabs
- sheep wool

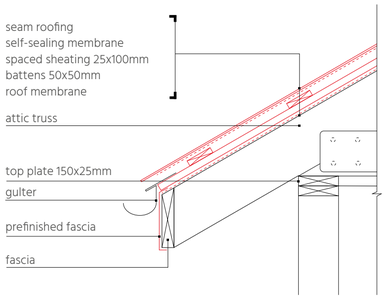
natural

- glasswool
- rockwool

mineral

roof finishing - 2-3 days
- counter battens
- tile battens
- breathable membrane
- roofing

roofing



04

3-4 persons
do-it-yourselfers / professionals

ceiling insulation

ceiling finishing

ceiling

ceiling unsulation - 1 day
- straw / linen
- wood wool slabs
- sheep wool

natural

- glasswool
- rockwool

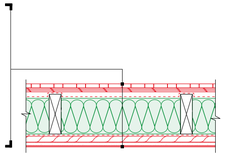
mineral

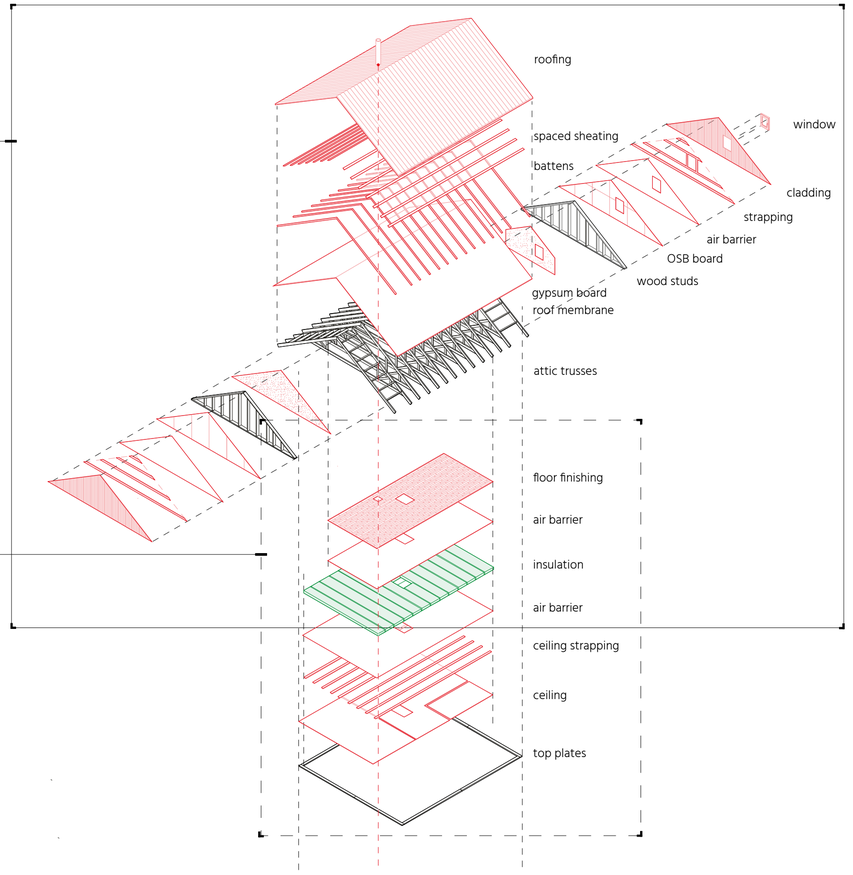
ceiling finishing - 3-4 days
attic:
- floor finishing
- vapour barrier

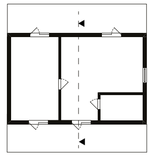
ceiling:
- gypsym board / plaste

ceiling slab 250 mm

floor finishing 30mm
OSB board 22mm
polyurhylene sheet
studs 150x50mm
insulation 100-150mm
sheating membrane
wood strapping 100x25mm
gypsum noard 12.5mm
paint







cold attic

ceiling detail
see p.104-105

roof detail
see p.104-105

wall detail
see p.102-103

wooden open veranda

+5.50

+3.25

+3.00

0.00

asphalt concrete over gravel treatment

drainage system

strip reinforced concrete foundation

the depth of foundation installation depends on the soil type and the depth of ground freezing

underfloor heating system

foundation & slab detail
see p. 100-101

wooden terrace

PREFAB TIMBER
construction

location: Kharkiv & Mykolayiv regions

construction time:
foundation - 3-4 weeks
wall assembly - 1-2days
floor/roof assembly - 1-2days
finishing - 3-5 days

*** It is important to note that the construction time can vary and depends on many factors, such as weather conditions, time of year, availability of materials, etc. So, this diagram shows the average time values.**

materials & time

references

3rd edition: Graphic guide to Frame Construction, Rob Thallon

Canadian wood-frame house construction, Canada Mortgage and Housing Corporation, https://www.cmhc-schl.gc.ca

Foundation Design Handbook, https://foundationhandbook.ornl.gov/handbook/toc.shtml

02

2-3 persons
do-it-yourselfers / professionals

slab structure

slab insulation

floor finishung

The filling of a monolithic slab can be carried out after 7-14 days after the filling of the strip foundation. After 14 days it can be possible to move to the next construction stage.

In the context of pile foundations, it is crucial to observe a waiting period of 7-14 days after the concrete pouring process. Once this duration has elapsed, construction can commence on framing the floor.

floors

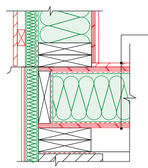
reinforced concrete slab - 2 weeks

insulation - half day
- expanded clay pellets
- EPS, XPS

floor finishing - 2-3 day
- waterproofing barrier
- OSB sheathing
- floor finishing (parquet / tile)

floor panels installation - 1-2 days

insulated floor panels



floor finishing 30mm
OSB board 22mm
polyurhylene sheet
floor joist 150x50mm
insulation 150mm
vapour retarder 6mm
sill plates 150x50mm
waterproofing
foundation

01

3-4 persons
do-it-yourselfers / professionals

foundation construction

insulation of the foundation

foundations

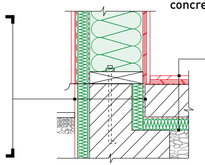
strip foundation

concrete strip - 2 weeks /
concrete block - 2 weeks

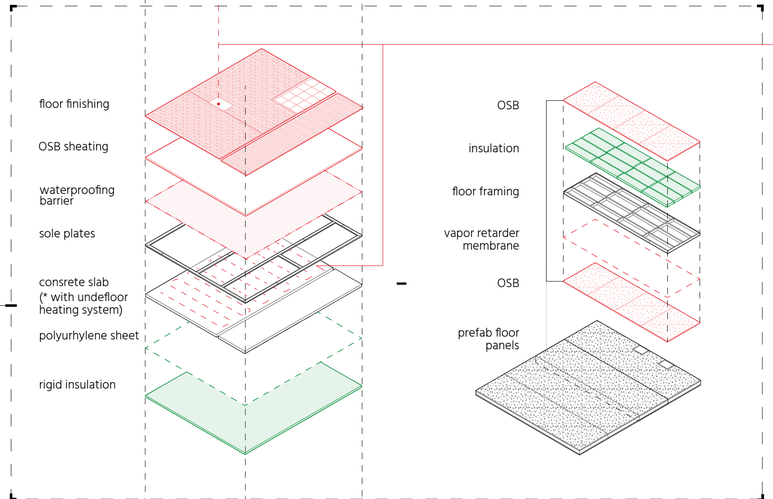
insulation - half day
- foamed cement (gasbeton)
- glasswool
- EPS, XPS

protection board
vapour retarder
rigid insulation 40mm
bituminous membrane
strip reinforced
concrete
foundation 300mm
rigid insulation 40 mm
vapour retarder
concrete slab

concrete floor & strip foundation

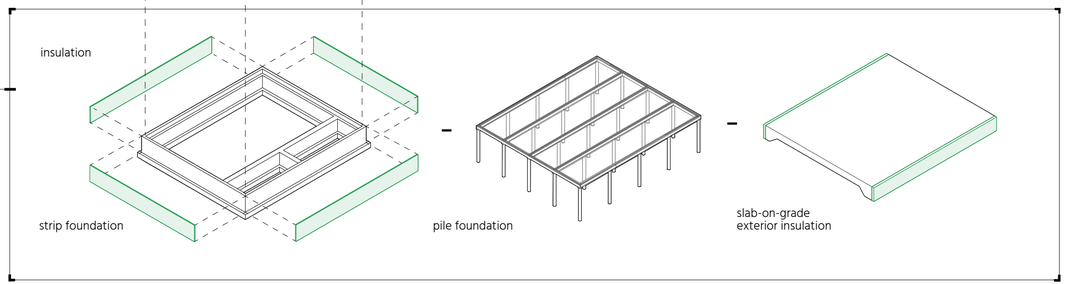


floor finishing 30mm
OSB board 22mm
polyurhylene sheet
concrete slab 150mm
vapour retarder 6mm
rigid insulation 50mm



There are several types of home heating:
- electric / gas boiler;
- central heating system;
- underfloor heating system;
- fireplace / stove

The type of heating is selected based on the specific case. In this version, a heating option is presented using a underfloor heating system and wood-burning stove. In turn, the installation of a gas boiler is the optimal solution.



project stage & responsibilities

03

3-4 persons
professionals

prefab wall structure

wall finishing

For wall installation it is recommended to use the services of a professional mason and use specialized equipment for wall installation.

* the construction of walls can be carried out only after the foundation and the monolithic slab gain their necessary strength (on average, concrete usually reaches most of its strength within the first 28 days after pouring).

materials & time

walls

wall panel assembly - 1 day

pine / spruce / fir / larch
structural wall: 200x50mm
internal wall: 120(150)x50mm

wall insulation - 2-3 days

- straw / linen
- cellulose
- sheep wool

] natural

- glasswool
- rockwool

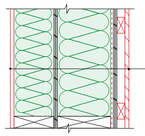
] mineral

wall finishing - 3-4 days

inside:
- gypsum board / plaster

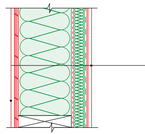
outside:
- OSB sheathing
- weather resistive barrier - WRB
- wood furring
- cladding (horizontal / vertical wood siding)

prefab timber frame panel 400-450 mm

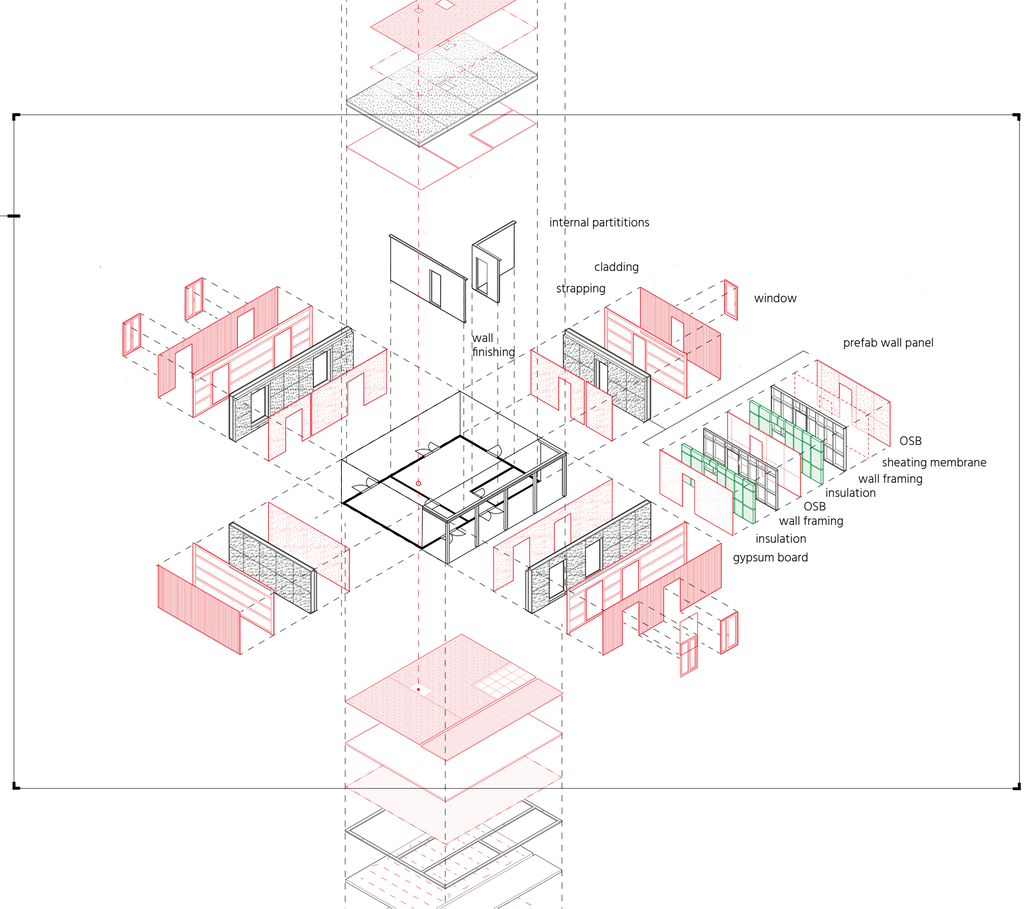


gypsum board 12.5 mm
cavity insulation 120-150mm
studs 120(150)x50mm
OSB sheating 15mm
studs 200x50mm
cellulose insulation 200mm
sheating membrane (air barrier)
OSB sheating 15mm
wood strapping 50x30mm
cladding

prefab timber frame panel 300 mm



gypsum board 12.5 mm
OSB sheating 15 mm
studs 200x50mm
insulation 200mm
sheating membrane (air barrier)
rigid wood fibre insulation board 40mm
base coat (reinforcing mortar)
textile glass fabric
lime render



project stage & responsibilities

materials & time

05

roof

3-4 persons
professionals

prefab roof structure

roof finishing

* there can be 2 options of the structure of attic: warm and cold ones. It depends on the preferences of people.

There are several construction options for the roof structure including wooden rafters and roof trusses, ans prefabricated roof and floor panels.
Both methods have their own advantages and depend on the specific project requirements and regional preferences.
This diagram shows an option using prefab roof and floor panels.

***insulated roof panels**

- straw / linen
- cellulose
- sheep wool

natural

- glasswool
- rockwool

mineral

roof panel assembly - 1 day

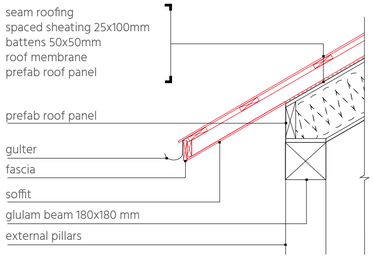
pine / spruce / fir / larch
beams: 150x50mm
OSB sheating

roof finishing - 2-3 days

- roof membrane
- counter battens
- spaced sheating
- roofing

roofing

seam roofing
spaced sheating 25x100mm
battens 50x50mm
roof membrane
prefab roof panel



04

ceiling

3-4 persons
professionals

prefab roof structure

ceiling / floor finishing

floor panel assembly - half day

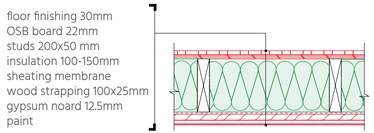
ceiling / floor finishing - 1-2 days

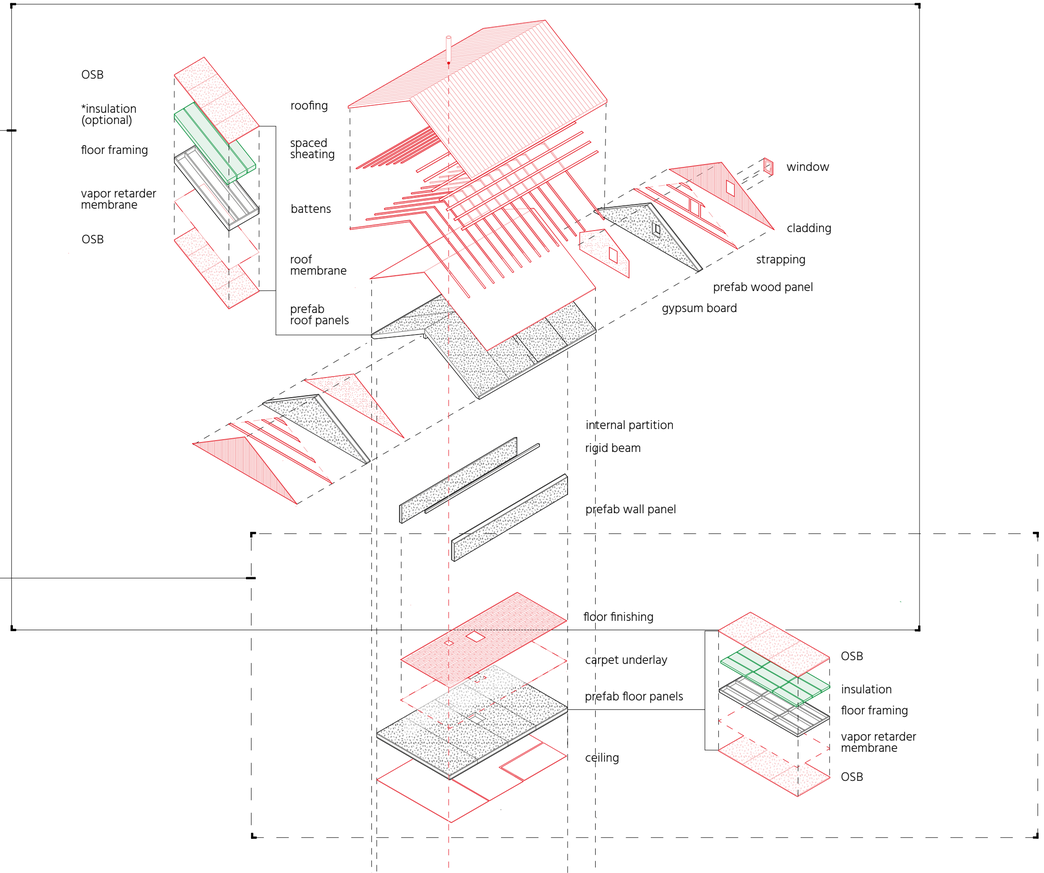
attic:
- floor finishing
- vapour barrier

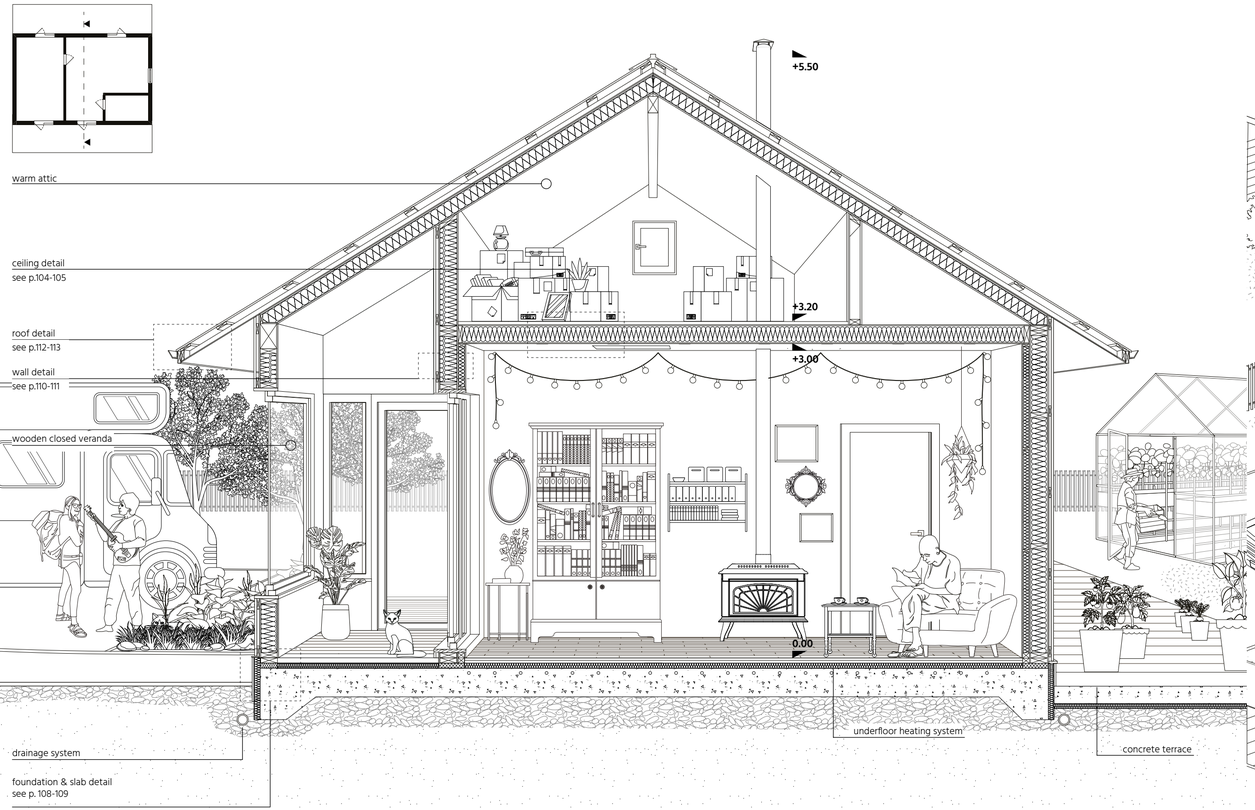
ceiling:
- gypsym board / plaster

ceiling slab 300 mm

floor finishing 30mm
OSB board 22mm
studs 200x50 mm
insulation 100-150mm
sheating membrane
wood strapping 100x25mm
gypsum noard 12.5mm
paint






+5.50
+3.20
+3.00
0.00
warm attic
ceiling detail
see p.104-105
roof detail
see p.112-113
wall detail
see p.110-111
wooden closed veranda
drainage system
foundation & slab detail
see p. 108-109
underfloor heating system
concrete terrace

MASONRY
construction

location: Kharkiv & Mykolayiv regions

construction time:
foundation - 3-4 weeks
structural masonry - 2 weeks
roof structure - 1-2 weeks
finishing - 1 week

*** It is important to note that the construction time can vary and depends on many factors, such as weather conditions, availability of materials, etc. So, this diagram shows the average time values.**

materials & time

references

DETAILS, Review of Architecture, Vol. 5, 2014 - Facades,
Vol. 5, 2015 - Solid Forms of Construction

Foundation Design Handbook, https://foundationhandbook.ornl.gov/handbook/toc.shtml

02

2-3 persons
do-it-yourselfers / professionals

slab structure

slab insulation

sloor finishing

The filling of a monolithic slab can be carried out after 7-14 days after the filling of the strip foundation. After 14 days it can be possible to move to the next construction stage.

This waiting period allows the foundation to achieve optimal strength and stability to support the subsequent phases of the building project.

floors

reinforced concrete slab - half day

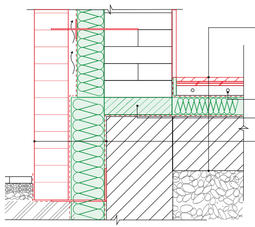
floor finishing - 2-3 day

- waterproofing barrier
- concrete screed
- floor finishing (parquet / tile)

insulation - half day

- expanded clay pellets
- EPS, XPS

* it is highly recommended to use a underfloor heating system for additional thermal insulation of the building.



concrete slab & strip foundation

floor finishing 30 mm
OSB board 22 mm
polythene membrane
concrete screed 60 mm
insulation 100mm
bituminous sealant
reinforced c-te slab 150 mm
underfloor heating system
thermoblock
facing brick veneer 120 mm
vapour retarder
XPS insulation 120 mm
bituminous membrane
strip reinforced -concrete
foundation 250-300 mm

01

3-4 persons
do-it-yourselfers / professionals

foundation construction

foundation insulation

foundations

strip foundation

concrete strip - 2 weeks /
concrete block - 2 weeks

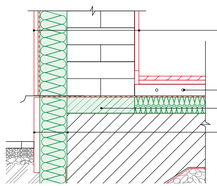
slab-on-grade foundation

reinforced-concrete plate
- 2 weeks

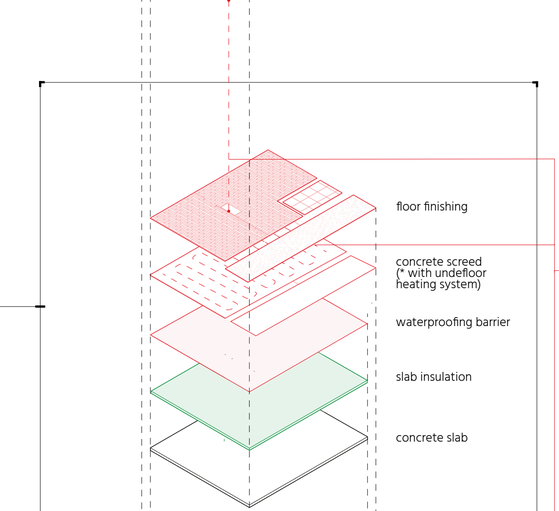
insulation - 1-2 days

- foamed cement
- glasswool
- EPS, XPS

slab-on-grade foundation with integral grade beam

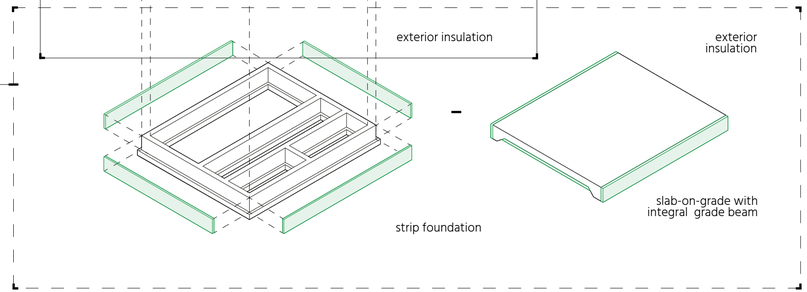


external finishing 20 mm
polythene membrane
insulation 100 mm
masonry wall 250 mm
plaster 20 mm
underfloor heating system
thermoblock
protection board
bituminous membrane
XPS insulation 60 - 100mm
slab-on-grade



There are several types of home heating:
- electric / gas boiler;
- central heating system;
- underfloor heating system;
- fireplace / stove

The type of heating is selected based on the specific case. In this version, a heating option is presented using a underfloor heating system and wood-burning stove. (this example is used if it is impossible to connect to a gas system).
In turn, the installation of a gas boiler is the optimal solution.



project stage & responsibilities

03

3-4 persons
professionals

structural masonry

wall insulation

wall finishing

As for load-bearing walls, it is recommended to consult a civil engineer or a professional mason to ensure safety and compliance with local building regulations.

*when designing a masonry house, there are various choices available for the veranda structure, such as masonry or concrete pillars, as well as wood-frame structures. This diagram illustrates an example utilizing masonry pillars.

materials & time

walls

masonry wall - 2 weeks

clay brick / eco-block / hempcrete / timbercrete / compressed bricks/ adobe bricks

wall insulation - 3-7 days

- cellulose
- wool
- linen / hemp

natural

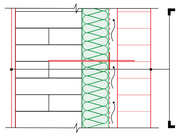
- glasswool
- rockwool

mineral

wall finishing - 1-2 days

- gypsum board / plaster

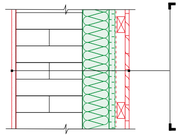
masonry wall 520 mm



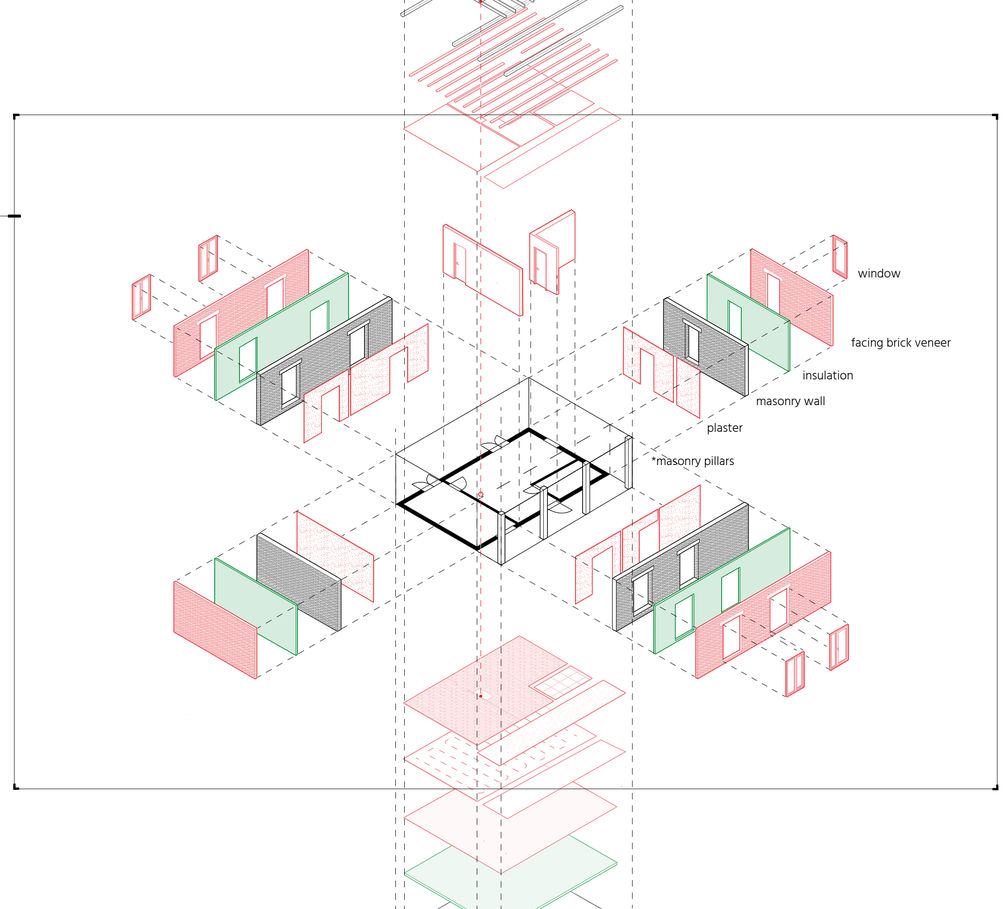
gypsum board / plaster 20 mm
clay brick 250mm
insulation 100 mm
windproof membrane*
masonry veneer anchor
ventilated air gap 30-40 mm
facing brick veneer 120 mm

*it is not obligatory, but it is highly recommended

ventilated facade 470 mm



gypsum board / plaster 20 mm
clay brick 250mm
insulation 100 mm
insulation with windproof membrane 30mm
wood strapping 50x30mm
cladding



project stage & responsibilities

05

3-4 persons
do-it-yourselfers / professionals

roof structure

roof insulation

roof finishing

cold attic warm attic

* there can be 2 options of the structure of attic: warm and cold ones. It depends on the preferences of people.

materials & time

roof

roof framing - 1 week
pine / spruce / fir / larch
rafters: 200x200mm
wall plate: 150x150mm
battens: 50x50 mm
sheating: 100x25 mm

roof finishing - 2-3 days
- counter battens
- tile battens
- breathable membrane
- roofing

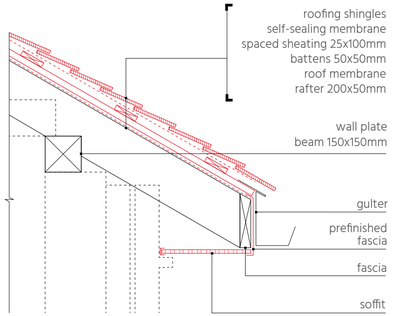
***roof insulation - 2-3 days**
- straw / linen
- wood wool slabs
- sheep wool

natural

- glasswool
- rockwool

mineral

roofing



04

ceiling

3-4 persons
do-it-yourselfers / professionals

ceiling structure

ceiling insulation

ceiling finishing

When constructing a pitched roof for a masonry house, there are several options for the roof structure, including wooden rafters and roof trusses.

This diagram shows an option using rafter system. It should be noted that professional assistance is recommended for the construction of a rafters.

ceiling framing - 2-3 days
pine / spruce / fir / larch
beams: 150x50mm, 100x50mm

ceiling insulation - 1 day
- straw / linen
- wood wool slabs
- sheep wool

natural

- glasswool
- rockwool

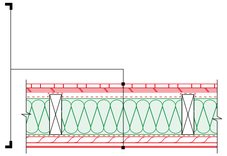
mineral

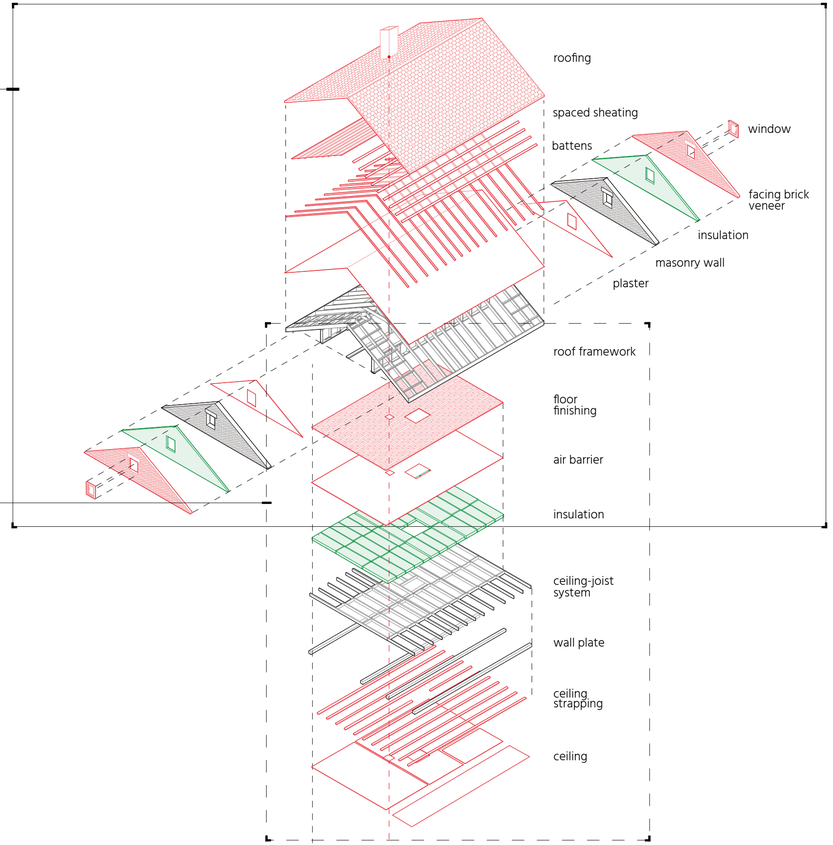
ceiling finishing - 1-2 days
attic:
- floor finishing
- vapour barrier

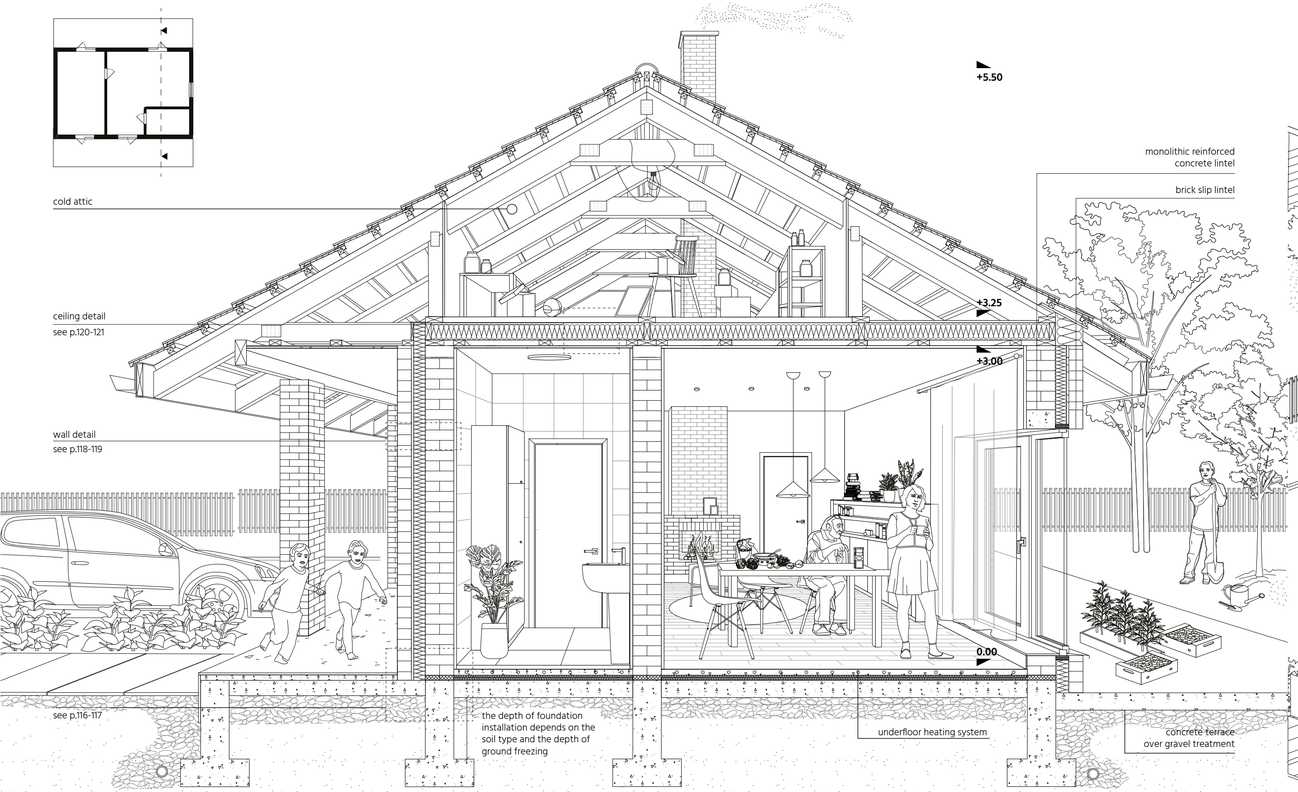
ceiling:
- gypsym board / plaster

ceiling slab 250 mm

floor finishing 30mm
OSB board 22mm
polyurhylene sheet
studs 150x50mm
insulation 100-150mm
sheating membrane
rafters 100x25mm
gypsum board 12.5mm
paint






+5.50
monolithic reinforced concrete lintel
brick slip lintel
cold attic
+3.25
ceiling detail
see p.120-121
+3.00
wall detail
see p.118-119
0.00
see p.116-117
the depth of foundation installation depends on the soil type and the depth of ground freezing
underfloor heating system
concrete terrace over gravel treatment

PRECAST CONCRETE
construction

location: Kharkiv & Mykolayiv regions

construction time:
foundation - 2-3 weeks
floors - 2-3 weeks
precast concrete wall structure - 1 days
roof structure - 1 day
finishing - 2-3 days

*** It is important to note that the construction time can vary and depends on many factors, such as weather conditions, availability of materials, etc. So, this diagram shows the average time values.**

02

2-3 persons
do-it-yourselfers / professionals

slab structure
slab insulation
floor finishung

The filling of a monolithic slab can be carried out after 7-14 days after the filling of the strip foundation. After 14 days it can be possible to move to the next construction stage.

This waiting period allows the foundation to achieve optimal strength and stability to support the subsequent phases of the building project.

01

3-4 persons
do-it-yourselfers / professionals

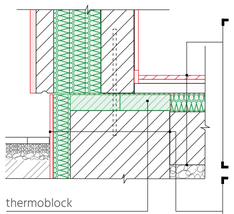
foundation construction
insulation of the foundation

materials & time

floors

reinforced concrete slab - 2-3 weeks

floor finishing - 5-7 days
- waterproofing barrier
- concrete screed
- floor finishing (parquet / tile)



concrete slab & strip foundation
floor finishing 30mm
OSB board 22mm
polythene membrane
concrete screed 60 mm
(with underfloor heating system)
bituminous sealant
polyethylene sheet
rigid insulation 50mm
bituminous sealant
reinforced concrete slab 150mm

protective board
vapour retarder
rigid insulation 50mm
bituminous membrane
strip reinforced -concrete
foundation 400mm

foundations

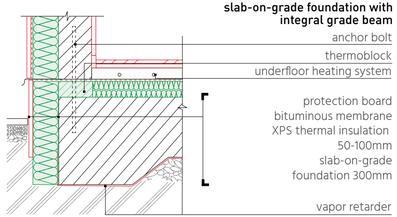
strip foundation

concrete strip - 2-4 weeks /
concrete block - 2 weeks

insulation - 1-2 days
- foamed cement
- glasswool
- EPS, XPS

concrete slab foundation / slab-on-grade foundation with integral grade beam)

reinforced-concrete plate
- 2-3 weeks



slab-on-grade foundation with integral grade beam
anchor bolt
thermoblock
underfloor heating system

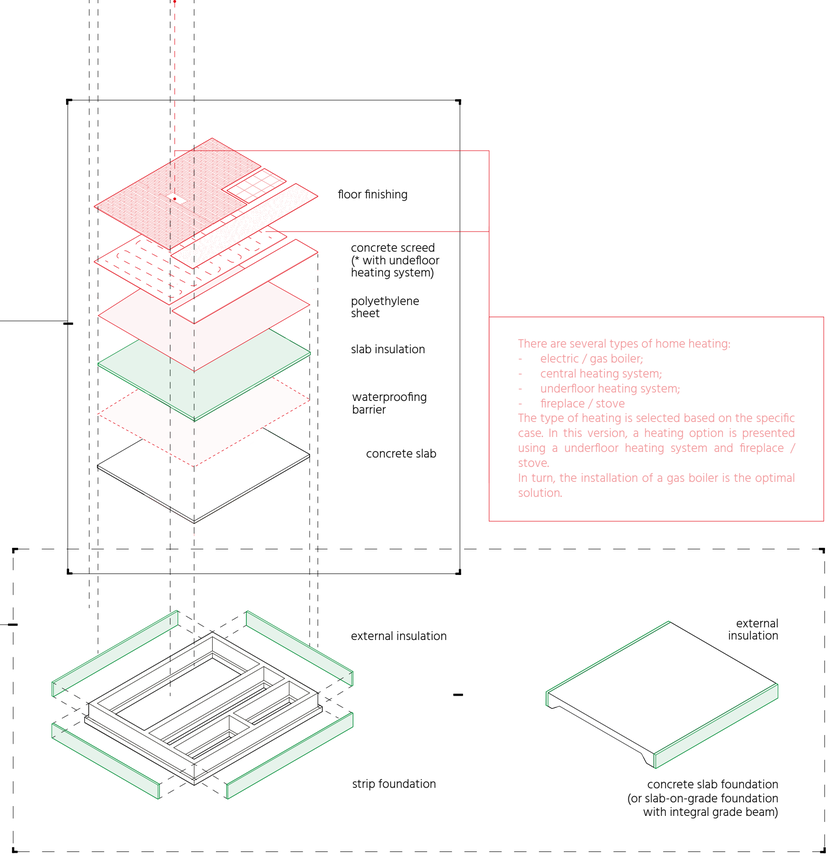
protection board
bituminous membrane
XPS thermal insulation
50-100mm
slab-on-grade
foundation 300mm

vapor retarder

references

https://oreillyconcrete.com/products/architectural-wall-panels/
NPCA Architectural Precast Connection Guide, http://precast.org

https://oreillyconcrete.com/products/architectural-wall-panels/
NPCA Architectural Precast Connection Guide, http://precast.org



There are several types of home heating:
- electric / gas boiler;
- central heating system;
- underfloor heating system;
- fireplace / stove

The type of heating is selected based on the specific case. In this version, a heating option is presented using a underfloor heating system and fireplace / stove.
In turn, the installation of a gas boiler is the optimal solution.

project stage & responsibilities

03

3-4 persons
do-it-yourselfers / professionals

concrete panel construction

wall finishing

As for concrete panels, it is recommended to use the services of a professional mason and use specialized equipment for wall installation.

materials & time

walls

sandwich concrete wall - 1-2 days
internal insulation:

- XPC
- PE

synthetic

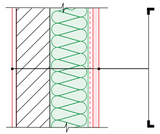
- glasswool
- rockwool

mineral

internal / external wall finishing - 1-2 days
- gypsum board / plaster

* the construction of walls can be carried out only after the foundation and the monolithic slab gain their necessary strength (on average, concrete usually reaches most of its strength within the first 28 days after pouring).

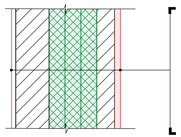
precast wall panel 250-280mm



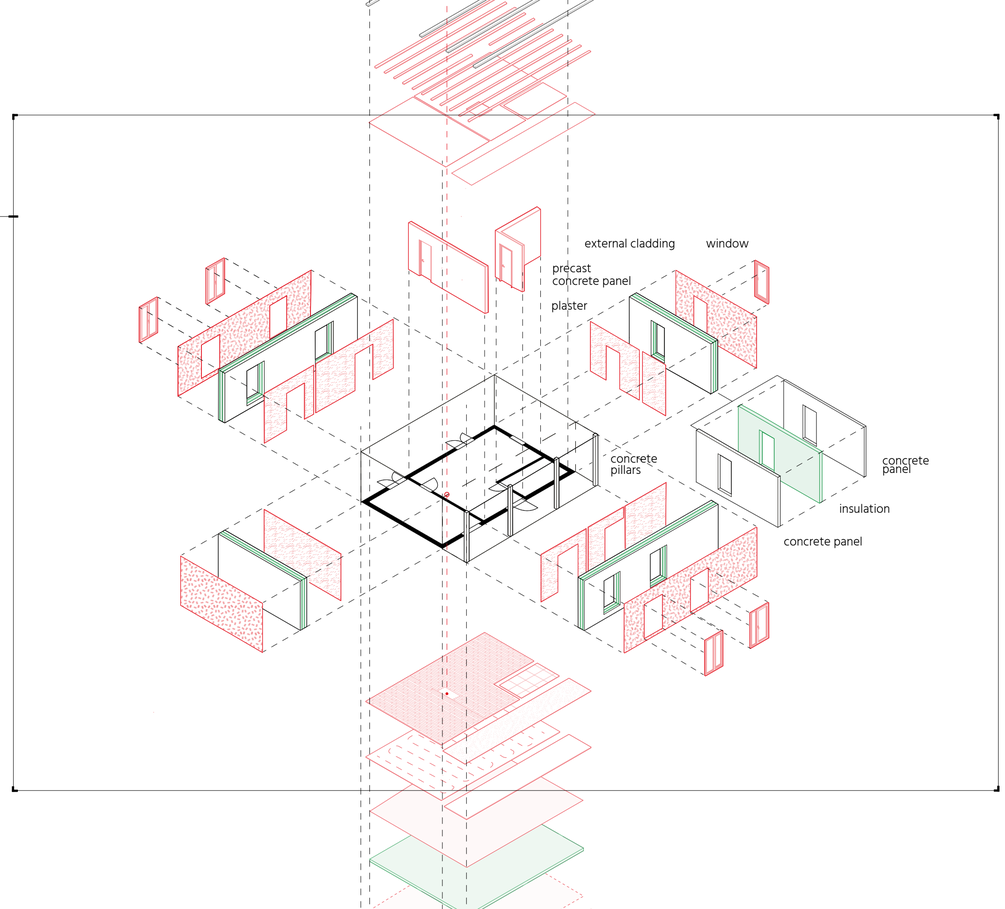
gypsum board / plaster 20 mm
concrete panel 120mm
insulation 100-150 mm
windproof membrane*
external cladding

*it is not obligatory, but it is highly recommended

insulated pre-cast concrete panel 400 mm



gypsum board / plaster 20 mm
insulated precast panel - 350-370 mm
concrete panel 120-140mm
thermal insulation 160-180 mm
concrete panel 70mm
external cladding



project stage & responsibilities

materials & time

05

3-4 persons
do-it-yourselfers / professionals

roof structure

roof insulation

roof finishing

cold attic **warm attic**

* there can be 2 options of the structure of attic: warm and cold ones. It depends on the preferences of people.

roof

roof framing - 1 week

pine / spruce / fir / larch
rafters: 200x200mm
wall plate: 150x150mm
battens: 50x50 mm
sheating: 100x25 mm

roof finishing - 2-3 days

- counter battens
- tile battens
- breathable membrane
- roofing

***roof insulation - 2-3 days**

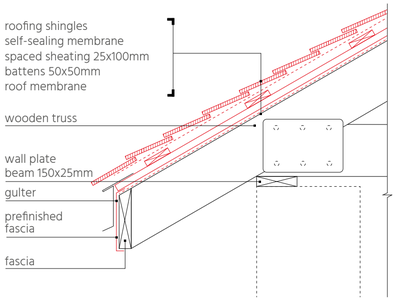
- straw / linen
- wood wool slabs
- sheep wool

natural

- glasswool
- rockwool

mineral

roof structure



04

3-4 persons
do-it-yourselfers / professionals

ceiling structure

ceiling insulation

ceiling finishing

When constructing a pitched roof for a precast concrete house, there are several options for the roof structure, including wooden rafters and roof trusses.
This diagram shows an option using truss system.

ceiling

wall plate - 30 min

pine / spruce / fir / larch
beams: 150x25mm

ceiling insulation - 1 day

- straw / linen
- wood wool slabs
- sheep wool

natural

- glasswool
- rockwool

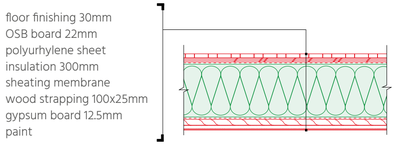
mineral

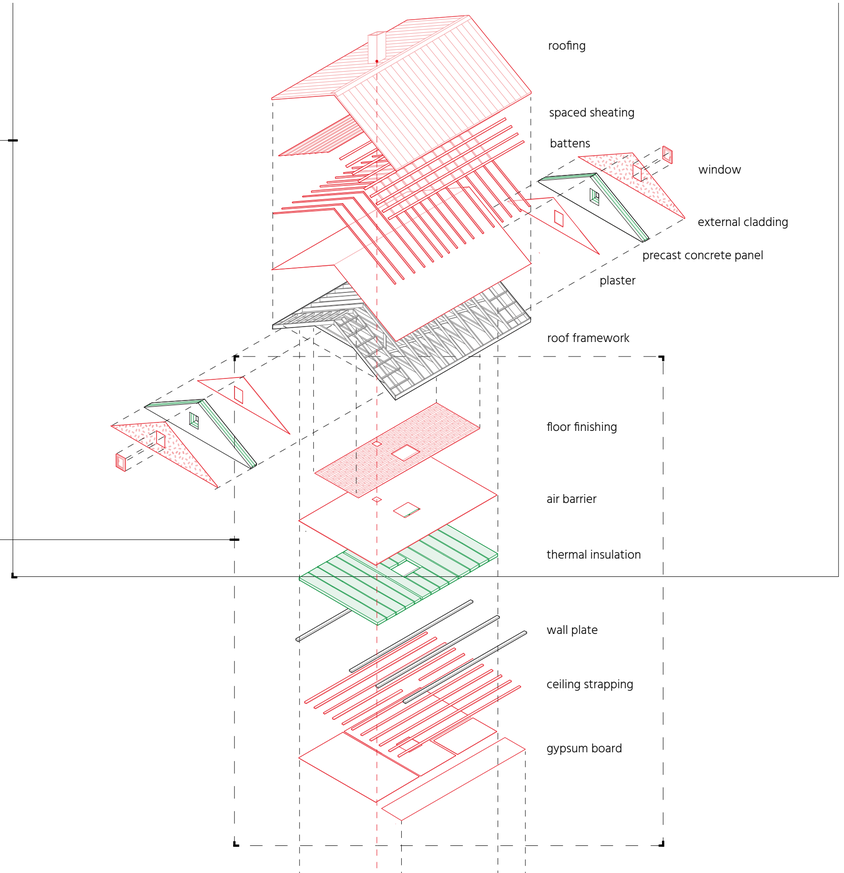
ceiling finishing - 1-2 days

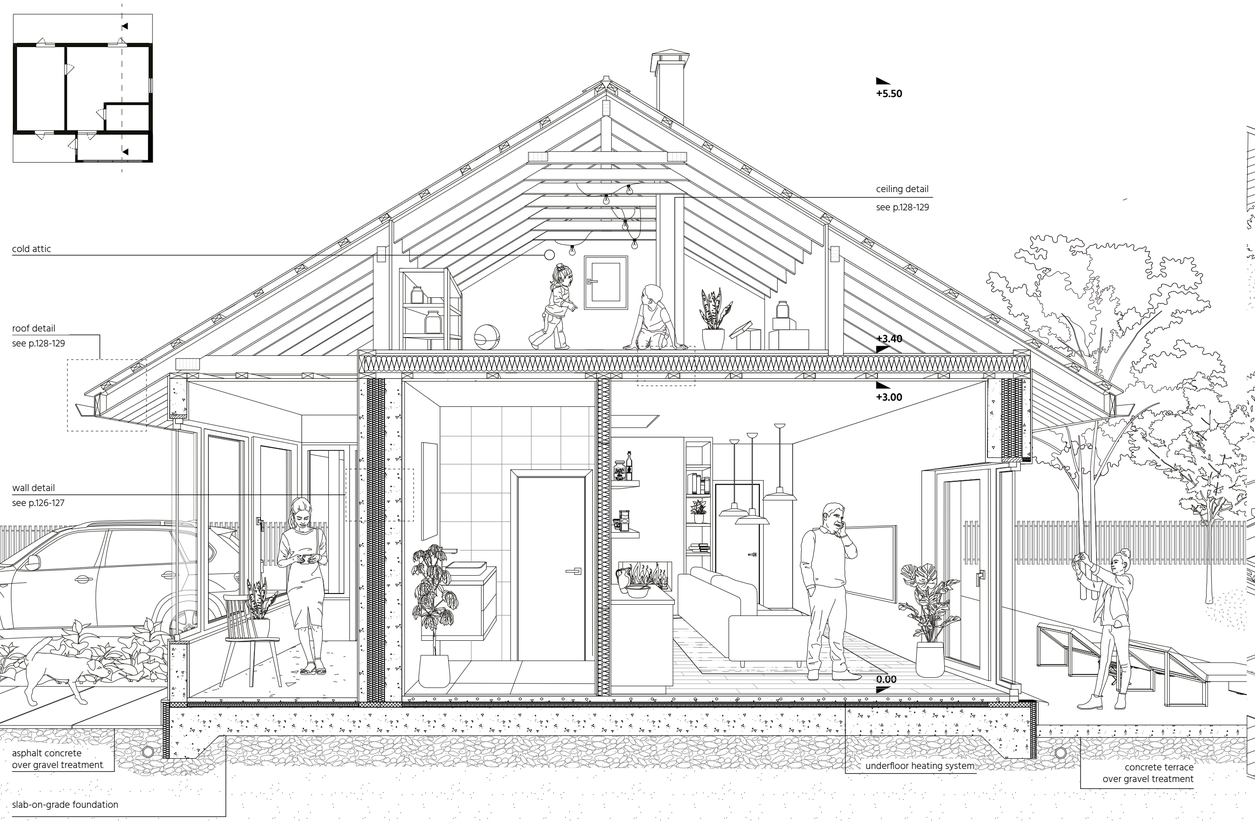
attic:
- floor finishing
- vapour barrier

ceiling:
- gypsym board / plaster

ceiling slab 400 mm






+5.50
ceiling detail
see p.128-129
cold attic
roof detail
see p.128-129
+3.40
+3.00
wall detail
see p.126-127
0.00
asphalt concrete
over gravel treatment
slab-on-grade foundation
underfloor heating system
concrete terrace
over gravel treatment

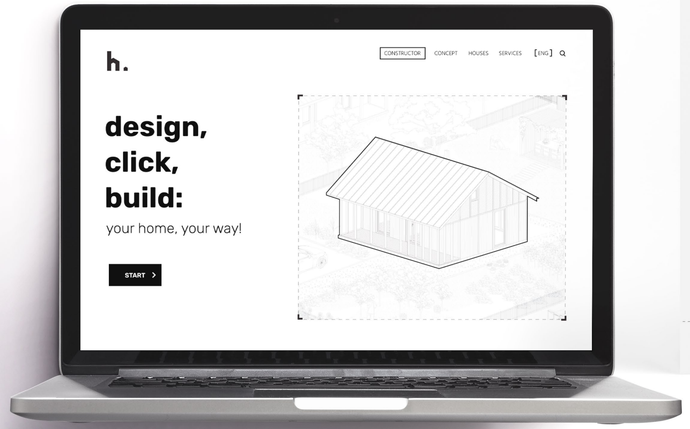
7

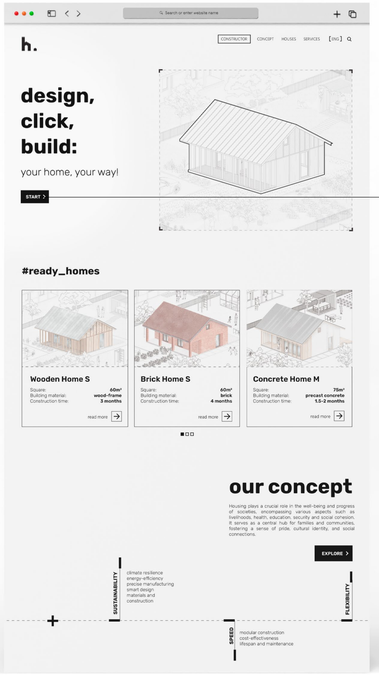
WEBSITE & MANUAL

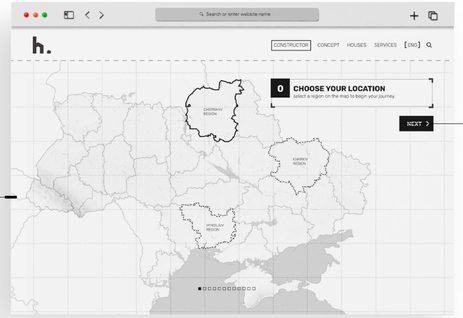
WEBSITE

To integrate this project into life, a convenient approach would be to establish a website where individuals can create their dream house interactively and easily using an online constructor. Users will have the option to choose their preferred solutions for their house.

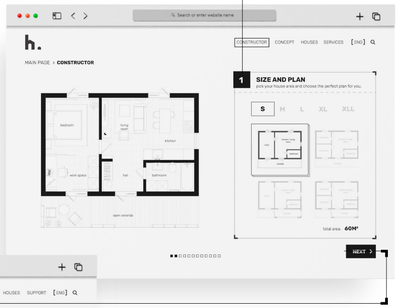
The website will also feature fundamental information about the project concept and pre-designed solutions.





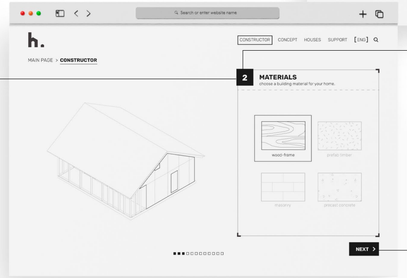


After selecting the location for your plot, a choice of house layout options will be presented.



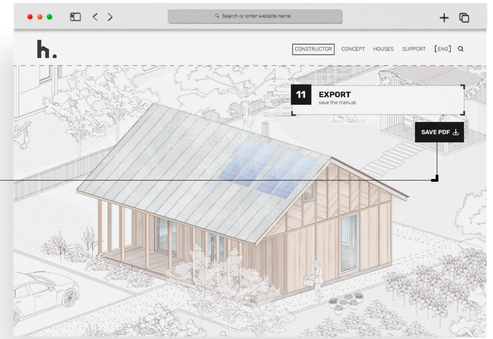
STEPS

0. Location
1. House plan
2. Materials
3. **Foundations**
4. **Roof**
5. **Veranda / terrace**
6. **Windows**
7. **Doors**
8. **Facade finishing**
9. **Roof finishing**
10. **Color palette**
11. Export manual



Then it will be possible to assemble the house by choosing materials, building elements and cladding of the future home.

After your house has been assembled, the manual for its construction can be downloaded.



SELF-BUILDING MANUAL

This streamlined construction guide is designed for individuals and families embarking on the journey of building their own homes. Our goal is to enhance your comprehension of the intricacies inherent in constructing one's own residence.

This manual is the result of a constructor assembled on the website using the option with wood-frame structure, and it illustrates the step-by-step process involved in the creation of a house on the website.

INTRODUCTION

This simplified construction guide is intended for individuals and families undertaking the construction of their own homes. We aim to provide with a better understanding of the complexities involved in building people's own house.

The project is expected to span 3-6 months, depending on the extent of work planned to be handled personally and the portions that will be delegated to subcontractors.
For your construction endeavor, you will receive house plans, building materials, site services, construction supervision, inspections, and subcontracted labor for tasks beyond your capabilities. Moreover, there is going to be the support of a Construction Manager. This reponsible person will oversee the work, offer guidance and assistance as well as ensure adherence to building codes and effective construction practices.

The sections in this guide have been organized in a suggested sequence to match the various stages of construction, and practical advice in the form of builder's notes has been included. Any necessary alterations to the provided details, arising from differences in local or provincial building regulations, will be communicated by a Construction Manager.

As the homeowner, the responsibility lies with you to construct your house, with the support of relatives, friends, and neighbors.

This spread contains information about the necessary building materials and tools, without which the construction of a house cannot be possible. In turn, materials for the construction of the house will be delivered to the site according to its configuration.

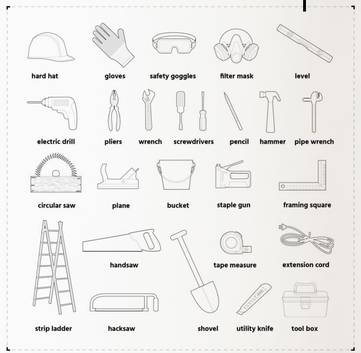
TOOLS

In order to ensure that the job is done effectively and smoothly, posessing the appropriate tools is a cricual moment to be taken into cosideration.

1. This guide outlines the essential tools required for constructing your house. These are the fundamental tools you might want to either buy or borrow for your home construction project.
2. After the tools have been acquired, their investment should be safeguarded by proper storage when not in use.
3. It is critical to maintenace carefully the construction tools. Immediately remove any rust, ensure that power saw blades are kept sharp, keep small tools conveniently stored in a single toolbox, and maintain the sharpness of hand saws, mitre saws, chisels, knives, and axes for ease of cutting.

To guarantee the safety of both yourself and your volunteer assistants, it is essential to make sure the following safety equipment items are accessible and utilized:

- Steel-toed/soled boots
- Hard hats
- Gloves
- Filter masks
- Safety goggles



MATERIALS

At your site, it's crucial to observe specific precautions to safeguard these materials from potential damage. Items like plywood, gypsum board, insulation, windows and doors, wood siding, and electrical materials must be stored on blocking and shielded with polyethylene covers to maintain their dryness. Prevent fainting, staining, and glue from freezing, and ensure that polyethylene (vapor barrier) is shielded from direct sunlight to avoid deterioration. Additionally, it's important to stack framing lumber tightly to prevent twisting. There are some additional recommendations:

timber materials

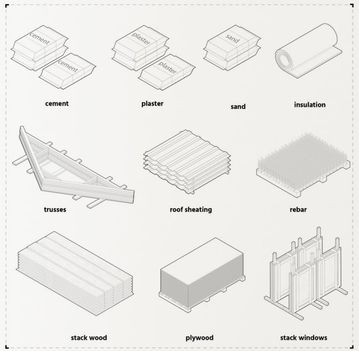
Properly store and handle wood to maintain quality. Avoid tossing timber materials carelessly on the construction site. Use a plastic pallet or wrap underneath the lumber and cover it with a plastic sheet to prevent damage. This approach preserves wood integrity and quality.

windows / doors

Handle windows with care upon delivery. Place them on a level, sturdy wooden pallet at a slight angle, not flat. After arranging, cover the glass with plywood and secure it with polyethylene to prevent moisture and ensure protection.

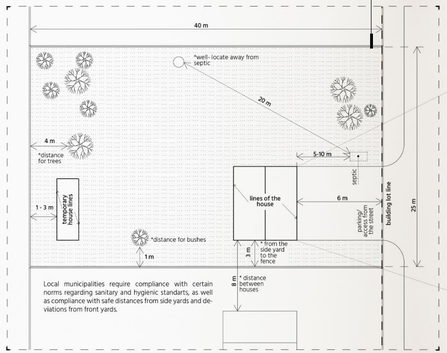
rebars

It is necessary to put the fittings on a pallet and provide a canopy made of waterproof materials or cover with a covering material



In this page there is information about the planning of the site with recommendations for its planning according to the selected location and local rules.

SITE PLAN

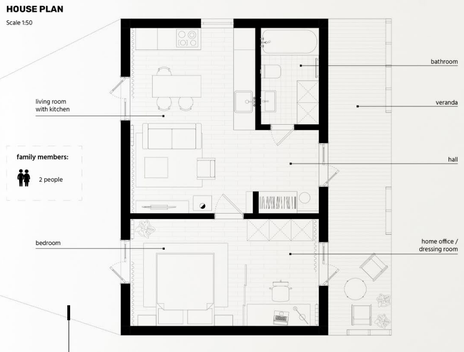


* it should be noted that the location of house depends on the location of the plot according to the cardinal directions

Local municipalities require compliance with certain norms regarding sanitary and hygienic standarts, as well as compliance with safe distances from side yards and deviations from front yards.

HOUSE PLAN

Scale 1:50



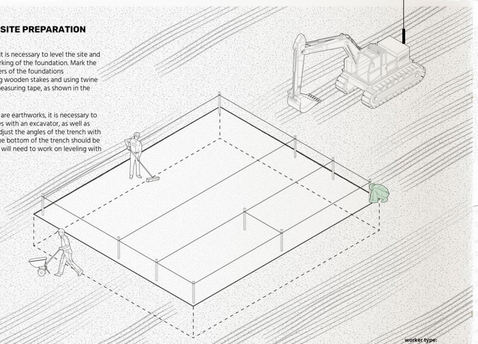
The planning solution of the house with the arrangement of furniture is recommendatory, and can be changed according to the preferences of the customer.

The construction of the foundation should be carried out by appropriate specialists, or under the supervision of the chief engineer, because this is one of the most important stages and is responsible for the stability of all structures.

The manual also contains brief illustrative information about all stages of foundation construction, for more accurate information, you should use the working documentation of the project with corresponding drawings and calculations.

BUILDING SITE PREPARATION

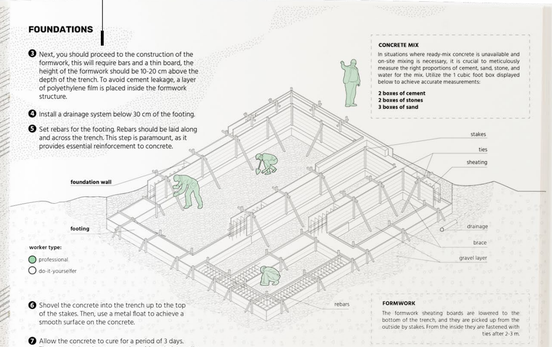
1. First of all, it is necessary to level the site and make a marking of the foundation. Mark the outer corners of the foundations by installing wooden stakes and using twine lines and measuring tape, as shown in the figure.
2. Then there are earthworks, it is necessary to dig trenches with an excavator, as well as manually adjust the angles of the trench with a shovel. The bottom of the trench should be flat, so you will need to work on leveling with a level.



worker type:
professional
do-it-yourselfer

FOUNDATIONS

3. Next, you should proceed to the construction of the formwork, this will require bars and a thin board, the height of the formwork should be 10-20 cm above the depth of the trench. To avoid cement leakage, a layer of polyethylene film is placed inside the formwork structure.
4. Install a drainage system below 30 cm of the footing.
5. Set rebars for the footing. Rebars should be laid along and across the trench. This step is paramount, as it provides essential reinforcement to concrete.



worker type:
professional
do-it-yourselfer

CONCRETE MIX

In situations where ready-mix concrete is unavailable and on-site mixing is necessary, it is crucial to meticulously measure the right proportions of cement, sand, stone, and water for the mix. Utilize the 1 cubic foot box displayed below to achieve accurate measurements:

2 boxes of cement
2 boxes of stones
3 boxes of sand

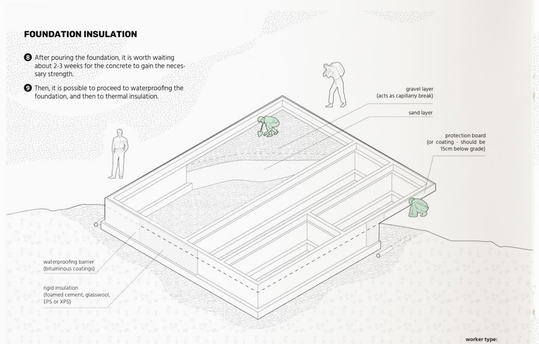
6. Shovel the concrete into the trench up to the top of the stakes. Then, use a metal float to achieve a smooth surface on the concrete.
7. Allow the concrete to cure for a period of 3 days. Then proceed to the construction of foundation walls according to the same scheme.

FORMWORK

The formwork sheating boards are lowered to the bottom of the trench, and they are picked up from the outside by stakes. From the inside they are fastened with ties after 2-3 m.

FOUNDATION INSULATION

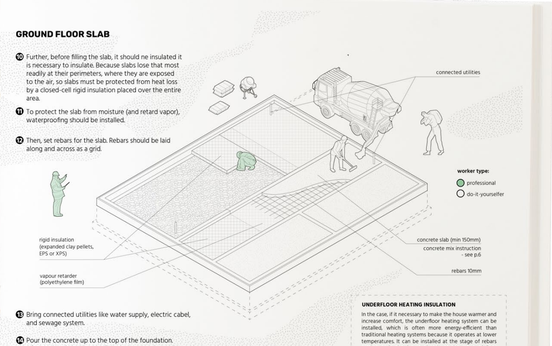
8. After pouring the foundation, it is worth waiting about 2-3 weeks for the concrete to gain the necessary strength.
9. Then, it is possible to proceed to waterproofing the foundation, and then to thermal insulation.



worker type:
professional
do-it-yourselfer

GROUND FLOOR SLAB

10. Further, before filling the slab, it should ne insulated it is necessary to insulate. Because slabs lose that most readily at their perimeters, where they are exposed to the air, so slabs must be protected from heat loss by a closed-cell rigid insulation placed over the entire area.
11. To protect the slab from moisture (and retard vapor), waterproofing should be installed.
12. Then, set rebars for the slab. Rebars should be laid along and across as a grid.



worker type:
professional
do-it-yourselfer

13. Bring connected utilities like water supply, electric cabel, and sewage system.
14. Pour the concrete up to the top of the foundation. After 14 days it can be possible to move to the wall construction.

UNDERFLOOR HEATING INSULATION

In the case, if it necessary to make the house warmer and increase comfort, the underfloor heating system can be installed. Such systems are more effective than traditional heating systems because it operates at lower temperatures, it can be installed at the stage of rebars setting or in the future already at the stage of floor cladding

This offer contains information about the creation of a concrete floor, if desired, at the stage of creating a house on the website, you can also choose an option with the use of a wooden frame of the house, or using another type of foundation that does not require the construction of the floor.

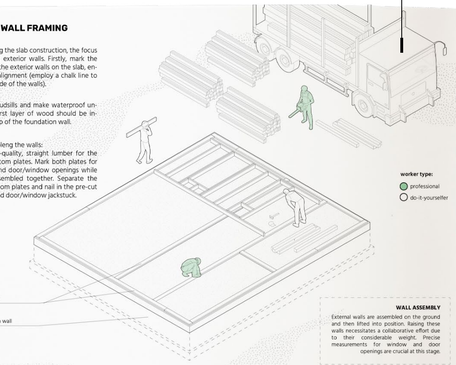
At this stage, the frame of the load-bearing walls is being erected, the booklet shows the main stages of construction and some of the joints of the frame.

EXTERNAL WALL FRAMING

15 After finishing the slab construction, the focus shifts to the exterior walls. Firstly, mark the positions of the exterior walls on the slab, ensuring their alignment (employ a chalk line to mark the inside of the walls).

16 Install the mudsills and make waterproof under it. The first layer of wood should be installed on top of the foundation wall.

17 Start assembleng the walls:
choose high-quality, straight lumber for the top and bottom plates. Mark both plates for wall studs and door/window openings while they are assembled together. Separate the top and bottom plates and nail in the pre-cut wall studs and door/window jackstuck.



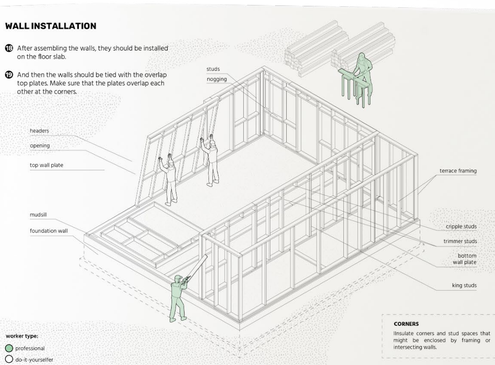
WALL ASSEMBLY

External walls are assembled on the ground and then lifted into position. Raising these walls necessitates a collaborative effort due to their considerable weight. Precise measurements for window and door openings are crucial at this stage.

WALL INSTALLATION

17 After assembling the walls, they should be installed on the floor slab.

17 And then the walls should be tied with the overlap top plates. Make sure that the plates overlap each other at the corners.



CORNERS

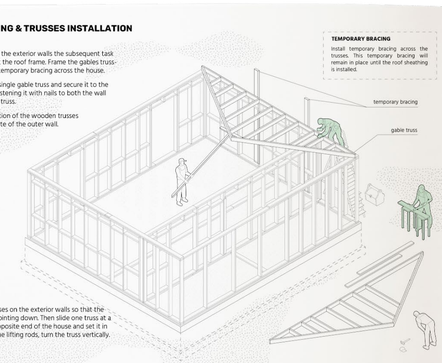
Insulate corners and stud spaces that might be enclosed by framing or intersecting walls.

ROOF FRAMING & TRUSSES INSTALLATION

20 After erecting the exterior walls the subsequent task is to construct the roof frame. Frame the gables trusses and install temporary bracing across the house.

21 Then install a single gable truss and secure it to the end wall by fastening it with nails to both the wall and the gable truss.

22 Mark the location of the wooden trusses on the top plate of the outer wall.



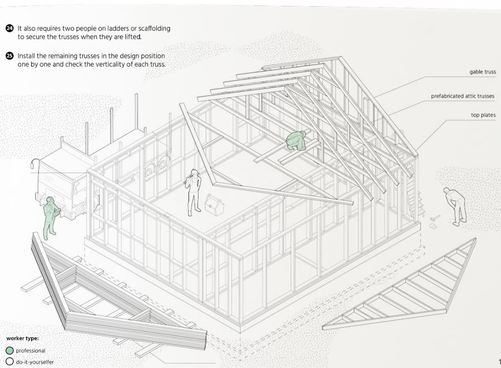
TEMPORARY BRACING

Install temporary bracing across the trusses. This temporary bracing will remain in place until the roof sheathing is installed.

23 Place the trusses on the exterior walls so that the roof visor is pointing down. Then slide one truss at a time to the opposite end of the house and set it in place. Using the lifting rods, turn the truss vertically.

24 It also requires two people on ladders or scaffolding to secure the trusses when they are lifted.

25 Install the remaining trusses in the design position one by one and check the verticality of each truss.



In this illustrative case, the structural roof system consists of wooden trusses. The installation and assembly of this pivotal component demand the expertise of highly skilled specialists equipped with specialized tools and machinery tailored to the intricacies of the task at hand.

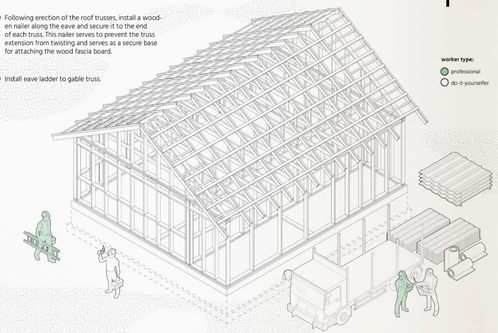
The construction of the foundation should be carried out by appropriate specialists, or under the supervision of the chief engineer, because this is one of the most important stages and is responsible for the stability of all structures.

ROOF FINISHING

16 Following erection of the roof trusses, install a wooden nailer along the eave and secure it to the end of each truss. This nailer serves to prevent the truss extension from twisting and serves as a secure base for attaching the wood fascia board.

17 Install eave ladder to gable truss.

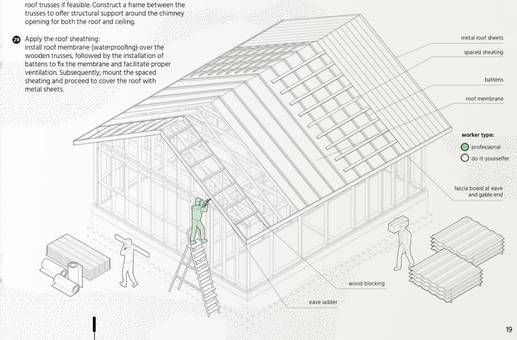
worker type:
professional
do-it-yourselfer



18

18 Consider siting the prefabricated chimney between two roof trusses if feasible. Construct a frame between the trusses to offer structural support around the chimney opening for both the roof and ceiling.

19 Apply the roof sheathing:
install roof membrane (waterproofing) over the wooden trusses, followed by the installation of battens to fix the membrane and facilitate proper ventilation. Subsequently, mount the spaced sheating and proceed to cover the roof with metal sheets.



19

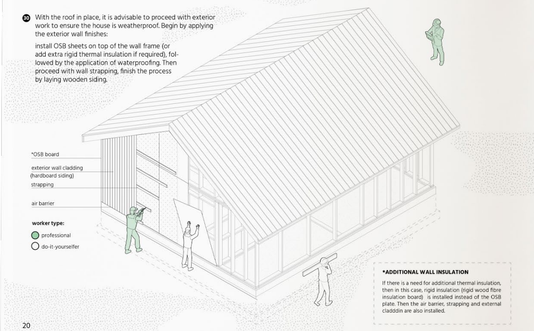
The manual also contains brief illustrative information about all stages of foundation construction, for more accurate information, you should use the working documentation of the project with corresponding drawings and calculations.

The construction sequence should be duly noted, with the initial focus in frame construction being the execution of external finishing, succeeded by the subsequent steps of wall insulation and interior finishing. Furthermore, it's essential to highlight that alterations or variations in the house's aesthetics and decor can also be contemplated and implemented during this particular phase.

EXTERIOR FINISHES, WINDOWS & DOORS

20 With the roof in place, it is advisable to proceed with exterior work to ensure the house is weatherproof. Begin by applying the exterior wall finishes:

install OSB sheets on top of the wall frame (or add extra rigid thermal insulation if required), followed by the application of waterproofing. Then proceed with wall strapping, finish the process by laying wooden siding.



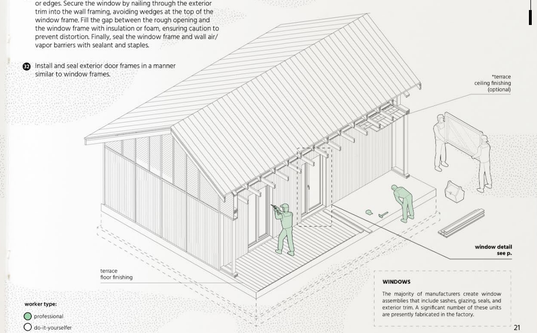
***ADDITIONAL WALL INSULATION**

If there is a need for additional thermal insulation, then in this case, rigid insulation (rigid wood fibre insulation board) is installed instead of the OSB plate. Then the air barrier, strapping and external cladddin are also installed.

20

21 Insert the window unit into the opening, leveling it with shims or edges. Secure the window by nailing through the exterior trim into the wall framing, avoiding wedges at the top of the window frame. Fill the gap between the rough opening and the window frame with insulation or foam, ensuring caution to prevent distortion. Finally, seal the window frame and wall air/vapor barriers with sealant and staples.

22 Install and seal exterior door frames in a manner similar to window frames.



WINDOWS

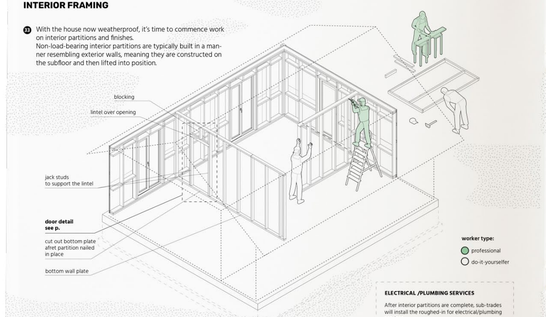
The majority of manufacturers create window assemblies that include sashes, glazing, seals, and exterior trim. A significant number of these units are presently fabricated in the factory.

21

The insulation of the house is a key stage that requires compliance with the relevant norms and regulations. This approach is necessary to ensure optimal quality and maintain the structural integrity of the house. Compliance with the established norms during installation not only increases overall productivity, but also contributes to the durability of structural elements.

INTERIOR FRAMING

13 With the house now weatherproof, it's time to commence work on interior partitions and finishes.
Non-load-bearing interior partitions are typically built in a manner resembling exterior walls, meaning they are constructed on the subfloor and then lifted into position.

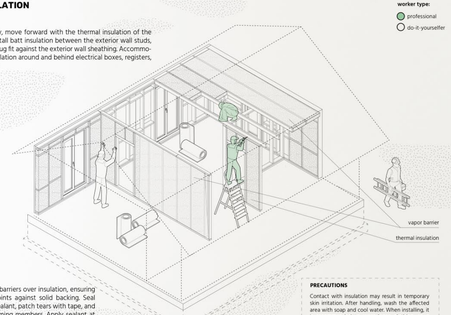


worker type:
professional
do-it yourselfer

ELECTRICAL /PLUMBING SERVICES
After interior partitions are complete, sub-trades will install the roughed-in for electrical/plumbing services.

WALL INSULATION

14 Subsequently, move forward with the thermal insulation of the walls and install batt insulation between the exterior wall studs, ensuring a snug fit against the exterior wall sheathing. Accommodate the insulation around and behind electrical boxes, registers, blocking, etc.



worker type:
professional
do-it yourselfer

15 Install vapor barriers over insulation, ensuring overlap at joints against solid backing. Seal joints with sealant, patch tears with tape, and staple to framing members. Apply sealant at top and bottom wall plates for a secure seal.

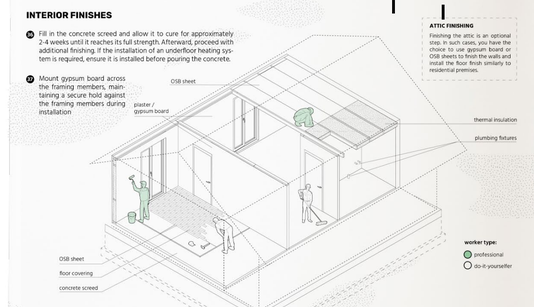
PRECAUTIONS
Contact with insulation may result in temporary skin irritation. After handling, wash the affected area with soap and cool water. When installing, it is recommended to wear loose clothing, snug work gloves, and a hat for added protection.

The interior embellishment of the house is subject to individual preferences, yet the installation of drywall or plastering on the walls is imperative.

INTERIOR FINISHES

16 Fill in the concrete screed and allow it to cure for approximately 2-4 weeks until it reaches its full strength. Afterward, proceed with additional finishing. If the installation of an underfloor heating system is required, ensure it is installed before pouring the concrete.

17 Mount gypsum board across the framing members, maintaining a secure hold against the framing members during installation



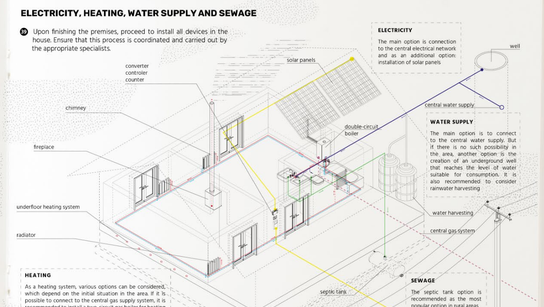
worker type:
professional
do-it yourselfer

18 Next, proceed to painting the walls and laying the final floor covering.

ATTIC FINISHING
Finishing the attic is an optional step. In such cases, you have the choice to use gypsum board or OSB sheets to finish the walls and install the floor finish similarly to residential premises.

ELECTRICITY, HEATING, WATER SUPPLY AND SEWAGE

19 Upon finishing the premises, proceed to install all devices in the house. Ensure that this process is coordinated and carried out by the appropriate specialists.



ELECTRICITY
The main option is connection to the central electrical network and as an additional option installation of solar panels

WATER SUPPLY
The main option is to connect to the central water supply. But if there is no such possibility in the area, another option is the creation of an underground well that reaches the level of water suitable for consumption. It is also recommended to consider rainwater harvesting

HEATING
As a heating system, various options can be considered, which depend on the initial situation in the area. If it is possible to connect to the central gas supply system, it is recommended to install a two-circuit gas boiler for heating and hot water as the most economically beneficial system. If it is not possible to connect to the central gas system due to its absence, it is also recommended to install an electric double-circuit boiler and/or an electric floor. An additional and alternative option is to install a fireplace.

SEWAGE
The septic tank option is recommended as the most popular option in rural areas

Towards the conclusion of the manual, you'll find comprehensive details regarding the structural nodes employed in the project. This insightful section serves to elucidate the intricacies of the project's key connection points, offering valuable insights into the overall design and construction methodology.

The manual also includes information about landscaping the site, detailing potential organization approaches and providing recommendations for the maintenance of both the site and the house.

LANDSCAPING

Enhance the aesthetic appeal and value of your new home and property through strategic landscaping. Consider the following steps:

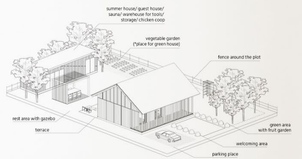
1. **Optimize Green Spaces:**
   Treat the areas around your house with quality topsoil, expanding them in harmony with existing varieties.

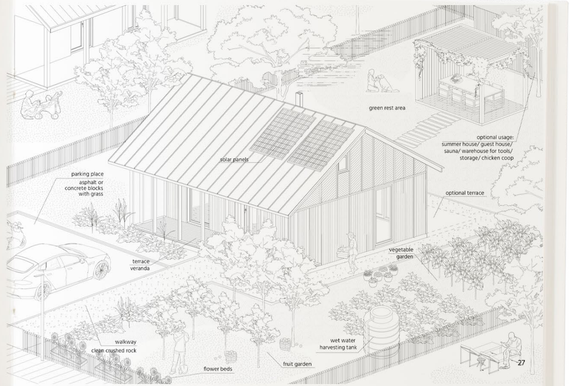
2. **Vegetable Garden Preparation:**
   If you're planning a vegetable garden, ensure proper soil preparation. During dry weather, distribute topsoil and apply commercial-grade fertilizers based on the plot's size and your preferences for seed choices.

3. **Driveway Excellence:**
   For a durable driveway, opt for pure crushed stone. Spread a 100 mm layer evenly on footpaths. For parking areas, use asphalt or concrete blocks with grass.

4. **Floral and Structural Enhancements:**
   Elevate your property's charm by planting flowers, trees, and shrubs or adding a stylish fence.

By embracing these detailed landscaping endeavors, you not only elevate the visual charm but also substantially augment the overall value of your property, creating a haven that seamlessly blends aesthetics with functionality.





Furthermore, information about the prospective expansion and addition of new blocks to the existing house is provided in the manual. Based on the initially specified data, details about potential options for the evolution of the house and plot can be found.

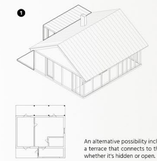
POSSIBLE HOUSE EVOLUTION AND EXTENSIONS

possible options for the site:
vegetable garden
fruit garden
flower beds

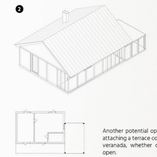
backyard zone

main house

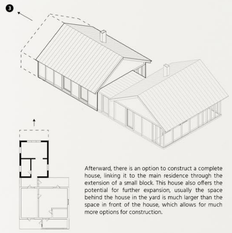
possible usage:
summer house
guest house
sauna
warehouse for tools
storage
chicken coop



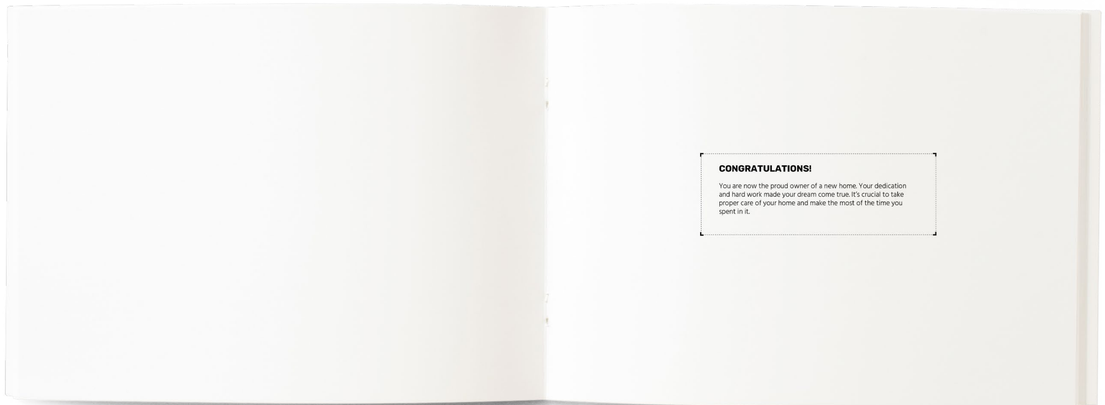
An alternative possibility includes adding a terrace that connects to the backyard, whether it's hidden or open.



Another potential option involves attaching a terace connected to a veranda, whether concealed or open.



Afterward, there is an option to construct a complete house, linking it to the main residence through the extension of a small block. This house also offers the potential for further expansion, usually the space behind the house in the yard is much larger than the space in front of the house, which allows for much more options for construction.



The creation of the website and guide is the result of our extensive research efforts and project proposals dedicated to the project. This comprehensive approach has been carefully refined and adapted to ensure convenient operation in accordance with our desire to provide users with accessible and understandable information about the possibilities of creating their own home, built with their own hands.

8

AFTERWORD

In the end, we, as authors, wish to express our extraordinary hope that our research and development will not remain only on the pages of this document. We strive to see them in real life, contributing to changes and improvements in the field of housing construction in Ukraine.

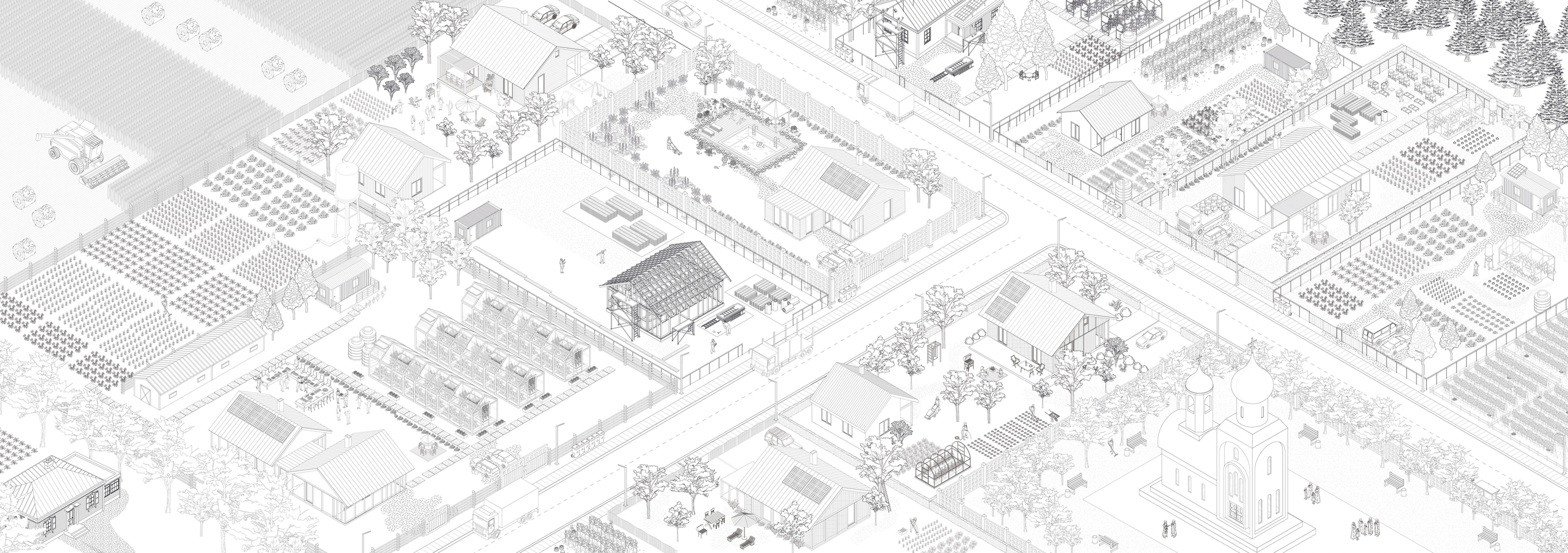
Our main goal has always been to create a project that will help improve the quality of life of modern Ukrainian families. We hope that our work will serve as a source of information that will help citizens better understand and implement positive changes in the construction and housing sector.

The method we call «self-construction» is well-known in Ukrainian culture and is not something extraordinary. It reflects ancient traditions and aspirations of Ukrainian families to build their own home and develop it over time. The gradual evolution of the home, including additions and modifications, allows owners to adapt the home to their changing needs and circumstances.

Our project emphasizes individuality and comfort for people in the post-war period. We hope that this will help modern Ukrainian families create a new beginning and forget the horrors of war by building quality and sustainable housing that meets their needs and ambitions.

One of the possible ways to implement our ideas and recommendations is cooperation with volunteers, public organizations, NGOs, etc., that are actively working to improve living conditions for citizens. Our project could be a useful tool for such organizations, inspiring them for new initiatives.

We believe that together we will be able to take steps towards the future, where every family in Ukraine will have the opportunity to get used to their normal life and live in comfortable housing.



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