Rudak village reconstruction

Rudak Village , Buin Zahra region , Qazvin province, Iran

Iran is located in a region with frequently earthquake occurrence and experienced a lot of destructive earthquakes in different rates during past centuries. So it is important to study regions, needs and way of reconstruction to learn points for future potential disasters.

Rudak, located at 25 km southwest far from Buin Zahra, is a village on the slopes of Jaroo Mountains, with 1270 population. Rudak is a mountainous, linear concentrated village alongside a river . According to residents, formation history of the village reaches over 400 years ago near Haji Arab river which was the main factor for it's establishment . The village was completely destroyed because of 1962 Buin Zahra Earthquake. This is the reason for relocation of the village from original place to it's current .

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Culture

- Azari language
- Islam religion
- Homogeneous community
- Turk people, Fars and Tat (originally from Saghzadabad who came to this village because of marriage after earthquake)
- Problems Between people: Land Problems and rights of water (Resolved by Dispute Resolution Council)
- 73% literacy ratio
  The less literate ratio of women to men: due to the lack of educational facilities for girls as opposed to boys and the dominant social culture

Climate

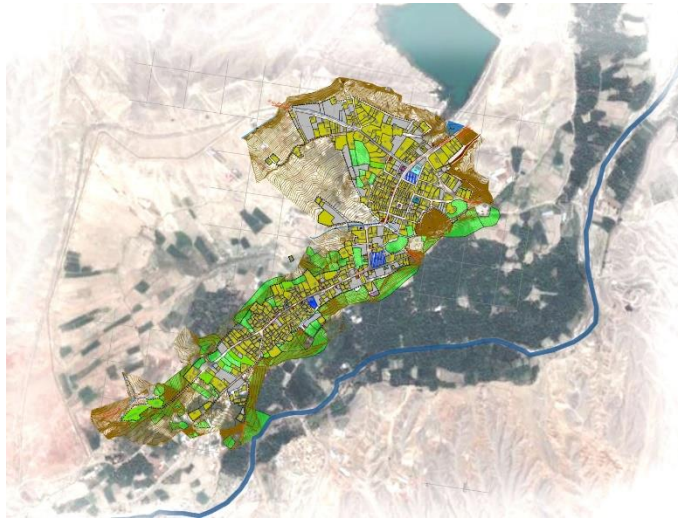
- Very cold winters and warm summers
- Heavy snowfall
- Desirable wind in the first half of the year and unpleasant cold winds in the second half of the year
- Water supply from 2 subterranean canal
- Vegetation as a limiting factor for rural development

Livelihood

- Agriculture
- Animal husbandry
- Gardening
- Services
- Industrial

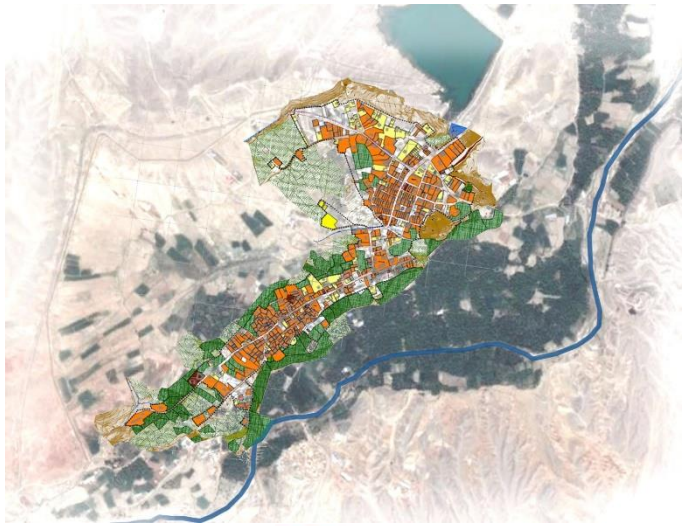
Physical Structure

- Mountainous position
- Slope direction mostly from northwest to southeast



Land use

- Residential
- Residential gardens
- Commercial
- Educational
- Religious
- Cultural
- Medical
- Administrative
- Services
- Military
- Health care
- Work shop
- Garden
- Agriculture



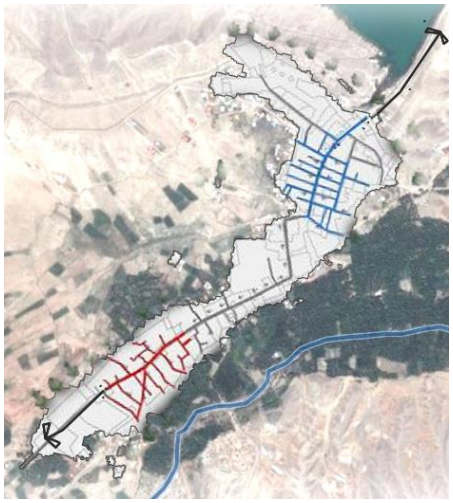
Building quality

- In construction process
- Newly constructed
- Appropriate quality
- Ruined

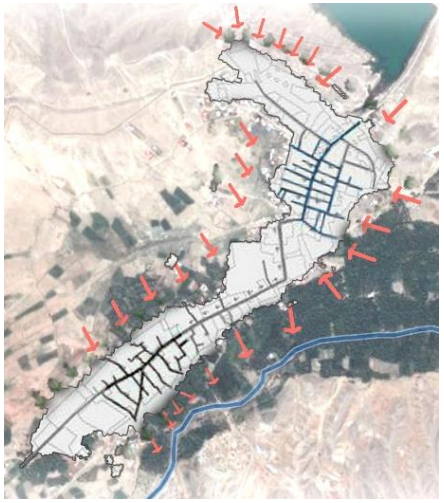
Two neighborhoods locally called
- 1: Paeen Mahalle which is formed after 1341 Buin Zahra Earthquake
- 2 : Bala Mahalle which is formed after 1343

Village morphology

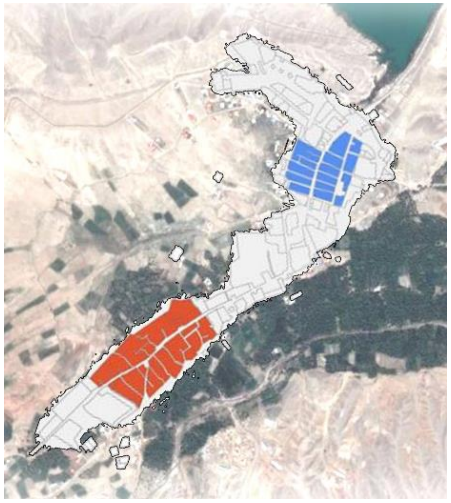
- village is stretched and has a main northern to southern slope along the Rudak- Saghzadabad road, and shorter secondary passages are located on both sides of the main road and approximately perpendicular to it.
- Village neighborhood system is “up” and “down” quarters.
- The “down” quarter transit network is in ordered ,checkered structure. The first-rate street is the main bone of the grid with low slope , and the passageways are located on both sides of it.
- House Toilets have wells, and the rest of the domestic sewage are flowing through the passageways.
- Level of main route is lower than adjacent subways. So light domestic sewage enters the small canals that are embedded in the main passage and are driven out of the village.



Roads network



Slope direction



Village morphology

Rural knots

Huts

Subterranean canals

Housing

- House spaces: courtyard, pre entrance, room, bathroom, toilet, livestock storage, warehouse, kitchen
- Climate-affected factors:
  Low height ceiling
  Southern porch to shade and prevent cold wind
  North to South direction due to lightning
  Using Waterproofing sheets At the base of the wall
  Mainly one floor and a few two-story buildings
- Holding livestock in huts around the village
- Maintaining small livestock in their yard

One floor buildings

Huts

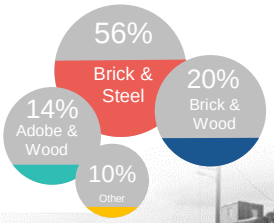
Livestock

Moisture penetration problems

Using Waterproofing sheets At the base of the wall

- Materials for construction:

Before the earthquake: Using adobe and mud
After the earthquake: Using cement blocks and clay roofs
newly built buildings: Using metal structure and brick

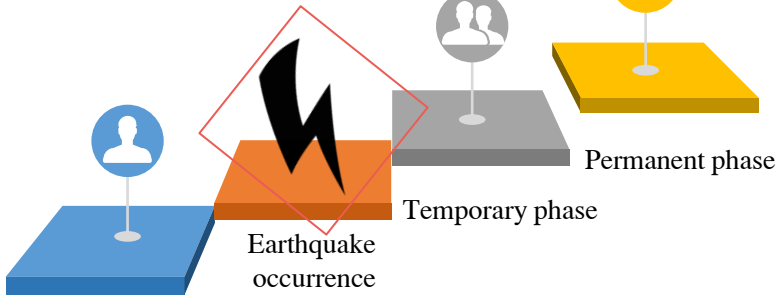


22;55
September 1962
Magnitude 7.2
Richter Magnitude earthquake

Rudak Village Reconstruction responsible :Department of Tehran University Building

After earthquake

About 60 houses inside the castle(destroyed because of the earthquake) and a number outside built by farmers near their agricultural land
Houses with wooden rafters and plaster of clay and straw
Stretched and concentrated morphology due to climate and security issues



Before earthquake

Digging two and a half meter deep trenches and covering it with the foliage and building a home with available materials like mud by people due to severe cold weather and prolonged temporary and permanent phase

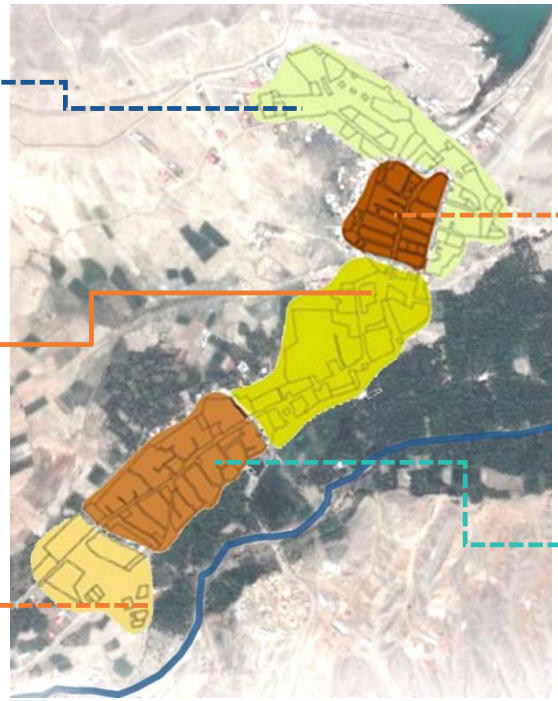
Due to the time and season of earthquake occurrence, most men of the village were at their own fields and farmlands at night, and women and children were alone at home. Because of the deaths of most women after the earthquake, there was no other woman or girl left in the village, so the men of the village gradually married girls from nearby villages like Saghzadabad.In result now there are Tat tribes.

Having high expectations, depression and amusement of residents to marriage again, are some of reasons for lack of participation in the reconstruction process in that time.

Case Study

Zarbanoo Gholi tabara

She was one of Sagzabad girls who came to this village after marriage to one of Rudak resident, Who lost his baby and his wife in earthquake's destructions. A few days after this incident, he followed a number of other male villagers to Sagzabad and married Zarbanoo. Zarbanoo said they were living in emergency tents while she was coming as a newlyweds. Over time, They were given a unit and over several years, they added other sections to the house by constructing rooms in the corner of their yard by themselves.
Now, Zarbanoo 's husband has passed away and her son and his wife are living in a house made by department of Tehran University. Zarbanoo live in added space because of its smaller area. Recently, they build a wall between two spaces to separate their living spaces be more privacy and independence.



Fifth phase

- In the north of the down quarter
- No limitations for development
- Gable Roof
- Section of current village development

Third phase

- Construction on the ground of the original village
- Connecting and creating coherence between up and low quarters

Forth phase

- South part of the up quarter
- New with gable roof
- No more development possible due to surrounding gardens

- Down quarter
- In the northern part of the village
- The initial core of new village after the earthquake
- Having resistant soil
- Includes 48 residential units, a bathroom and a school

First phase

Second phase

- Up quarter
- After 1964
- In the southern part of the village
- Mud houses made by people in this section after the earthquake because of access to subterranean canals.

2:

- Accessibility to the subterranean canals
- and water resources

- Vulnerable soil against future earthquakes

1:

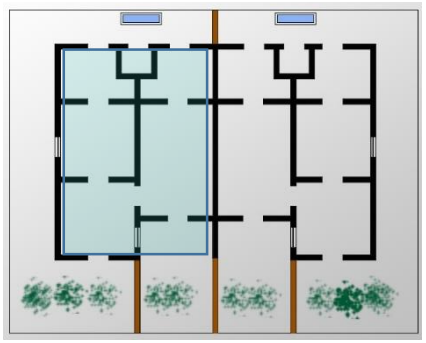
- Reducing the cost of construction due to stone bedding
- Not having agriculture value
- Resistance soil due to stone bedding against future earthquakes

- Digging Problems especially for foundation and toilet wells
- Inaccessibility to the subterranean canals and water resources

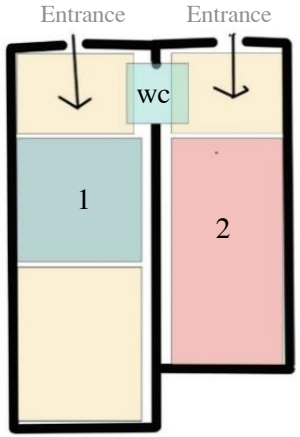
New Site Alternatives

- The plotting of the sites : 700 to 800 square meters of land for each building
- The northern and southern streets allow each building to construct stables and warehouses with sufficient space from residential units
- General buildings: shops and workshops in the two main fields of the village, in the middle of which there will be trees, and buildings used for public use, such as the six class elementary school for boys and the four class elementary school for girls, a public bath, a mosque, a health center, and a police station.

Introduction | Review of past reconstruction | New site | Reconstruction plan



Two units joining to each other for four households as a complex



Each unit is for two households (mostly who are relatives or neighbors before the earthquake)

It can be for one household by opening a gateway later

Buildings with a flat roof and a southern porch

Sufficient distance between units

Due to limited budget of the university and the number of households that are single, double and triple, each unit will be for two households. But between the middle houses and the neighboring houses there is a gateway that will be opened later, if one of the inhabitants get the ability to buy side unit or build his own dwelling in another site.

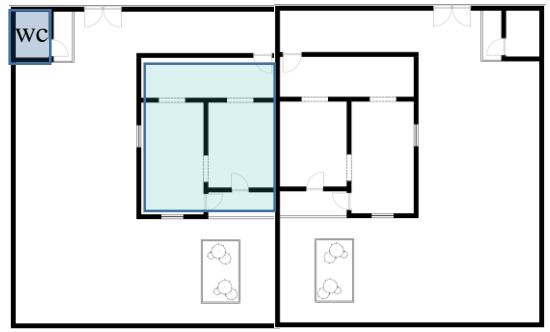
Division of 52 Construction Complexes

1) Half of the complex for families with 8, 9, 10 and 12 people
2) A quarter of the complex for families with 4, 5, 6, and 7 people
3) A quarter of the complex for families with 1, 2 and 3 persons
4) Half of the complex for the police station and other half for the supervisor workshop
5) Half of the complex for the teacher and other half for the health department

Changed core

Cement
Steel bars

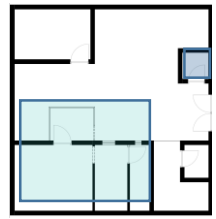
Relocation of wc to the corner of land because of their preference



Floor finishing , landscaping , building walls between the enclosures , building of the warehouse and the stables are by the residents with the support of Rural Cooperative Fund

cement block

Adjoining



Steel door and window frames

reinforced concrete
Roof Insulation with sack and bitumen and a layer of straw for protection
Use white mud from near regions for interior lacquering and painting

Recovery process problems

Difficult access to the subterranean canals

Dissatisfaction with the area of houses (the villagers who settled down tried to solve this problem by trading units and adding new spaces to their houses.)

Scattered units (ignoring the climate of the area tring to increase enclosure with adjoining units made by people)

Lack of justice. Quoting villagers about giving a type of house to all the poor and rich villagers

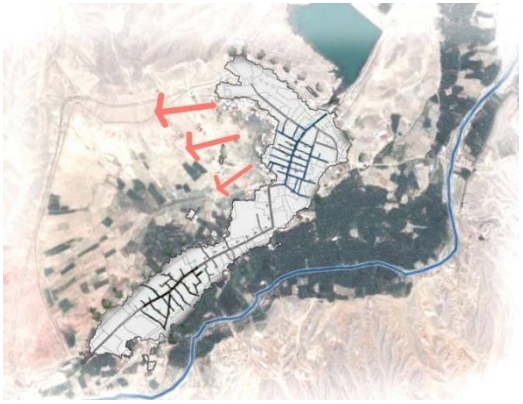
Not paying attention to the spaces needed by people (spaces such as a room, a kitchen, a porch and a shared toilet, but people were adding storage spaces, shelves And tanoor (:for baking bread) themselves.

- Improvement and extension of subways
- Sloping and Construction of Water Conduit
- Make possibility of passing relief cars

▪Measures are taken regarding the village public spaces, due to the lack of following spaces, their design is on the agenda.
▪Revival of the neighborhood center
▪A space for garbage gathering
▪A Neighborhood house
▪An exercise field
▪New user requirements for rural people can be located and designed according to the village's development.

Up quarter due to its high density, has limited permeability. By extending the passageways and allocating the yard to the local, it is possible to consider granting land to the landlords according to the development plan.

The village knots, hangouts for the elderly villagers, can be transformed into spaces for also young people and children to improve the social interaction between local people. Designing attractive spaces and furniture, green space design and shadings are recommended.



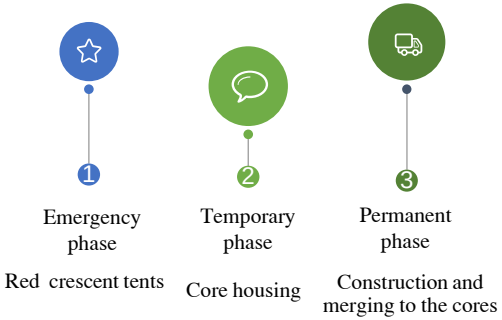
Regarding to the importance of public bath building for local, it is possible to renovate this building as a house of art and culture for holding classes like tailoring and handicraft , especially for women and girls, in order to train and empower them.
Also, the outdoor space surrounding the building, can be considered as a space for monthly market sales of manufactured products.

Methods of Temporary Shelter criteria

Method	strength	weakness
Core housing	• Flexibility • Using indigenous techniques and materials • Increased sense of ownership • Initial expansion of the core according to the economical situation • Organic growth of habitations	• Difficulty of educating people • Small primary area
Help rent	• Moving people away from the seismic environment • Reduce the costs in temporary phase	• Absence of people at the time of debris removing • Complexity of ownerships recognition
conex	• Popularity in society	• Environmental pollution • Difficulty of collecting after temporary phase • Incompatibility with the climatic conditions • Difficult and costly shipment • Difficulty of locating

House spaces:
Yard, porch, room, bathroom, toilet, livestock storage room (small number of livestock), kitchen

Points of interest in design
Low height ceiling
Considering concrete platform in order to prevent the moisture as well as immunity against possible regional floods.
Pre entrance space
East-west direction due to lightning
Separation of the toilet from the residence of the family
Separate livestock storage from living space
Use of canvas materials (bricks) in tufts and decorations
Use of Abyk cement and Isfahan Steel in building structures.

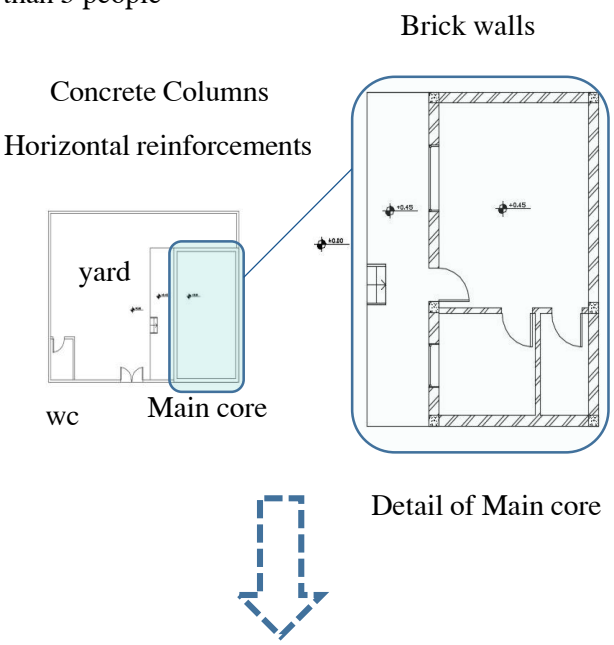


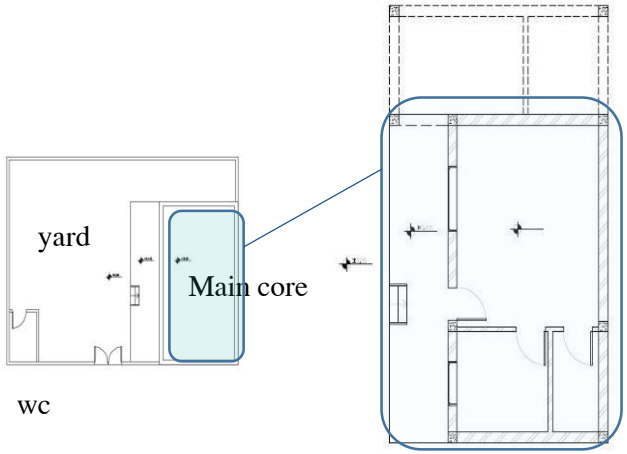
Shelter reconstruction plan

Initial main core
- At least one indoor space for survivors with healthcare facilities
- A very simple way of constructing that can be implemented by survivors.
- Participation of all remaining family members in order to expedite the rehabilitation process
- Attention to the location of the initial core and predict how to extend in future.

Core housing

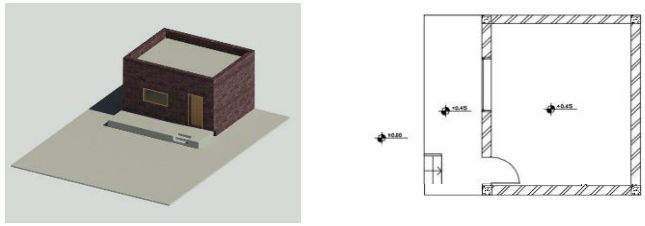
Proposed Core Houses
Type 1 : 20 square meters for single and family with less than three people
Type 2 : 45 square meters for families of 4 to 5 people
Type 3 : 60 square meters for households with more than 5 people



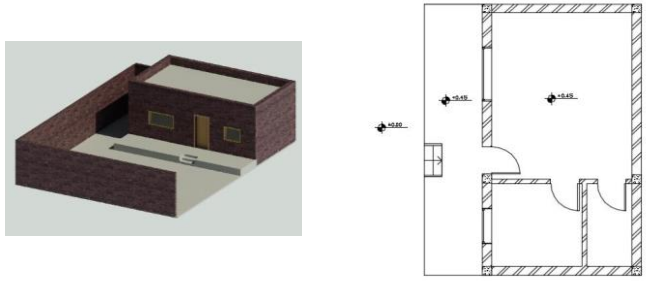


Future development plan

Type 1
This core includes a porch, living room and separate service alongside the courtyard._ 20 square meters



Type 2
This core includes a porch, living room , kitchen , bath room and separate service alongside the courtyard._ 45 square meters



Type 3
This core includes a porch, living room , kitchen , bath room , bed room and separate service alongside the courtyard._ 60 square meters