

## BELBAR, FROM LIMITATIONS TO OPPORTUNITIES DISCOVERING THE NATURAL POTENTIALS

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### Introduction:

*First glance:* The land of Iran is located in western half of historical Silk Road. Howramans region is situated in western south of Kordestan province which lies on outspread mountainsides and plains of Zagros mountain range. Howraman is an ancient region which has been populated since the arrival of Aryans. Howraman's writings on leather (charm-nebeshte) which belong to first century AD are evidences to age of this fascinating land. The word, "Howraman" means divine land or the place of Ahura-mazda(the name of God in ancient Persian theology).

*Second glance:* Studying and forming a precise understanding of villages are of importance from so many aspects, since present cities are formed from the heart of small and grand villages which many of those are on the edge of destruction. On the other hand, these rural settlements in Iran are perfect examples of harmonization with nature and transforming limitations to opportunities. In general, rural architecture can be described as the resultant of given responses to climatical, economical, cultural and social conditions of the village that's been embodied in stone, wood and straw-clay.

*Third glance:* The rural settlement that's being discussed, Belbar (i.e. forty springs), is one of the villages of Howramans region. Residents of this village have dealt with many limitations such as geographical, climatical and social limitations in constructing their settlements. This article is an effort to study the kind of responses these people gave to each one of these limitations. These limitations are discussed in two categories of A) contexture Formation and arrangements of the blocks of the settlements and B) form and construction methods of residential blocks of Belbar.



Fig. 1:Whole vision of Belbar

**Treatise:**

**A) The effects of limitations on contexture Formation and arrangements of the blocks of the settlements**

**Weather and climatic feature**

Lying in the valley and locating on the banks of Sirvan River (see Fig. 1), this village disobeys mountainous climate of Kordestan province and is a little bit more moderate during winters and humid in summers.

**General Introduction of Rural Contexture**

The contexture is organic like a Semicircular, located on two side of the valley. Because of Mountainous and moderate climate, the contexture is formed from compressed step like small blocks of settlements; The houses are placed in a way that shading and obstructing each others' vision are minimized.

Different ethnic groups are settled in zones considering their requirement and history .for example Shiras are farmers therefore their houses are near the fields. Mollahas are religious people and therefore, they live near the mosque. (See Fig. 2)



Fig. 2 Village site plan / zones of ethnic groups



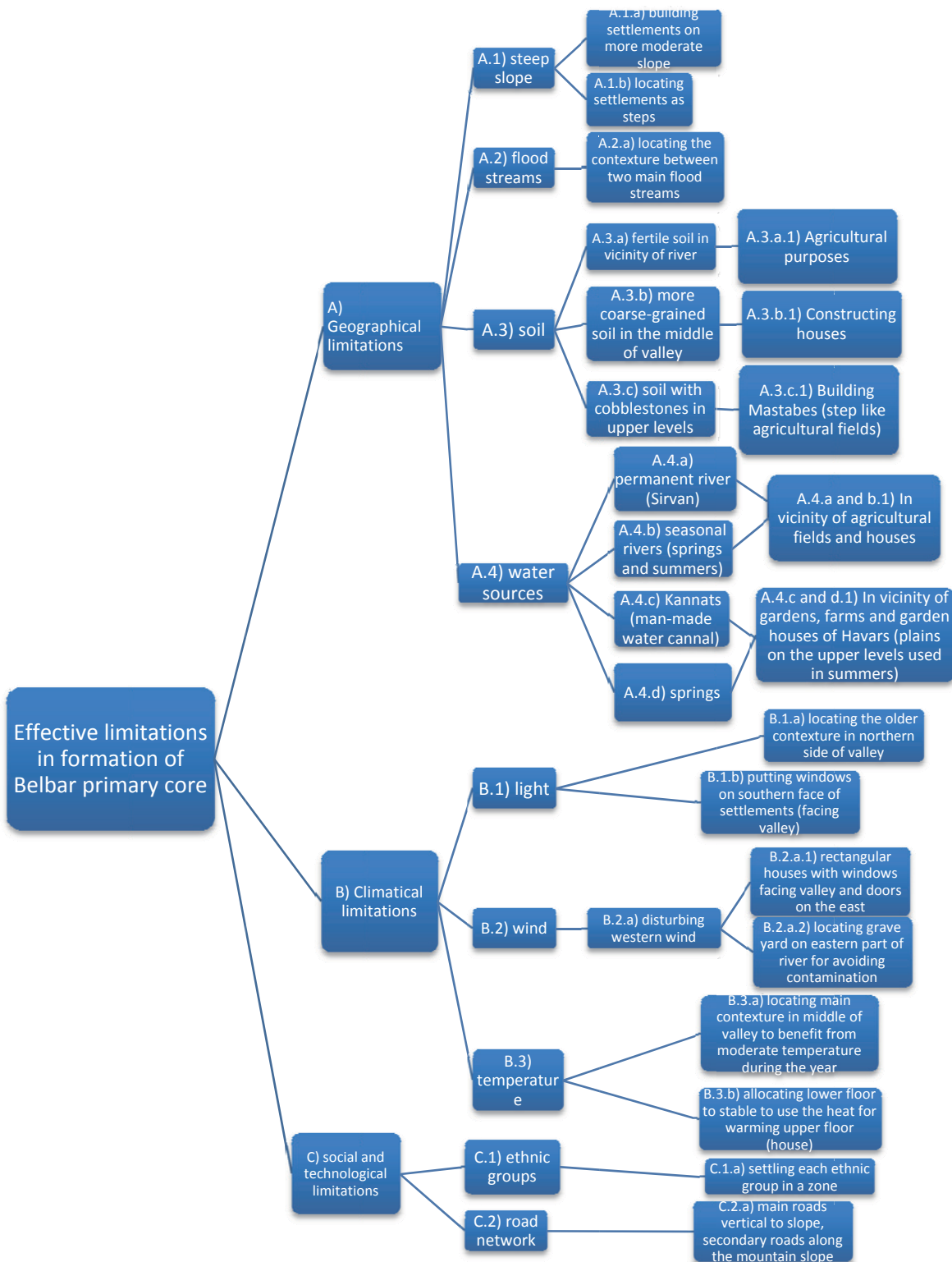
Fig. 3 Part of village contexture

The architecture of houses is Extroverts that make them not to have central patio despite of the houses located in warm climate.in fact these patios are superseded by verandas which can be seen before entering the house. (Table 1)

Table 1

Limitation	A response for it
Mountainous climate	compressed and small blocked contexture
compressed and small blocked contexture not shading each other	Step like geometry
Mountainous climate	Not using central patio
Not using central patio and step like geometry	The roof of each house is yard ofupper one

In general, we can put these limitations in 3 categories of A) geographical, B) climatical and C) social and technological. These limitations, how they transformed to opportunities and their responses have been studied as shown in the Fig. 4 below:



OPPORTUNITIES

Fig. 5 Effective limitations in formation of Belbar primary core •



Fig. 6 Mastabas (step like agricultural fields)

Fig. 7 On right: garden On left: agricultural field

## B) The Effects of Limitations on form and construction methods of residential blocks of Belbar

### B.1) Locating the Rural Settlements According to Limitations

Like any other project in any region, the first step for constructing a building is choosing its site. In this step, two main categories of limitations play important roles in choosing the site

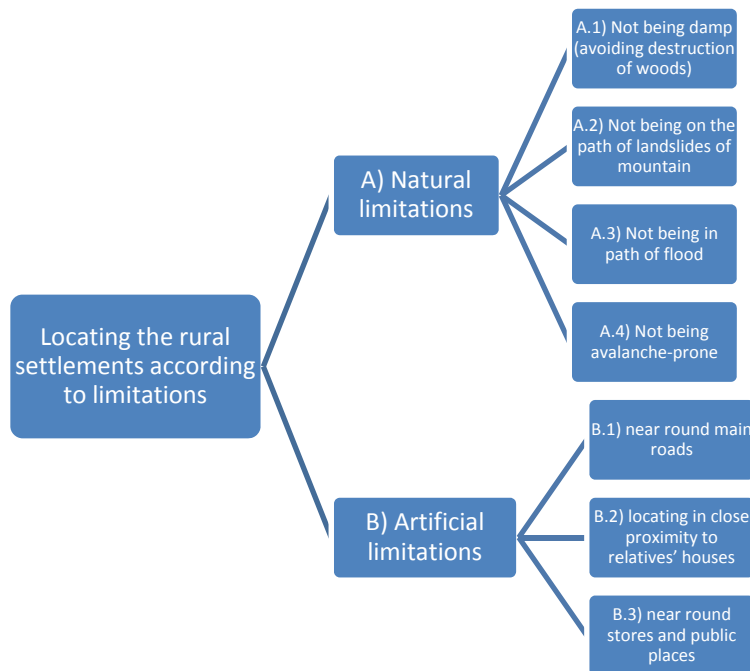


Fig. 8: Locating the rural settlements according to limitations

**B.2) Form:** The forms of settlements are generally rectangles in two stores that the down floor was allocated to stable. Because of placing the houses in gradient, the roof of every house also functions as the upper house's court-yard. In fact one out of four faces of every house faces the valley always. By paying attention to appropriate light and inappropriate western wind, windows face the valley and doors open towards the east. Also houses extend through the east-west axis. Buildings are placed on stone platforms and they have linear order which concentrates in complexical points. (Fig.7)



Fig. 9: (A residential block in Belbar)

### B.3) Construction of Rural Settlement:

#### B.3.a) Limitations in Choosing Materials:

Table 2

Materials	Ability	Where they are used
Stone	Bear pressure forces/vertically transfer weight of the walls and ceiling to the ground/High Heat Capacity/recyclability	the bearing walls, ceiling
Lumbers, made from a native tree called "Daar" or "Chenaar", length 4 to 5 meters.	high tensile strength/High Heat Capacity/recyclability	Flat ceilings, door and window frames, different sections of the exterior walls
Wooden boards	high tensile strength/High Heat Capacity/recyclability	On the beams of Ceiling
Straw-clay plaster	adhesive quality, High Heat Capacity, High Thermal Resistance/recyclability	Fill the cracks, join the materials, cover the inside surfaces of the walls and ceiling, and as moisture and thermal insulation.

**B.3.b) Construction Methods:** Construction technology adapts to using accessible materials and confronting nature forces like wind. For instance their special method of placing stones emphasis on reinforcing resistance against vertical forces. Also Longitudinal and transverse lumber are used to distribute loads in walls evenly. (Fig. 7) A fine example of this vernacular technology, considering the low tensile strength of stone, is using lumber pieces in particular places of different sections of the exterior walls as tension frames to connect the parts of the whole structure in order to make the walls strong enough to stand the horizontal forces.



Fig. 10: Lumbers in different sections of the exterior walls (woven in corners)



Fig. 11: Wooden boards on the beams of Ceiling

### B.3.c) Age of Houses in Response of Limitation in Choosing Materials:

The age of the houses depend on the wood age so if the roof has good insulation that water doesn't reach the lumbers and maintenances well, houses could be used for decades.



Fig. 12 Wooden structure

### Conclusion:

As mentioned in this article, Belbar is one of the valuable rural settlements of Howrman region that has been harmonized with nature, culture, tradition and economics through time, as reflected in the wholesale of the village, from its general arrangement to construction of every single settlement. In order for this architecture to be harmonized there are some limitations to deal with and be transformed to opportunities. This transformation is best indicated in its rural contexture and building technology. Construction has always been performed with considering the potentials of every available vernacular material and this affects the optimization of energy usage and all of these facts lead this native constructing to be considered as some kind of sustainable architecture. These features should be preserved and followed in expansion process of Belbar.

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