

# People's Acceptance of Vernacular Houses – Transformed Dwellings of Ghantasala, Andhra Pradesh

Venkata Krishna Kumar Sadhu\*, Srikonda Ramesh

Department of Architecture, School of Planning and Architecture, Vijayawada, Andhra Pradesh, India

**Abstract:** Dwellings are usually constructed by people as per their respective needs, with the use of traditional skills. The architectural built form, layout, building materials, and local construction practices vary from one region to the other, depending on the socio cultural and socio-economic significance. It is essential and crucial to understand the cultural significance in an ever-transforming world. Thus, a study has been attempted to analyze typical characteristics of houses in Krishna district of coastal Andhra Pradesh. As part of the study process, a few dwellings were selected which have vernacular building components and which underwent transformation (spatial, physical and esthetical) in response to the respective users' changing requirements in time and space. People's attachment to the vernacular components of the present and earlier house was recorded. The qualitative analysis brought out that 25% of houses exhibited transformation in their built-up area while 75% exhibited transformation in terms of its spaces, components such as roof, wall, joinery and ornamentation. It was also found that the quantum of transformation which had taken place arose from different reasons in isolation and combination such as family structure, change from joint large family to a

smaller nuclear family system within the same premises, property subdivision, growth in economic condition, and partial physical deterioration of building components. The principal focus of this paper is to understand the degree of people's attachment or satisfaction level toward vernacular elements and thereby understand the social acceptance of vernacular architecture in a broader perspective.

**Keywords:** Vernacular houses, Transformation, t-test, Degree of attachment, Acceptance model conservation

## 1 Introduction

The state of Andhra Pradesh (AP) was formed mainly on a linguistic basis and was originally a part of the Madras Presidency in the year 1953. Further, in the year 1956, the state was merged with the Hyderabad state and this led to creation of the new state. AP has a noteworthy cultural significance and is known for its rich heritage of vernacular architecture and culture. There are many references about history of Andhra and about people named as the Andhras in historic epics, Puranas, Ramayana, Mahabharata and Jataka Tales. Several evidences indicate that the kingdoms that flourished in coastal AP relate to the visit of Buddha to Amaravathi in Guntur district.

Telugu speaking area of Hyderabad (Telangana) had been merged with Andhra State to create AP state in the year 1956. On June 2, 2014, the north-western portion of AP was separated to form the separate state of Telangana, and resultantly a new AP state was carved which can be seen in **Figure 1**. AP is one of the 29 states of India and is the seventh-largest state in India. It covers an area of 160,205 km<sup>2</sup> with strong vernacular architecture. However,

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**\*Corresponding Author**

Venkata Krishna Kumar Sadhu,  
Email: [krishnakumar.sv@spav.ac.in](mailto:krishnakumar.sv@spav.ac.in)

the past values and historical significance are getting ignored, due to globalization and industrialization.

The state has got a strong political as well as historical heritage wherein there are several old settlements with high heritage value. It was also observed that the dwellings in a few towns and villages which are far from a city, still bear vernacular architectural character. In this context, a few dwellings have been selected in Ghantasala village of AP, as in **Figure 2**, so as to assess the degree of people’s attachment to vernacular architecture, amidst an era of transformation.

## 2 Problem statement

In the context of houses constructed by individuals or the government, the new houses have the least relevance to the vernacular architecture of the place. Resultantly, identity is misplaced. The

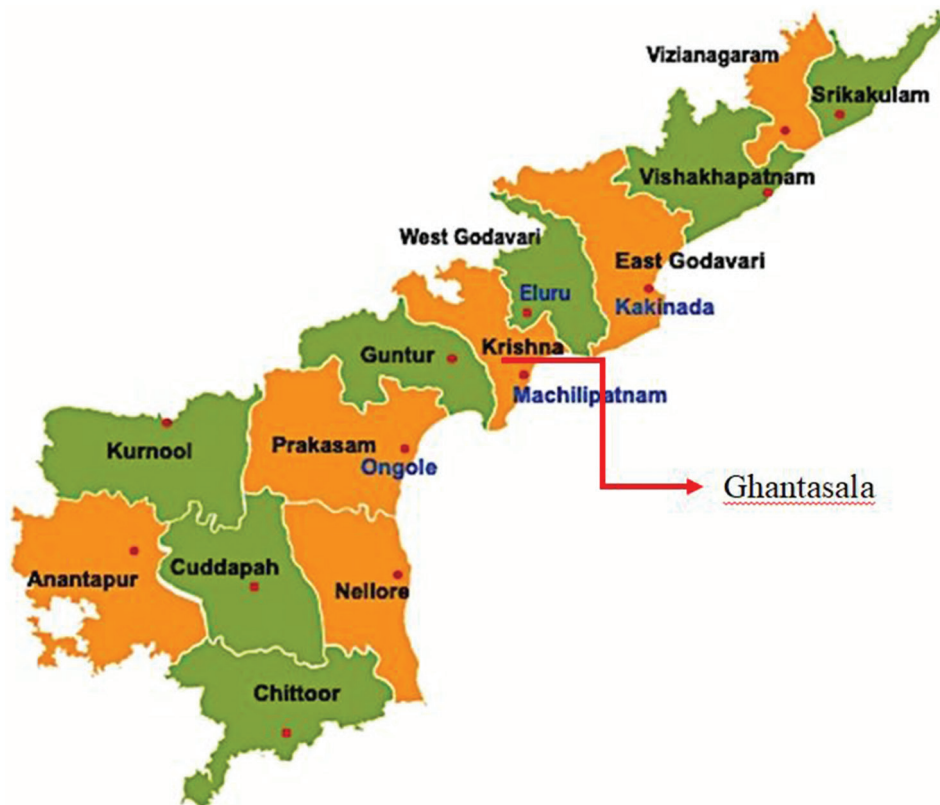
beneficiaries are also deprived of a homestead and a sense of belongingness with the new house. The general reasons quoted are that lack of time and people’s lack of willingness for building vernacular-relevant houses is the major constraints and that none are interested anymore. It is also loosely stated that people in the rural areas have no attachment to the old vernacular houses anymore. In the said context, the following research questions emerge:

- Is vernacular house acceptable as on date in rural areas?
- Is vernacular housing design a scientific requirement or emotional expectation?
  - To develop an understanding of the character of vernacular housing
  - To examine the specialty of such a housing and invite users’ opinion on their attachment.



**Figure 1.** Location of Andhra Pradesh in India.

Source: [https://www.fourjay.org/myphoto/f/68/680146\\_india-map-png.png](https://www.fourjay.org/myphoto/f/68/680146_india-map-png.png)



**Figure 2.** Location of Ghantasala village in Andhra Pradesh.

Source: [https://www.ap.gov.in/?page\\_id=36](https://www.ap.gov.in/?page_id=36)

### 3 Objectives

The objectives of the study are as follows:

- To measure the degree of people's acceptance of vernacular houses
- To recommend and advise for adoption of appropriate vernacular design option for proposed public housing in rural areas
- To safeguard the identity of a place and the people by continuing vernacular building traditions and techniques.

### 4 Study methodology chronology

- Select a periurban area which has vernacular houses.
- Select the housing typology which has Tiled Roof, with or without Manduva (Manduva is like an open courtyard surrounded by a corridor, followed by a group of rooms surrounding the corridor; sometimes, a courtyard may be surrounded only by a group of rooms without the intermediate corridor. In certain cases, Manduva is a perforation in the roof of the house, and the perforation brings in air, light,

and rainwater, like in the case of the houses of Ghantasala. The rainwater thus gets collected into a pit or trough, which is dug on the floor of the courtyard). As vernacular houses are intrinsically in response to climate, Manduva is one of the visual and physical attributes of climate responsive design of vernacular houses. However, the focus of this paper is to bring out the reasons for the transformation of vernacular houses and to ascertain the people's attachment to vernacular houses despite the transformation from time to time.

- Document the selected houses and check if there is any transformation, which may be spatial, visual and/or physical w.r.t Plan form, spatial function, building components, etc.
- Identify the reasons for transformation (disappearance/missing features) through a primary survey.
- Check the level of acceptance of the user toward the earlier/old (original) and new (after transformation) house and the components within.
- Analyze the users' response through the appropriate statistical tools to ascertain the users' level of acceptance of the vernacular house.

## 5 Dwelling typologies in Andhra Pradesh

A dwelling is a reflection of cultural, occupational, climatic, and functional factors of the user groups. The building practices overages lead to a near-perfect environment which fulfills users' conditions. Experience, exposure, and practices lead to enable satisfaction, develop affection, and attachment to the respective dwellings of people. The definition of "vernacular architecture" indicates buildings such as courtyard houses in India, English thatched cottages, mud huts in Africa,<sup>[1]</sup> and the like. The main focus of this paper is on dwellings with terracotta tiled pitched roofing and courtyard/Manduva, in India. Things from the rural past and things from foreign places that are associated with the identity of the people who built and live, or lived, in them are analyzed. In addition, for some, the vernacular may also mean the work of the then contemporary architects whose buildings bear a resemblance to the style of those of a given region. Vernacular architecture helps in assessing the nature of dwelling, meaning of privacy, and the origins of built environment, energy efficient built up and is communicated by setting<sup>[2]</sup>. It is essential to understand the importance of reconstruction of vernacular architecture by understanding its origins and specifically the geometry, which is an expression of primitiveness<sup>[3]</sup>. Geometric modes of the organization have been explained in the literature that it will develop later in life to serve particular purposes, and it can be understood explicitly as basic topologically responsive structures<sup>[4]</sup>. The traditional values' oriented house is an expression of a culture which depicts the local identity of a community in a region with a function consistent with its type<sup>[5]</sup>. Vernacular houses are in the transforming phase, and the common transformation is of function, followed by form as required as a natural phenomenon<sup>[6]</sup>. The transformation of dwellings is mostly not happening appropriately in India, but the inhabitants still remember the transformed vernacular components with regard to the attachment and its values. However, it has been studied that in Bali, the transformation not only improves the housing environment but also contributes to cultural development<sup>[7]</sup>. Due to the push and pull factors, the traditional communities, especially those living in rural areas cannot escape the phenomenon of transformation<sup>[8,9]</sup>. The transformation makes the

homeowners to take practical decisions based on economic considerations<sup>[10]</sup>, for example, changing the site layout for contemporary functions and using modern building materials and technical know-how. It is essential to have participatory action research (PAR) to integrate with the community empowerment that is essential to maintain the local wisdom. PAR should be taken up with full support from all sectors by other approaches, i.e., observation, in-depth interview, and focus group discussion to achieve the study purpose<sup>[11]</sup>.

## 6 Transformation of dwellings

Urbanization and industrialization can be taken as a natural phenomenon with the advent of technology in every field. Subsequently, it is understood that to improve the condition of people, Government of India launched schemes through the Planning Commission of India. National Rural Employment Guarantee Act, Pradhan Mantri Awas Yojana, Pradhan Mantri Gram Sadak Yojana, Swachh Bharat Abhiyan, Sarva Shiksha Abhiyan etc., to improve the socio-economic conditions of human settlements *per se*, to improve living conditions and speed up the development process. The job guarantee program was started on August 25, 2005, to end the problem of unemployment in rural areas by creating 100 days of work. All developmental schemes accelerated the transformation process and started reflecting in their lifestyle and built environment. Particularly, various housing schemes and liberal housing loans have got direct influence on the transformation of dwelling units of new constructions, addition, and alterations as per their need and affordability. The author had surveyed and investigated several dwellings in Ghantasala village in Krishna district, a typical traditional dwelling in Pippara in west Godavari district, transformed dwellings in Athukuru in Krishna district, traditional setting in Amaravathi town in Guntur district, etc., for understanding the trends of the transformation of dwellings and built forms. This paper presents the cases of Ghantasala village.

## 7 The case area - Ghantasala village

Ghantasala is one of the 20 villages within Ghantasala Mandal of Krishna district, AP, India. Geographical boundary of the village is as shown



in **Figure 3**. It is situated at a distance of 21 km to the west of Machilipatnam (district headquarter), 11 km to the east of River Krishna, and 60 km to the southeast of Vijayawada. Ghantasala was one of the pivotal places of Indo-Roman trade besides being a religious center. Proximity to river Krishna, Machilipatnam and Vijayawada enabled its prevalence as one of the prime transit centers of trade. Columns made of limestone, belonging to the hypostyle halls of Buddhist monasteries dating to 2<sup>nd</sup> BCE have been discovered in and around the place. There are Buddhist relics such as Stupa and many Hindu worshipping places which indicate the past glory of Ghantasala village. Due to the predominantly higher number of Hindu temples, it can be said that the influence of Buddhist architecture was insignificant.

As per the Census of India 2011, Ghantasala Mandal has a population of about 40,000 persons, while Ghantasala village has a population of about 9200 persons. A few facts about Ghantasala village are presented in **Table 1**.

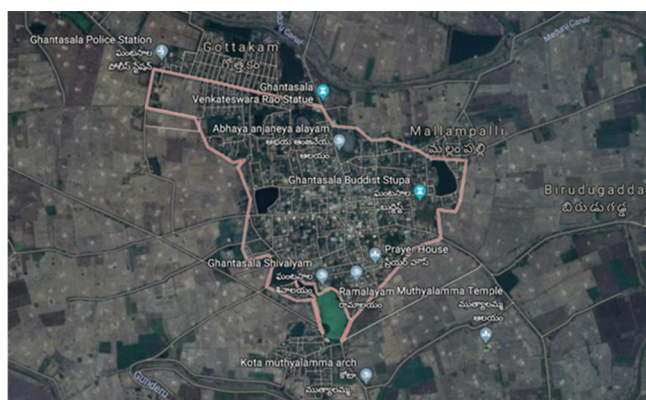
Of the total population of 9248, 5212 are involved in work activities. Nearly 95% of workers are engaged in Main Work (having earnings for more than 6 months of employment); nearly 5% were involved in marginal work activity, providing livelihood for <6 months. Of the total workers involved in Main Work, 421 were farmers (owner or farm lessee), while 2709 were farm laborers. Thus, the economy of Ghantasala village was predominantly agrarian.

Snapshot of the village is as below:

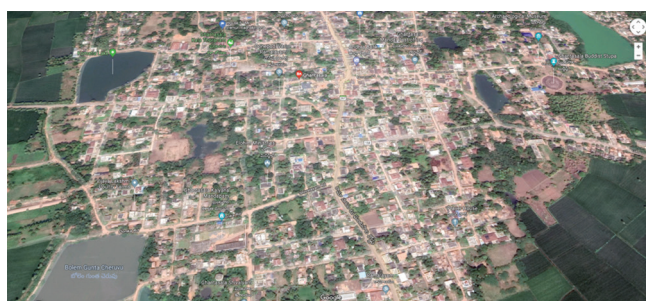
- As shown in **Figure 4**, houses are predominantly pitch roofed with clay tiles as roof cover; the rich agricultural belt adjoining the village is the place of work for the 94% of main workers.

## 8 Transformation of vernacular houses in Ghantasala village

Houses in Ghantasala village were predominantly built using mud, mud blocks, or bricks for walling; wooden truss – clay curved tiles for roofing; wooden rafters – madras terracing for flat roofing; and wood for openings as well as ornamentation and mud, local stone for flooring till the 1990s period. Houses which were built or reconstructed beyond this period employed bricks for walling; wooden



**Figure 3.** Boundary of Ghantasala village, Andhra Pradesh. Source: <https://www.google.co.in/maps/place/Ghantasala>, accessed on 14.09.2019.



**Figure 4.** Birds eye view of Ghantasala village, Andhra Pradesh. Source: <https://www.google.co.in/maps/place/Ghantasala>, accessed on 14.09.2019.

**Table 1.** Profile of population, houses and workforce of Ghantasala, AP, and India

S. No.	Particulars	Total	Male	Female	Remarks
1	Population	9248	4585	4663	
2	Total number of houses	3187	-	-	
3	Child (0 – 6)	686	373	313	
4	Literacy	75.06%	79.58%	70.69%	67.02% for AP State
5	Total workers	5212	2951	2261	
6	Main worker	4946	-	-	
7	Marginal worker	266	66	200	

AP: Andhra Pradesh. Source: <https://www.census2011.co.in/data/village/589702-ghantasala-andhra-pradesh.html>

rafters – madras terracing or RCC for flat roofing; wood for openings as well as ornamentation and local stone or marble, tiles, etc., for flooring.

There are several definitions of vernacular architecture. However, for the purpose of this paper, an operational definition in the context of Ghantasala village, i.e., houses which are built with mud, mud blocks or bricks for walling; wooden truss – clay curved tiles for roofing; wooden rafters – madras terracing for flat roofing; and wood for openings as well as ornamentation and mud, local stone for flooring are considered as vernacular houses.

A primary survey was conducted as part of the case study of vernacular houses in Ghantasala village. It was observed that there was visible sign of transformation in terms of building material/s, additional built-up area, interchange of functional spaces, ornamentation, color/texture, structural supports, etc., some of which were visible at a glance while some were not. On completion of the said case study, a few aspects were identified which can be treated as parameters or components or categories of transformation. The said parameters are given in **Table 2**.

## 9 Qualitative analysis – Degree of people’s acceptance

The houses having similar characteristics with regard to the age (not <50 years), plot size, number of floors, occupation, family structure, etc., have been selected out of the total number of houses. It was observed that there was a transformation in all the houses, but the extent of transformation varied from one dwelling to the other. Scoring of responses about the attachment to present/transformed condition against attachment to the earlier/original condition has been done on Likert scale, as given in **Table 3**.

To understand the inhabitants’ attachment to the vernacular components of the buildings, a “Critical – t” test analysis has been conducted.

- A t-test is used as a hypothesis testing tool, which allows testing of an assumption applicable to a population. A t-test looks at the t-statistic, the t-distribution values, and the degrees of freedom to determine the probability of difference between two sets of data. The t-statistic was introduced in 1908 by William Sealy Gosset
- The two sets of data are
  - Attachment of the house owner to the earlier condition of the house

**Table 2.** Parameters for mapping of transformation in vernacular houses of Ghantasala, Andhra Pradesh, India

S. No.	Parameter of transformation	Interpretation of transformation
1	Plan	Change in original plan or additional built space
2	Openings	Change in the existing ones or provision of new type doors, Windows
3	Roofing	Change of roofing style/material for existing space or additional space
4	Flooring	Change of floor material in the original space or additional space
5	Columns/Beams (Struc. Supports)	Change in the existing ones or provision of new type in the additional space
6	Moldings	Change in the original ones or provision of new type in the additional space
7	Outside seating	Exists as it was or transformed/removed
8	Manduva	Change in the original one by modification with new material
9	Walls	Change in the original ones or provision of new material in additional space
10	Open space	Exists as it was or used for additional built-up space

**Table 3.** Rationale for scoring of users’ response

S. No.	Type of users’ response about attachment/acceptance of earlier (original/before transformation) or present (after transformation) components	Numerical score for users’ response (1 – 5 scale)
1	No attachment (user strongly disagrees)	1
2	Below average (user’s opinion is “not very satisfactory”)	2
3	Average (user’s opinion is neutral)	3
4	Fair (user agrees)	4
5	Good (user strongly agrees)	5



- Attachment of the house owner to the present condition of the house (after transformation).

$$\text{Testing hypothesis "t"} = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \quad (1)$$

where,  $\bar{x}_1$  = Mean of  $x_1$ ;  $\bar{x}_2$  = Mean of  $x_2$

$$\text{Standard deviation "S}_1\text{"} = \sqrt{\frac{\sum(x_1 - \bar{x})^2}{(n_1 - 1)}} \quad (2)$$

$$\text{Standard deviation "S}_2\text{"} = \sqrt{\frac{\sum(x_2 - \bar{x}_2)^2}{(n_2 - 1)}} \quad (3)$$

The rationale of the test is that if the absolute value of the "t" is higher than the critical "t," then it can be construed that the transformed vernacular house is not to the satisfaction of the inhabitants. If the absolute value of the "t" is lesser than the critical "t," then it can be construed that the transformed vernacular house is to the satisfaction of the inhabitants.

Nearly ten such houses have been considered for qualitative analysis through questionnaires and interviews with the inhabitants. Mapping of transformation was done using ten parameters, as aforementioned. However, by further detailing the said ten parameters, 40 parameters have been developed, and the transformation of one house was **Figure 4** mapped and the users response has been scored as per the rationale of scoring The selected house is as shown in **Figure 5**, as seen from the abutting main road. Important features and details of the said house are given in **Table 4**.

Key transformations related to the selected house are shown through **Figures 6-16**, as described below:

- Construction of a new building annexed to the old house, with new building materials and new construction techniques, as shown in **Figure 6**
- East verandah with wooden columns and the typical arrangement of seats for guests and visitors as shown in **Figure 7**.
- Addition of engineered wooden planks on roof rafter network in one of the bedrooms to wade off termite dust etc. as shown in **Figure 8**.
- Complete Paving of the open space (originally unpaved), as shown in **Figure 9**.
- Addition of car parking shed in the side open space with new building materials and new construction techniques, as shown in **Figure 10**.

- Diversion of water received from the roof-Manduva, through a PVC pipe as against the traditional system



**Figure 5.** View of the selected house from abutting road.



**Figure 6.** View of the new house behind old house.



**Figure 7.** View of the entry into the old house.



**Figure 8.** View of the main roof rafters.

**Table 4.** Details of the transformed house (House No. 7) in Ghantasala, Andhra Pradesh, and India

S. No.	Type of information about the house	Description
1	Name of the house	Venkatrama Nivas (Saahukar)
2	Year of construction (approx.)	1920
3	Year of major renovation/subdivision	1988 and 2000
4	Frequency of repairs/modifications	10 years or as per need from time to time
5	Name and age of house owner	Mr. V.V. Praveen, 59 years (S/o. Mr. V.V. Ramakrishna Prasad, 72 years)
6	Location	Thoorpu street, Museum road, Ghantasala
7	Site area (approx.)	630 Sq.M
8	Built-up area (approx.)	350 Sq.M
9	Orientation	North
10	Rooms and type	Old House: Front verandah, living cum dining, kitchen, Manduva, 2 bedrooms, toilets, storerooms, pooja room New Annex House (2000): Front Verandah, 2 bedrooms, toilets, Semi-open Parking Shed, storerooms
11	Building materials	Old House: Wall: Burnt Clay lumps in Lime Plaster plus Mud mortar, Openings: Teak wood Roof: Clay Tiles laid on Wooden Rafters and Bamboo sections New Annex House (2000): Wall: Burnt bricks and Cement Mortar plus Cement plaster Openings: Teak wood and Flush doors Roof: Reinforced Cement Concrete
12	Number of floors	Old House: Ground Floor New Annex House (2000): Ground Floor and First Floor
13	Type of transformation	Construction of additional space/new house with new building materials, on South end of the old house, in the year 2000
14	Components of transformation in old house	a. Plan/interchange of space usage b. Building material (wall plaster) c. Building Finish, namely, Paint/color d. Ornamentation e. False ceiling f. Construction of attached toilet in Bedroom g. Manduva (rain water pipe re-directed off the floor and drain out stormwater directly to outside, through external wall) h. Bamboo sections replaced with thin rafters i. Additional main rafters of roof to support ceiling fans, etc.



**Figure 9.** View of the paved side open courtyard.

of collecting rainwater directly into a floor pit inside the living room, as shown in **Figure 11**.

- Addition of false ceiling to the second bedroom using cement corrugated panel, as shown in **Figure 12**.
- Columns of front verandah are made of Cement Concrete as shown in **Figure 13**, while the original columns in the rest of the house or other verandahs, are made of wood.
- Addition of partial false roof in the bedroom of old house, to accommodate the requirements of





**Figure 10.** View of the side courtyard with new temporary structure for parking.



**Figure 13.** View of front Verandah and Arugu (traditional seating platform).



**Figure 11.** View of the transformed Manduva inside the living room.



**Figure 14.** View of the main roof support system.



**Figure 12.** View of cement corrugated sheet added as false ceiling.

the elderly persons of the family, as shown in **Figure 14**



**Figure 15.** View of the false ceiling done in bedroom to avoid dust falling from the roof and air conditioner added for thermal comfort.

- Addition of false ceiling to one bedroom using thermocol – aluminum channels and installation of Air conditioning system, as shown in **Figure 15**. Picture showing the addition of

**Table 5.** Critical – t-test as per users’ response

S. No.	Component of transformation	Case 1			Case 1		
		Condition - Present			Condition - Earlier		
		X	Z = X-Xbar	Z <sup>2</sup>	X	Z = X-Xbar	Z <sup>2</sup>
1	Plan	2.00	0.02	0.00	3.00	-0.18	0.03
2	Front Courtyard	3.00	1.03	1.05	4.00	0.83	0.68
3	Rear Courtyard	2.00	0.02	0.00	4.00	0.83	0.68
4	Sleep Out space	2.00	0.02	0.00	3.00	-0.18	0.03
5	Puja	3.00	1.03	1.05	4.00	0.83	0.68
6	Community space	2.00	0.02	0.00	3.00	-0.18	0.03
7	Openings to Courtyard	1.00	-0.98	0.95	3.00	-0.18	0.03
8	Doors	1.00	-0.98	0.95	4.00	0.83	0.68
9	Windows	2.00	0.02	0.00	3.00	-0.18	0.03
10	Ventilators	3.00	1.03	1.05	2.00	-1.18	1.38
11	Sky Light	2.00	0.02	0.00	2.00	-1.18	1.38
12	Roofing –Flat	3.00	1.03	1.05	4.00	0.83	0.68
13	One side Slope	1.00	-0.98	0.95	3.00	-0.18	0.03
14	Slope all sides	1.00	-0.98	0.95	4.00	0.83	0.68
15	Flooring of Verandah	1.00	-0.98	0.95	3.00	-0.18	0.03
16	Flooring of living room	3.00	1.03	1.05	3.00	-0.18	0.03
17	Flooring of bed rooms	2.00	0.02	0.00	2.00	-1.18	1.38
18	Flooring of kitchen	2.00	0.02	0.00	2.00	-1.18	1.38
19	Flooring of wash areas	3.00	1.03	1.05	2.00	-1.18	1.38
20	Courtyard flooring	3.00	1.03	1.05	4.00	0.83	0.68
21	Columns–Front Verandah	3.00	1.03	1.05	4.00	0.83	0.68
22	Columns – living room	3.00	1.03	1.05	2.00	-1.18	1.38
23	Columns – Courtyard	2.00	0.02	0.00	4.00	0.83	0.68
24	Columns – rooms	2.00	0.02	0.00	2.00	-1.18	1.38
25	Main door moldings	2.00	0.02	0.00	4.00	0.83	0.68
26	Window moldings	2.00	0.02	0.00	4.00	0.83	0.68
27	Moldings to roof projections	2.00	0.02	0.00	4.00	0.83	0.68
28	Verandah at front	2.00	0.02	0.00	4.00	0.83	0.68
29	Verandah at rear	2.00	0.02	0.00	3.00	-0.18	0.03
30	Community space	2.00	0.02	0.00	3.00	-0.18	0.03
31	Store for fire wood	2.00	0.02	0.00	4.00	0.83	0.68
32	Storage to grains	1.00	-0.98	0.95	3.00	-0.18	0.03
33	Manduva single Courtyard	1.00	-0.98	0.95	4.00	0.83	0.68
34	Manduva double Courtyard	2.00	0.02	0.00	3.00	-0.18	0.03
35	Wall Texture	2.00	0.02	0.00	3.00	-0.18	0.03
36	Wall Decoration	2.00	0.02	0.00	3.00	9.53	90.73
37	Wall color	2.00	0.02	0.00	3.00	-0.18	0.03
38	Wall Hangings	1.00	-0.98	0.95	2.00	-1.18	1.38
39	Wall mounted lights	1.00	-0.98	0.95	3.00	-0.18	0.03
40	Roof tiles	1.00	-0.98	0.95	3.00	-0.18	0.03
	Total	79.00	0.98	18.98	127.00	9.70	112.47
	Mean of X	<b>1.98</b>		<b>0.49</b>	<b>3.18</b>		<b>2.88</b>
	Standard Deviation			<b>0.70</b>			<b>1.70</b>
	S-Error			<b>0.11</b>			<b>0.27</b>

(Contd...)

**Table 5. (Continued)**

S. No.	Component of transformation	Case 1			Case 1		
		Condition - Present			Condition - Earlier		
		X	Z = X-Xbar	Z <sup>2</sup>	X	Z = X-Xbar	Z <sup>2</sup>
t-test	-8.258744731						
A + B	0.290275068	Variance S	0.47	Variance S		2.81	
t-critical	1.833	Level of significance for one-tailed test 0.05					



**Figure 16.** View of the newly added attached bathroom to bedroom; false ceiling done in bedroom.

attached toilet in the bedroom of old house, to accommodate the requirements of the elderly persons of the family, as in **Figure 16**.

- Location of kitchen, storeroom, and puja room changed or interchanged, for reasons of Vastu, a popular belief among people.

Key plan of the house is presented in **Figure 17**, also indicating changed or interchanged use of spaces, as aforementioned.

A t-test has been conducted to assess the level of acceptance of the users of the house and the same is presented in **Table 5**.

As shown in **Table 5**, the absolute value of the “t” which is **8.258**, is higher than the critical “t” which is **1.833**. Thus, it can be construed that the transformed vernacular house is not to the satisfaction of the inhabitants.

Mapping of transformation was done for the remaining nine houses as well, across the ten parameters, and in all the nine cases too, the absolute value of the “t” was higher than the critical “t” of each respective house. Thus, it can be construed that the transformed vernacular house is not to the satisfaction of the inhabitants, and accordingly, it

is concluded that there is people’s acceptance and attachment for vernacular houses.

On the contrary, there was visible transformation in each of the selected houses despite people’s attachment to the vernacular house. Hence, an attempt was made to understand the causes and reasons for the transformation of the vernacular houses of Ghantasala village. The reasons, as revealed by the primary survey, stemmed from various underlying concerns which were personal, circumstantial, or unavoidable in nature, as graphically presented through **Figure 18**. The said reasons are presented in **Table 6**.

## 10 Conservation of vernacular architecture

The models for the transformation of vernacular dwellings while also conserving vernacular components of a dwelling can be understood together so as to pave the way for a new approach wherein a vernacular consideration serves as the pivot of housing development. The said process shall include four aspects, namely, awareness, appreciation, protection, and utilization. The awareness phase can be executed through cultural mapping activity of the community. The appreciation phase can be achieved through community organizing, which encompasses community solidarity and capacity building so as to instill technical empowerment. The protection phase can be accomplished with the help of a vernacular charter, bill, legislation, and/or guidelines. Finally, the utilization phase can be executed through educational programming so as to ensure education value or project feasibility study and accomplish economic value.

### 10.1 Awareness of vernacular values

Vernacular values begin with resources identification which are context-specific, covering various aspects such as topography, climate, culture, occupation,



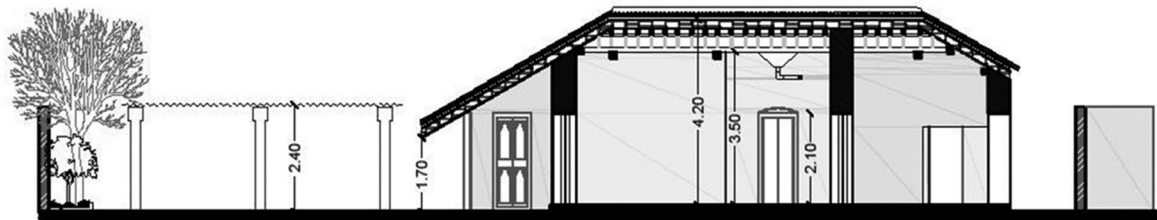
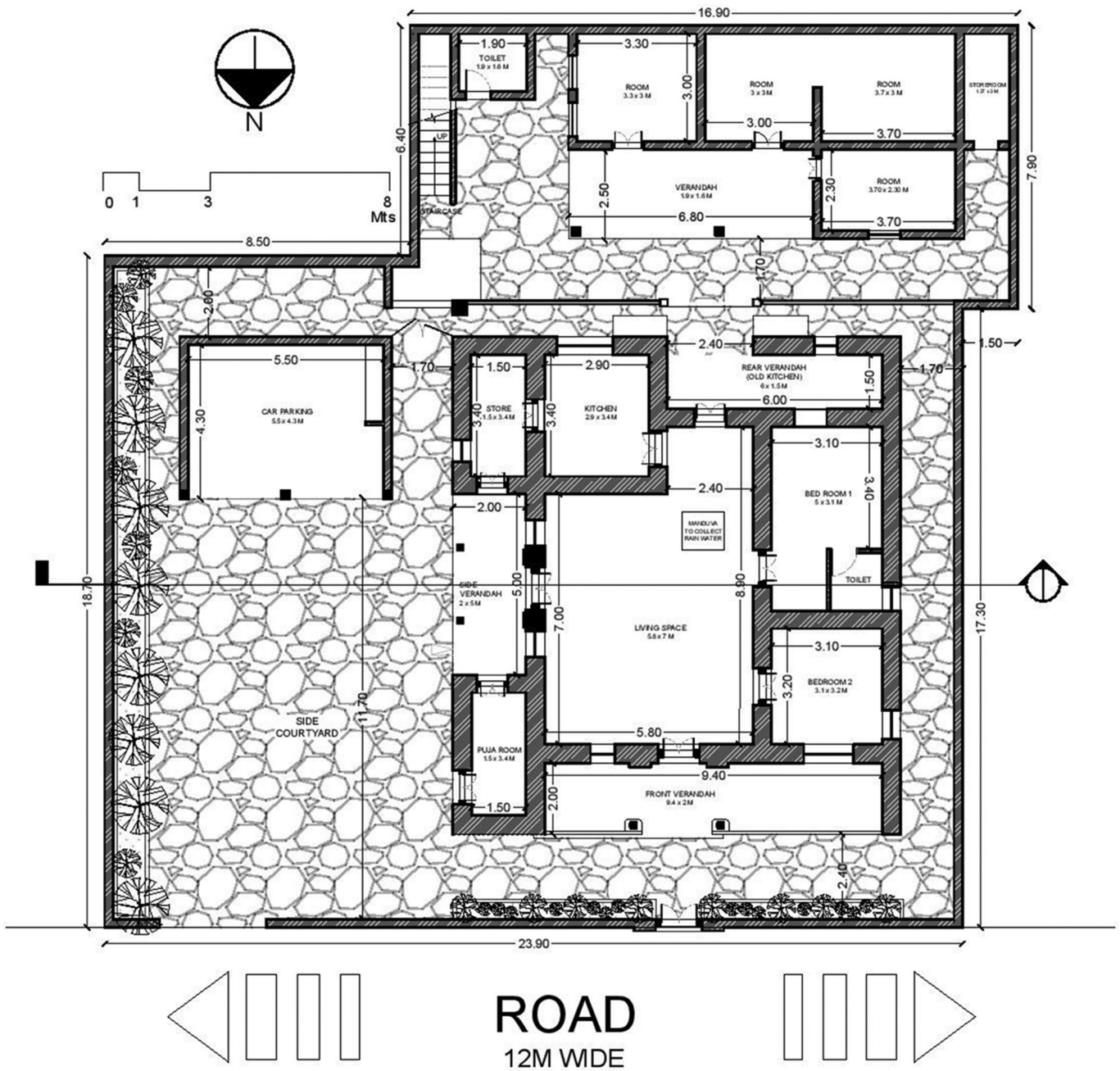
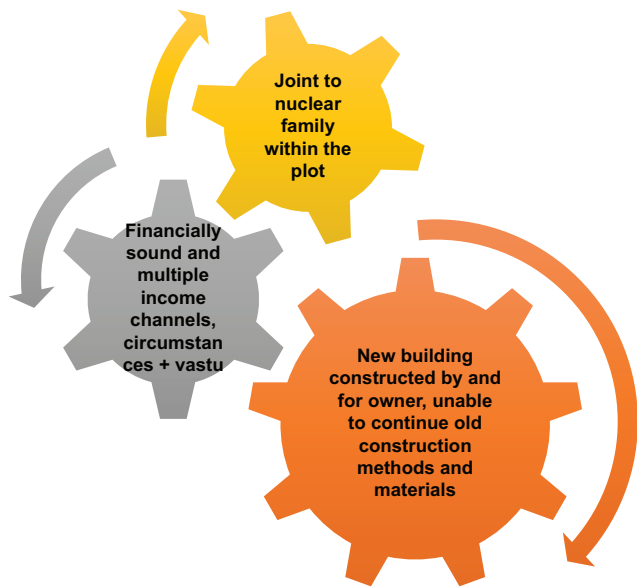


Figure 17. Plan and Section of the selected House, Ghantasala village, Andhra Pradesh.



**Figure 18.** Transformation scenario of House No. 7.

manpower, technique/technology, finance, and entrepreneurship. With vernacular architecture as the basis for development, tangible vernacular resources should be identified, documented, and studied further to optimize its potential use. Mapping of vernacular components is the process of identifying natural and cultural related artifacts and resources of a specific geography for the purpose of conservation and appropriate transformation as a way forward.

### 10.2 Appreciation of vernacular values

The appreciation of vernacular values may lead to develop or unveil the strong attachment of the inhabitants as observed in the analysis. Discussions and documentation of local history, built form, traditional street picture, built-up areas, dwellings, etc., may be a core activity in bringing a community together toward a common belief, understanding, and regard for the vernacular components. However, the practices of tangible and intangible vernacular components have to be assessed properly to get synchronized by the changing technology and innovations in building industry so as to protect the attachments to the vernacular components.

### 10.3 Protection of vernacular components

Sustainable development is achieved through resource identification, community participation, and value generation. It is institutionalized through statutory protection. For protection of vernacular components, a conservation guideline outlining

technical standards for the place and its fabric must be developed by experts and legislators to be further adopted by the community. While such charter, on the other hand, is a generally agreed set of conservation concepts, policies, and practices to be adopted by community and conservation professionals. The protection is based on principles and policies which can preserve the significance of heritage and guide the dependent community in its proper utilization. There are general as well as specific principles in the protection of vernacular components, which are essential and crucial.

### 10.4 Utilization of vernacular components

Any new development may involve transformation of components and services so as to improve quality of life, but there is a need to follow a way so as to relate to the character of existing vernacular architecture. The utilization of spaces and materials to address contemporary needs is relevant to users because it provides value, either functional or economic. Functional value breeds intellectual and anthropometrical enrichment over a long period of time, while economic value would lead to return on investment over a short turnover period. Vernacular components and its functional utilization is an all encompassing but poorly documented subject. Vernacular architecture focuses on residences and more on administrative buildings and villas, but attachment to the components character has to be protected, documented and used as design guidelines for further designing the residences and even for developing building bye-laws.

### 11 Housing shortage and government policy

In addition to the latent housing shortage, the settlements in the coastal region of AP face severe damage of properties due to cyclones and floods. The transformation of vernacular houses may be not only to improve their requirement of additional space but also to ensure safety and resilience of the houses to all conditions. During the year 1977, a severe cyclonic storm occurred and devastated two coastal districts and rendered thousands of people shelterless. Other than mitigation plan, the state government formulated rehabilitation in Pucca houses to all the 1977' cyclone victims.

The designs and its details were just to provide a space with roof, and most of the occupants were

**Table 6.** Reasons for transformation of vernacular houses in Ghantasala village, Andhra Pradesh, India

House No.	Causative factors for transformation	Final reasons
1	Inheritance Purchase of additional plot on east Need to extend on west Old Verandah with flat roof plus stairs, New Verandah Visual and material transformation	1. Inheritance of ancestral property -leading to urge for transformation 2. Change of family from joint family to nuclear small family system 3. High cost of replacement of old components in partial or full
2	Children settled and migrated, Widower Poor Maintenance of Large House NW portion irreparable Lack of time and skilled labor NW portion reconstructed with total transformation	4. Employment opportunities in cities and resultant migration of educated children to urban areas within or out of country 5. Marriage of children and resultant migration to urban areas within or out of country
3	Inherited as Gift Lack of regular income and ill health Sold 2/3 House (West) and retained 1/3 (East) Small portion added on South (abutting road) to run business Front new building camouflages the old building on rear	6. Living as widow or widower with least interest in materiel things 7. Economic constraints to repair, replace or reconstruct in vernacular style economic constraints to bear repair or replacement cost
4	Inheritance and subdivision into 4, Entrance Hall in SE is narrow, kitchen NE House already in repairable condition Central column replaced, roof secondary rafters replaced Flooring replaced Entrance gate for identity, internal space and material transformation	8. Non-availability of skilled workers to repair, replace or reconstruct in vernacular style 9. Vastu norms 10. Property subdivision and different approaches by the surviving inheritors
5	Loss in Agriculture Poor maintenance Irreparable North wall, Termite affect for Roof Vastu compliance, North Wall Lime Plaster replaced with Cement Plaster; roof tarpaulin Transformation in space utilization, Material, and Finishes	11. Improvement in economic condition and general urge to ape modern building style as a result of peer pressure 12. Peer pressure and combination of above factors
6	Childless, Widow but financially sound Sees No reason for maintenance Income from Farm Land leased out Front Vernadah corners reserved for farm tools and store are unused Transformation in terms of interchange of spaces	13. Present generation not in favor of old house due to many of the problems listed above
7	New Building constructed by and for owner, unable to continue old construction methods and materials Financially Sound and multiple income channels, circumstances + Vastu Joint to nuclear family within the plot	
8	Widower, financially sound; daughter's family stays along Daughter's family to be kept happy and house does not have modern look despite repairs Guest room built on SW (Vastu); Parking shelter added on NE	

*(Contd...)*



**Table 6. (Continued)**

House No.	Causative factors for transformation	Final reasons
9	Maintenance expensive, time consuming; urge for modern house despite merits of the old house Transformation is there, but final decision to lease it out and shift to a modern house Old house destroyed partly due to 1977 Cyclone; Declining Agricultural income Repaired major portion and reconstructed semi-open on Western part – used for Hotel Hotel business not suitable – again on agriculture; settled children not in favor of old house New structure to be for children or to be given on rent Transformation due to natural calamity; unhappy with transformed house too	
10	Owner living away with children House repaired, subdivided into two and given on rent Central wooden column sheathed with masonry, inner side of roof covered with Tarpaulin to avoid leakage from Manduva and Termite dust Tenants not concerned with regular maintenance Transformation is there, due to children’s expectations; house partly neglected as a cannot but	

found to be dissatisfactory in terms of the housing environment created, even though the “New National Housing Policy” (1992) had indicated to promote vernacular architecture. At present, both the Central Government of India and State Government of AP are promoting Housing for All by 2021. To meet the demand-supply gap of 14 lakh dwelling units in the state of AP, construction of affordable housing has been taken up by the state government under various housing schemes such as Affordable Housing through Credit Linked Subsidy, Affordable Housing in Partnership, subsidy for beneficiary-led individual house construction or enhancement and guidelines/ Instructions to Private Developers through development control regulations wherein 12.5% of total dwelling units has to be constructed each for Economically Weaker Sections and Low Income Group in all group housing schemes undertaken on sites of area more than 3000 Sq.M.

## 12 Conclusion and the way forward

As aforementioned in **Table 5**, the absolute value of “t” was **8.258** and the value of critical “t” was **1.833**. As the absolute value of “t” is higher than the

critical “t,” it can be construed that the transformed vernacular house is not to the satisfaction of the inhabitants. Furthermore, it can be concluded that there is people’s acceptance and attachment for vernacular houses.

The users of the case house belong to the affluent class and they possess willingness as well as interest to continue living in the vernacular houses despite the constraints such as nonavailability of skilled labor and the high cost of repair and maintenance. Thus, willingness of users of other houses depends on their respective economic capacity to incur the necessary expenditure.

It is pertinent to consider phenomena like degree of people’s acceptance of housing typologies, schemes, and transformations, so as to make any housing scheme meaningful, relevant, and successful. To accomplish it, it may be necessary to document the architecture of existing rural houses so as to map the regional variation in rural houses and outline the essential components, namely, spatial, material, visual, physical, and esthetic aspects of housing settlements in general. This shall be a well-maintained repository with the government beforehand.

Whenever any new housing scheme is proposed for a rural area, the finer outcome of the aforementioned documentation may be integrated with the design of proposed housing scheme. Through this approach, the proposer can aspire to ensure that the beneficiaries of the government schemes are satisfied with the housing scheme, which is in close relevance to the vernacular houses of the given location with due consideration to the people's acceptance level. In a nutshell, a housing scheme which is capable of balancing the need for the provision of new housing without ignoring the vernacular aspects of the place can in a successful implementation of new housing schemes.

## References

- [1] Brown R, Maudlin D. Concepts of Vernacular Architecture. In: Crysler CG, Cairns S, Heynen H, editors. *The SAGE Handbook of Architectural Theory*. Ch. 9. London: SAGE Publications Ltd.; 2012.
- [2] Rapoport A. *History and Precedent in Environmental Design*. Boston, MA: Springer; 1990. p. 297–311.
- [3] Egenter N. *The Present Relevance of the Primitive Architecture, Architectural Anthropology: Research Series*. Vol. 1. Switzerland: Structura Mundi; 1992.
- [4] Norberg-Schulz C. *Genius Loci: Towards a Phenomenology of Architecture*. New York: Rizzoli; 1980. p. 212.
- [5] Rapoport A. *House, Form and Culture*. London: Prentice Hall Inc.; 1969.
- [6] Sueca NP. Home Transformation: Its Prospects for Improving the Home in Indonesia (A Preliminary Study). *J Natah* 2004;2:10–6.
- [7] Sueca NP. *Housing Transformation: Improving Environment and Developing Culture in Bali*. Bali: University of Newcastle upon Tyne Dissertation; 2003.
- [8] Antoniadis A. *Poetics of Architecture*. New York: Van Nostrand Reinhold; 1990.
- [9] Najosan S, Mandey J. Transformation as a Design Strategy. *Media Matrasain* 2011;8:117–30.
- [10] Vitasurya VR, Pudianti A. The Influence of Traditional Culinary Industry in the Development of Tourism in Lopati Village, Yogyakarta. *Proceedings Promoting Cultural and Heritage Tourism*. Denpasar, Bali: Universitas Udayana; 2016. p. 280–7.
- [11] Yin RK. *Case Study Research Design and Method*. 3<sup>rd</sup> ed. California: SAGE Publisher; 2003.