



Criteria 3 – Research, Innovations and Extension (110)

3.3- Research Publication and Awards (25)

3.3.2. Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five years (15)

N O	List of Book/Chapter
	2021-22
1	Changing Cultural Landscapes along The Shorter And Longer Circumambulation (Pheri) Of Trimbkeshwar
2	Kathi-Kuni construction technique and CLT (cross laminated timber) construction technique for rural settlement in case of Shimla, Himachal Pradesh
3	Development of Dado ornamentation in Mughal Architecture
4	Role of context in development of Rural Housing in Junnar, Pune District, Maharashtra
5	Role of Openings in Different Climatic Zones in the view of Sustainability
6	The Impact of Lockdown on the Movement of Disabled People in Rural Region - Akole, Ahmednagar
7	Study of Values Associated with Rural Open Space (Villages of Western Maharashtra)




PRINCIPAL
Pravara Rural College of
Architecture, Loni



PRCA BOOK OF ABSTRACTS 2022

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Changing Cultural Landscapes along The Shorter And Longer Circumambulation (Pheri) Of Trimbakeshwar

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Abstract:

Pilgrimage town of Trimbakeshwar is also known for Circumambulation (pheri), a holy walk around Brahmagiri Mountain, the origin of river Godavari and Harihar hill on the occasion of third Monday of the month of Shravan. First shorter loop (pheri) is around Brahmigiri hill and nil mountain, which takes around 6-7 hours. Second longer loop (pheri) is around Brahmigiri hill and Harihar hill, also covers Nil mountain and Brahma mountain. This takes around 12-13 hours. This paper is aiming to study and analyze the changing religious anchors along the shorter and longer circumambulation of Trimbakeshwar on the basis of Mythological and Current followings. Objectives of the study are To study shorter and longer circumambulation of Trimbakeshwar as per Mythology and Current followings, To study and analyze the significance of religious anchors along circumambulation, To map the path of shorter and longer circumambulation and religious anchors along it. To analyze religious anchors along circumambulations as per Mythology and Current followings. Primary Data for the study is collected through site visit, interview, mapping methods. Secondary data is collected through literature study. This study will help to throw light on forgotten and lost Tirthas and pause points on both the circumambulations. These forgotten and lost Tirthas and pause points are having strong religious, mythological and geographical significance. They are rural heritage which needs to be reviving through landscape conservation.

Keywords:

Circumambulation, Trimbakeshwar, Cultural Landscapes



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KATHI-KUNI CONSTRUCTION TECHNIQUE AND CLT (CROSS LAMINATED TIMBER) CONSTRUCTION TECHNIQUE FOR RURAL SETTLEMENT – IN CASE OF SHIMLA HIMACHAL PRADESH

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Abstract: Comparative analysis of Kathi-kuni construction technique and CLT (Cross Laminated Timber) construction technique for a residential unit. This research is aiming to do the comparative analysis of 2 construction technique which is Kathi-kuni and CLT which is best suited in Himachal Pradesh. Objectives of study are to calculate the cost, structural framework and availability of material, then classify data and analyze it, to identify today's need of users on various aspects. The general purpose of the study is to compare the 2-construction techniques. This research needs to study the Residential unit. This research needs a duration of 1-2 months. The study is going to cover the aspects like cost, safety, environmental aspects, earthquake resistant, horizontal spread and its vertical spread. The Geographical location covered in the study is Himachal Pradesh. Methodology would be conducted through literature review and book case study. This research is necessary to get best possible outcome as the regional people will be hugely benefitted due to affordance of cost and can reduce and lock carbon emission. This research is not going to cover any type of building except residential buildings. The research will throw light on the Kathi kuni and CLT Construction technique its impact of wood and its awareness. This research will show how CLT will change the people's life. From this research it is found that Reason for building (Kathi-Kuni) is getting older and the advancement of material led to occupants to consume more energy to create a comfortable zone for themselves.

Keywords: CLT, Kathi-kuni, Himachal Pradesh, Construction technique

1. Introduction :

1. Problem statement: Studying Kathi kuni and CLT construction technique for comparative analysis to identify and understand today's need of users on various aspects like cost, occupants comfort and availability.
2. Motivation of research: This research focuses on things which can harm less to environment so then came across a processed wood (CLT) video which caught my attention due to its enormous benefits
Then thought about comparing it with regional techniques
3. Brief summary: Kathi kuni is the native construction technique of Himachal Pradesh and CLT is been used in Australia and western countries and is immensely liked over those area due to its cost reduction and can be used in sky scrapers.
4. Description of gap in literature:
The research did not include approximate cost of CLT construction technique as well as kathi-kuni

5. How important is it for the industry practice /knowledge advancement: Industry practice or knowledge advancement will increase employment of skilled labor?



6.

Map showing selected region

2. Aim:

The comparative analysis of 2 construction technique which is Kathi-kuni and CLT which is best suited in Himachal Pradesh.

3. Objectives:

1. To study the Cost, structural framework and availability of material.
2. Then classify data and analyse it.
3. To identify today's need of users on various aspects.

4. Scope:

The general purpose of the study is to compare the 2-construction techniques. This research needs to study the Residential unit. This research needs a duration of 1-2 months. The study is going to cover the cost, economical, less hazardous, earthquake resistant, horizontal spread and its vertical spread. The Geographical location covered in the study is Himachal Pradesh.

5. Limitation:

This research is not going to cover any type of building except residential buildings.

6. Methodology:


Literature review by reading various research papers





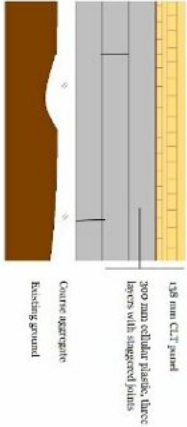
Data collection by selecting appropriate data for the research

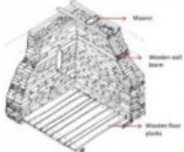



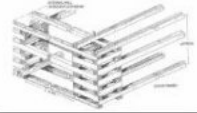

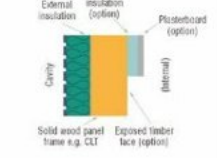
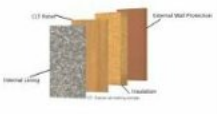
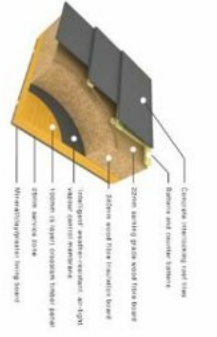
	'kona' for corner.	dried dimension lumber		
Origin	Himachal Pradesh	Austria and Germany	Due to its climate the need of this techniques emerged	--
Year of origin	no less than 500-years-old according to local legend	1990	Kathi kuni has deeper roots than CLT	--
Type of wood used	Deodar/ kali	Spruce	Both are soft wood which grow quicker than hardwood and are cheaper, softer and easier to work	We can use those 2 types of wood
Materials used for construction	Stone (igneous), Wood and Slate (metamorphic).	Solid wood panels clad with other materials such as timber, brick, render or composite panels.	Kathi kuni has natural materials and CLT has processed materials	Materials used in Kathi kuni can be cheaper and affordable
Spread of technique	It has been transmitted orally and empirically from one generation to the next, through apprenticeships spanning a number of years	Early engineering research occurred first in Switzerland and then in Austria during 1990's It is now being accepted by many countries.	Kathi kuni is spread orally and CLT is spread by research publication	--
Labor costs	Construction of the houses is done by hands with the help of people from neighboring villages or by the residents themselves and is passed on from generation to generation.	Labor demands for CLT projects are also less. In a tight labor market, this can be significant.	In percentage wise the Kathi kuni is 50% Cheaper than CLT	Kathi kuni is cheaper than CLT
Interior	It can be left exposed from interior or can be covered with mud plaster giving these	CLT can be left exposed in building interiors up to 8 stories	No interior finishing is needed in case of Kathi kuni and CLT can be left	In both the techniques walls can be left exposed





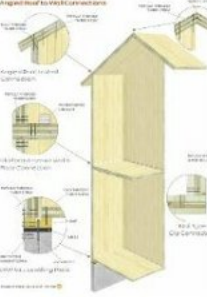
	structure excellent insulation		exposed up to 8 stories	
Horizontal spread	7m×4m - Rectangular 5m×5m- Square Till now seen	As per requirement any size	There is a limitation in kathi kuni and but in case of CLT the structure is of any size	CLT has no limitation horizontal spread
Vertical spread	Allows the structure to rise up to as high as 7 floors	Allows the structure to rise up to 650 meters	Height is restricted up to 7 th floor unlike the CLT which can go up to 20 th floor	CLT has no limitation vertical spread
Type of structure	Load bearing	Framed structure	Framed structure is considered more stable than load bearing	In CLT space required is less as stable
Elements of house	Ground level- Work as storage or shed for cattle 1 st 2 nd & 3 rd Floor- House rise up to 3 rd floor only Low Height of the rooms (2.1-2.4), keeps interior warmer from heat released by individuals, also low surface to volume ratio reducing heat loss from surfaces	It has structural components like floor, roof, and wall which are prefabricated in factories	The kathi kuni can be fully made of vernacular	
Climate Influence	Small window size and low ceiling height to prevent heat loss and keep the interiors warmer. Terrace in all around the building should have proper slope for efficient	No restriction of sizes of window or ceiling or roof 	In case of kathi kuni vernacular technique is adapted to tackle the climate and in CLT the vernacular with respect to modern aspects are considered	In case of CLT window sizes can be kept large as per users need no size restriction

	<p>drainage, in heavy rain fall and snow fall areas.</p>  <p>low ceiling height Small windows slope for efficient drainage</p>			
<p>Foundation</p>	<p>The foundation consists of hand packing of stones without any mortar. The foundation depth ranges from 3-4 feet for loose soil. First the owner is given the area where he can construct his own house. The owner brings all the materials needed to construct his house. The owner also hires the carpenter and 2-3 workers for constructing his house. The carpenter sets the area for constructing the houses as a square or a rectangle accordingly, and checks all the dimensions with</p>	<p>It consists of a lightweight construction where the concrete slab is replaced by a 138 mm thick CLT panel with an underlying layer of cellular plastic which gives an average U value of 0.089 [W/m².K]. The edges of the foundation structure have been fitted with fiber cement clad cellular plastic boards. In view of its light weight the foundation is anchored by four earth anchors to prevent the foundation from moving under high wind loads. The earth anchors are attached to fittings in the</p>	<p>The foundation of Kathi Kuni is bigger than the CLT. The material used in foundation of building in Kathi Kuni is just stones without mortar unlike the CLT where concrete slab, CLT panel are used.</p>	<p>In both of the technique's foundations are appropriate</p>

	<p>measure tape and verifies it by measuring the diagonals set. Then he lays a thread as line out (for the boundary) and starts arranging stones in the trenches. Small stones are fixed in between the large ones for proper bounding.</p> 	<p>CLT foundation panels.</p> 		
<p>Flooring</p>	<p>Material used for flooring are wooden plank and Nails, Cow dung and mud plaster is done on the ground floor Wooden beam is used as a support for the wooden planks laid and nailed on wooden beam which acts as the floor. There are two wooden beams on the top of opposite walls and on in the middle laid parallel to the walls and on in the middle laid</p>	<p>Pre-fabricated floor is fitted</p>	<p>Mud flooring and wooden flooring is used in kathi kuni and prefabricated flooring can be seen in CLT flooring</p>	<p>Life span of kathi kuni flooring is less than CLT as Kathi Kuni has lesser life span</p>

	<p>parallel to the wall. Then wooden planks are laid on the beam in the other direction (horizontally) and connected with nails.</p> 			
<p>Wall construction</p>	<p>The stone walls are load bearing with a thickness of 480mm. It involves laying of two wooden beams longitudinally parallel to each other with a gap in between.</p> <p>This gap is filled with aggregates.</p> <p>The walls are constructed with an alternate course of dry masonry and wood without any cementing mortar.</p> <p>These wall provide a very good thermal insulation by giving high time lag of more than 8 hours.</p> <p>The wall above the plinth level is strong with an alternate layer</p>	<p>Multiple layers use with CLT for such as weather protection (on the outermost wall), insulation, CLT Panel, and Internal Lining (From the inside).</p> <p>This is very important for external walls.</p> <p>CLT is an environmental-friendly building material.</p> <p>Its use does not cause any harm.</p> <p>This material is used to reduce energy consumption.</p>	<p>Walls are very thick in kathi kuni as compare to CLT</p> <p>Walls of kathi kuni are cast in-situ and in case of CLT it is prefabricated</p>	<p>Space required is more in case of kathi kuni for the wall construction and in case of CLT less space is required as Prefabricated planes are used</p>

	<p>of stones and wood.</p> <p>This distributes the mass equally.</p> <p>So the construction of walls without use of cement mortar and dry stone masonry allows the stone to oscillate within the flexible wooden frame work to allow the energy of earthquake to disperse, leading to settlement of energy and the structure staying intact.</p>  	  		
<p>Roofing</p>	<p>The constructing from foundation to roof does not involve the use of mortar in the courses of stone, the sheer weight of dry masonry and the roof in slate stones holds the structure down in place. Traditionally no metal nails were used in wood courses instead strategically inserted wooden</p>	<p>It is factory made</p> 	<p>No mortar in used in both cases as in kathi kuni interlocking of slate stones is done and in CLT prefabricated panel are used</p>	<p>In case of kathi kuni hand picked tiles are used which are easily available and in case of CLT the need to be brought from factory</p>

	<p>braces and joints held the structure together. Nail-less framework without rivets and not rigid construction allows the building flex with the seismic waves and effectively dissipate the energy of earthquake.</p> 			
<p>Details</p>	 <p>Images of wall construction at Devi Dhar village, which show the dry masonry construction with in-fill and lap jointed members at the corner.</p>  <p>Corner detail: wooden members are notched and lap jointed so that they intersect at the corner and further supported by cantilevered</p>		<p>Different details can be seen in both the techniques</p>	<p>In kathi kuni there is no requirement of skilled labor and in case of CLT skilled labor are required to installations.</p>

	member fixed at one end in the wall.			
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8. Conclusions:

Reason for building (Kathi-Kuni) is getting older and the advancement of material led to occupants to consume more energy to create a comfortable zone for themselves.

9. References:

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DEVELOPMENT OF DADO ORNAMENTATION IN MUGHAL ARCHITECTURE.

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Abstract: Development of dado ornamentation, this research is aiming to do the study of evolution of dado ornamentation in the era of various emperors. Research is Mainly focused on descriptive and historical approach that is based on studies of Mughal architecture as it evolved under succession of emperors beginning with Babur, Akbar, Jahangir, Shah Jahan and then Aurangzeb Objective of study are to understand, from which period dado ornamentation start, which changes happened in ornamentation in 15th to 17th century, analyzes the changes and synthesis the evolution of dado ornamentation in the aspects of motifs, material, form, color. By studying the various structures in the era of above emperors, we achieve the proposed objective. case study method is use for research. We can synthesize the difference between dado ornamentation by studding different monuments. From the case study it is conclude that, transformation of ornamentation from Babur to Aurangzeb period is with free-flowing to geometric forms. Material changes from stone, black marble to white marble. The research has truism, historical, cultural, educational and aesthetical values.

Key words- dado ornamentation, emperors, evolution, culture, art.

Introduction:

- Mughal decorative art of dado ornamentation is one of the remarkable features of Mughal architecture that display their artistic sense into form of beautiful design blended into vibrant colours and mosaics. this particular ornamentation starts in during Babur period up to the Aurangzeb period.
- Curiosity and interest develop while study about Taj mahal decorative carving, to know the how Mughal time artist carved beautiful ornamentation with the detailing?
- Research is Mainly focused on descriptive and historical approach that is based on studies of Mughal architecture as it evolved under succession of emperors beginning with Babur, Akbar, Jahangir, Shah Jahan and then Aurangzeb.
- In earlier research paper, researcher research only about materials and colours and not about forms.
- Research is help for tourist to getting knowledge about the dado ornamentation and employment for the local people in tourist spot as a guide.

Aim: To study the Evolution of dado ornamentation in the era of various emperors.

Obectives:

1. To understand, what is dado ornamentation?
2. From which period dado ornamentation start.
3. Study the changes happened in ornamentation in 15th to 17th century by the study of different monuments in that particular period.
4. Analyses the changes and synthesis the evolution of dado ornamentation.

Scope:

- Purpose of study is to diagnosis how dado ornamentation changes according to emperor.
- Some monuments like Kabul Bagh Mosque, Humayun's palace, red fort, Akbar tomb Sikandar, Taj mahal, Badshah mosque etc. are studying.
- Material, uses according to emperors, forms of ornamentation, are studying while research.
- Delhi, Lahore, Agra, Fatehpur Sikri etc. are geographical places include in research.

Limitations:

Limitation of research is ,How Dado ornamentation changes according to philosophy of emperors?
Is not going to cover in research

1. Find examples
2. Do the case study
3. Analyses the required topic


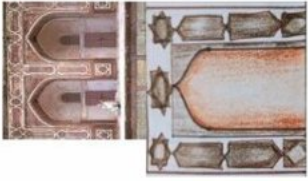


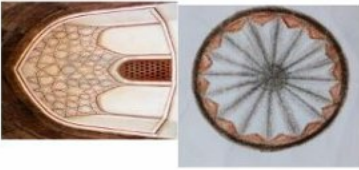
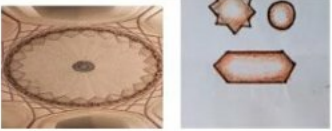
Methodology:










studying the various structures
↓
Case study method is use for research.
↓
Analyse the case study





Need of the topic:

Earlier researcher had not thought about the use of dado ornamentation in various ways, various purposes. data does not include information about the how various emperor use it accordingly.

The research is useful for tourist, for architects and artist for their innovative work, when people know the importance of this ornamentation, they conserve it.

S. no	Mughal Emperor	Famous building(mosque)	material	color	Dominated elements	Forms	Motifs	Inference	observation
1	Babur 1504-1530	Kabul Bagh at Punjab, 	Red sand stone, brick and stucco plaster	Monochromatic red	 use on gate	 Simple forms are use	Babur use only decorative purpose	Dado ornamentation just introduced at the Babur period, so it is rarely use	Generally dado ornamentation use for highlighting the specific element of monuments .
2	Humayun 1530-1556	Humayun's place at Delhi called Din Panah. Mosque at Fatehabad in the hisar district 	Red sand stone, brick and plaster	Monochromatic red	 Use on domes	 Geometrical forms were use	Humayun use geometrical forms only for asthatical purpose and highlight the feature	Humayun use dado rarely or at specific space of monuments	

3	Akbar 1556-1605	Jama masjid 	Red sand stone	Monochromatic red	 use on gate	 Use of geometrical as well as floral forms	Akbar use dado for asthetial purpose as well as show their culture and values.	Akbar is impresses by the dado . so, he extensively use dado in his period
4	Jahangi r 1605-1627	Patthar mosque 	White marble	Poly chromatic (multicolor with the use of stones) white	 use on domes and gate	 Use of organic shape	Use of organic shapic to depict their religion and cultural value	jahangir pramote the art of dado use it creatively
5	Shah Jahan 1627-1658	pearl Mosque Lahore. 	White marble	Poly chromatic multicolor with use of stone	 Use on profile of building	 Use of organic shape	jahangir use organic shape for asthetic purpose and make symbols showing islamis culture.	Shah jahan is very impress by the dado ornamentation he use dado in every monuments which is built by him. By the dado use he shows the equality in every religion by using symbols

6	Aurangzeb 1658-1707	Badshah Mosque Lahore 	Red sandstone brick and plaster	Monochromatic red	 Use in all parts of monuments	  Use of floral shapes extensively	Aurangzeb use floral shape for mosque to depict hindu as well as islamic culture and also for asthetic	Aurangzeb use dado but he is not impressed by the dado like above emperors. therefore, after aurangzeb dado ornamentation we can not see.
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Conclusion:

- Transformation of dado ornamentation from Babur to Aurangzeb period is with free-flowing floral forms to geometric forms.
- Material changes from stone, black marble to white marble.
- Every emperor tries to magnified dado ornamentation according to their necessity and choices with the addition of previous stage of dado ornamentation.

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Role Of Context In Development Of Rural Housing In Junnar, Pune District, Maharashtra.

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Abstract: Junnar is a taluka in Pune district, Maharashtra and it was declared as first tourism taluka in Pune by Maharashtra government in 2018. The research focus on aspects of rural housing, growth pattern of their settlement, issues like planning, orientation, form, surface, architectural typology of structure. This research to find out the role of context in development of rural housing at Junnar covers the introduction of traditional rural houses, architectural features, context, street grid pattern, study of climate responsive materials, their properties and co-ordination with respect to local climate etc. The study deals with the social, political, economic and climatical background by live case-studies and book case-studies, etc. Methodology would be conducted by survey, live case-studies, discussion with residents, settlement evolution study and then identifying their problems, define their solutions like construction techniques. This study is limited to Junnar town and it include only the study of old houses and Wada. Modern architecture noticed here has control the new developments are inappropriate because it may be introduced without consideration for local climate and cultural need of the people. Most of the old structures get renovated by new techniques so this will be beneficent to maintain these structures with their original old techniques. This research will also beneficiate to the people who work here related to construction.

Keywords: rural housing, context, settlement grid pattern.

1. Introduction-

Junnar has heritage places and historical background, as it has 2000years old prosperous history as Junnar was sub capital of Satvahana dynasty. there is the birthplace of Chhatrapati Shivaji Maharaja, Shivneri fort, and also have other six forts as Jivdhan fort, Shindola fort, Nimgiri fort, Chavand fort, Hadsar fort, Narayangad fort, Lenyadri caves, more than 350 caves of Buddhist, Jain, and Hindu caves with ancient inscriptions. it has religious places as Vigneshwara temple, Shri Girijatmka Ganpati temple etc. Naneghat is an ancient place in Junnar it has 2000 years old importance. Leyadri caves, Darya ghat, so many waterfalls are there. There are five main dams and 183 villages in Junnar taluka.

1.1 Introduction to the topic-

1. To study the relationship between the settlement pattern & surrounding context at the macro level & the effect of natural & cultural variables on architecture.
2. Motivation of research is cluster planning & traditional housing of Jaisalmer city & try to find out such characteristics of Junnar village.

3. The study deals with the issues like planning, orientation, form, surface, architectural typologies, and building techniques with respect to surrounding context.
4. It deals with the growth pattern of settlement.
5. The research focuses on aspects of traditional structures in Junnar.
6. It deals with the study of different types of houses.
7. The only gap in literature is there are modern houses present in large scale as compared to traditional houses.
8. This research will benefit to the people who work here related to construction.
9. It is also help to visitors / tourist to get familiar with this region.

1.2 Introduction to the study area-

1. Study area is the main village Junnar.
2. It is an ancient village and therefore there are so many old structures such as Wada, forts, two floor houses, and ground floor houses, with their original characteristics of Maratha architecture.
3. Settlement pattern of village is also different which is developed according to surrounding factors from ancient time.
4. Architecture of this region is a result of social, cultural, economic, climatic factors.

1.3 Aim-

To find the role of context in development of rural housing in Junnar.

1.4 Objective-

1. To collect the information related to climate analysis & surrounding factors, historical background, cultural factors etc.
2. Comparative study of current houses & old houses.
3. To develop a table format for techniques observed during live case studies.
4. Study of climate responsive materials, their properties & co-ordination with respect to local climate.
5. To study the grid pattern of settlement.
6. Find out merits & demerits of techniques used in Junnar for warm & humid climate.

1.5 Scope-

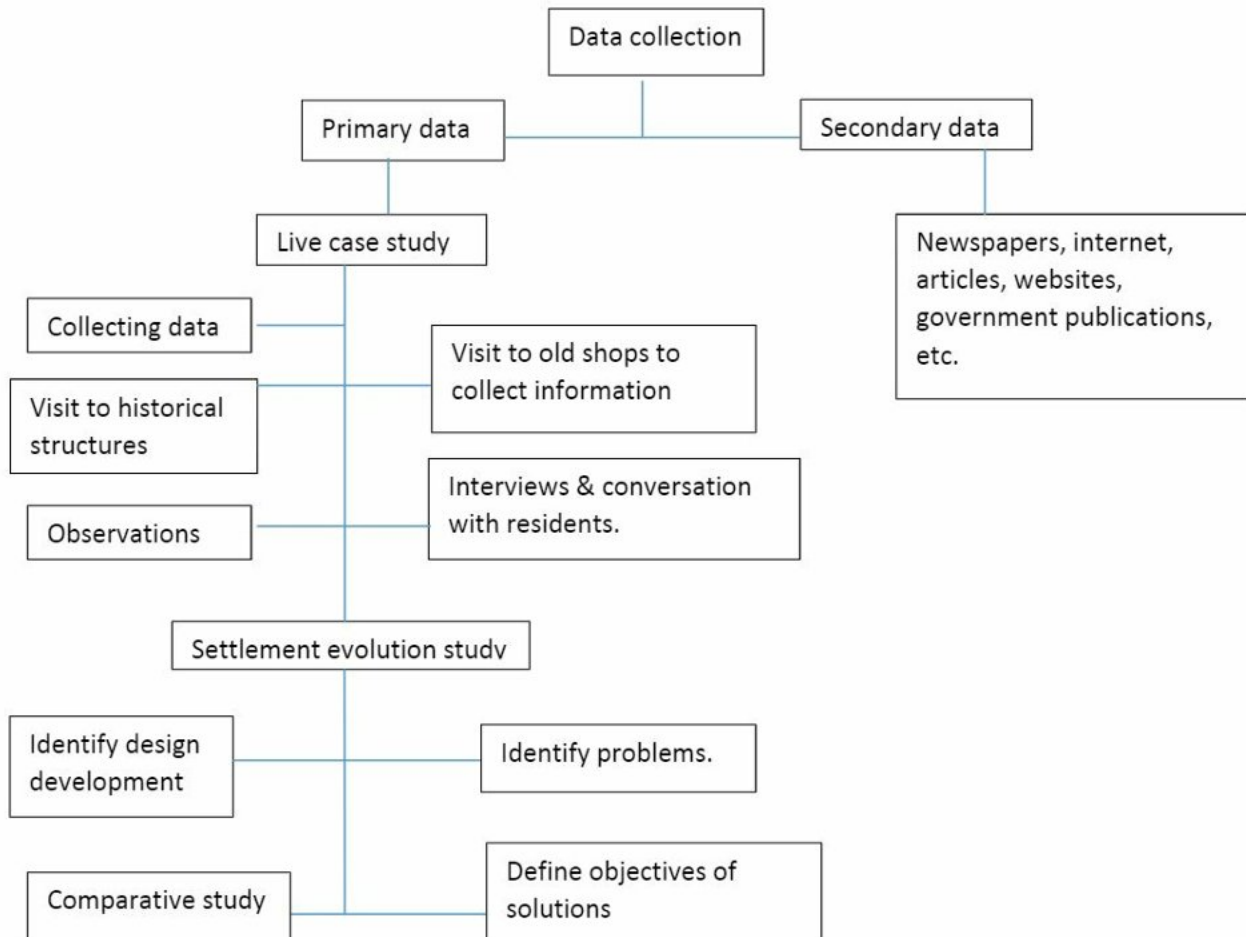
General purpose of the study is that find out the special features in structures with respect to surrounding context in this town. Why the structures found here are differ with structures in other region / towns. Study include only main village Junnar & no other sub villages. Duration of study is 3 to 4 weeks. Topic & theories – growth pattern of settlement, climate responsive local materials, study of traditional houses & Wada

1.6 Limitations-

The study area would be limited to Junnar and all the techniques that have been observed in this village.

1.7 Methodology-

It include the primary and secondary data collection by various methods as follows-



1.8 Need of the topic-

To well-maintained traditional houses, with their original features. Most of the old structures get renovated by new techniques, so this research will helpful for them to use the original old techniques. This will be beneficent in future & in present for the people who wants to work here related to construction. To conserve and cultivate structures socially, economically, climatically .Modern architecture observed here has dominated the new developments are inappropriate because it may be introduced without consideration for the local climate & cultural need of the people.

1.9 Case studies-

1.9.1 Case studies of -Wada



1.9.1.1 Deshmukh wada-

- **Orientation** – this Wada is north-south orientated, which is ideal orientation in point of view of blocking solar radiation.
- **Open space**-there is no courtyard as open space but outside there is a lot of space around the Wada.
- **Semi-open spaces**- balconies , verandah , porches can be used advantageously for day time activities as well as give protection from rainfall
- **Wall**-all four walls are exposed to sun as there is no other structures connected to it.the walls are built from rectangular stones, bricks. The thickness of wall is 400 mm.
- **Roof**-Mangalore tiles are used for roof and it is a sloped roof, hip roof. A.c. sheets are also used for porch.
- **Shading device**-the projections of balcony & windows on walls are the shading device. Plants & trees around the wada act as shading device.
- **Ventilation & light**- windows of sizes 1.2x 0.9 m are provided they are shaded by external overhangs. Sufficient light comes in and cross ventilation done by this openings.
- **Landform**-almost flat site with small slope from n-s direction.
- **Materials**- stones, wood.



Fig 3: front view of wada



Fig 4: from living room

1.9.1.2 Joglekar wada -

- **Orientation**-north south to east west oriented.
- **Built form**- the plan of wada is rectangular in shape, giving 2 walls exposed. Plinth is 300 mm.
- **Zoning**- entry is through otta which is not covered by any projections. There is central court around it all rooms are situated. There is a staircase near to entrance to first floor.
- **Open space**-there is a open to sky courtyard at center. At front & at back there is a verandah, which is used for sit outs.
- **Walls**- for foundation dress stone masonry from plinth 300 mm rubble (undressed) masonry stones are used & then brick work is done at first floor front facades having wooden facades with windows. This wooden windows at the central part of first floor, remaining walls are brick worked.
- **Roof**-sloped roof with Mangalore tiles. Projected to work as chajja for windows & walls to protect from heavy rain & sunrays.
- **Shading device**-roof projections.
- **Ventilation / light**-sufficient light & air is provided inside as open courtyard is present at ground floor. There are two windows of door size present. At f. Floor there are also many windows to the front facades so cross ventilation work done perfectly.
- **Landform** – flat land.
- **Materials**-cement , stones (dressed , undressed) , bricks , wood (door , windows , frames , beams , columns , rafters. Etc.



Fig 5: Front view of wada



Fig 6: right view of front facade



Fig 7: front view of front facade and side view of front facade

1.9.1.3 Jogalekar wada-

- **Orientation-** the structure is oriented towards north-south.
- **Built form-** built form of structure is rectangular in shape. Plint is 600 mm.
- **Zoning-**entrance is through south face through semi covered space as otta from the road.
- **Open space-**no courtyard, only at front & at back, open space is available. Other two side walls are common between adjacent structures as row house.
- **Semi-open space-**front porch is used as sit outs, there is no Balconies on front side it create a barrier between house and sunrays from south.
- **Walls-**wall thickness is 400 mm. From foundation to plinth level stones are used & form plinth bricks are used for construction.
- **Roof-**Mangalore tiles used for roof. Sloped roof.
- **Shading device-** front façade, first floor is projected so, otta , entry doors, windows get shade & protection from sunrays. For first floor roof is projected (800-1000) mm to work as shading for windows.
- **Ventilation / light-**ventilation & light is only entered from front & back door, windows, no courtyard. At first floor front facades is constructed by large windows, sufficient light & air comes inside & from back windows, door cross ventilation occurs.
- **Landform** –little sloped land.
- **Materials-**stone, bricks, wood. Wood is used for door, windows, columns, beam, and some decorative parts. At first floor, front façade is totally constructed by wooden windows.



Fig 8: front view of wada



Fig 9: backyard view



Fig 10: view of otta



Fig 11: view of front façade

1.9.2 Case studies of - old houses

1.9.2.1 Surekha Niwas-

- **Orientation-**north south oriented.
- **Built form-** the plan of house is rectangular in Shape, giving 3 walls exposed. Plinth is 450 mm.



Fig 11: front view of house

- **Zoning**- entry is from west with small otta .there is a staircase between living hall & kitchen to first floor. There is a utility area after kitchen & then backyard.
- **Open space**-there is a big open space at front side & at back of the structure. For parking.
- **Walls**- for foundation dress stone masonry up to plinth 450 mm are used & then brick work is done at first floor front facades having wooden facades with windows. This wooden windows at the central part of first floor, remaining walls
- **Roof**-sloped roof with Mangalore tiles. Projected to work as chajja for windows & walls to protect from heavy rain & sunrays.
- **Shading device**-roof projections.
- **Ventilation / light**-sufficient light & air is provided inside as small windows at ground floor. There are many windows to the front facades and back wall so cross ventilation work done perfectly.
- **Landform** – flat land.
- **Materials**-cement, stone, wood, bricks. Stone used in large quantity.



Fig 12: view of wall



Fig 13: stone steps.



Fig 14: wooden ceiling.

1.9.2.2 Shinde Niwas-

- **Orientation**-east- west oriented.
- **Built form**- the plan of house is rectangular in shape, giving 4 walls exposed. Plinth is 150 mm.
- **Zoning**- entry is through a wooden door which is covered by 600 mm roof projections .it is a small structure of single room having small windows at front & back walls.
- **Open space**-there is an open space at front & at back there is a verandah, which is used for sit outs.
- **Walls**- for foundation dress stone masonry is used.
- **Roof**-sloped roof with Mangalore tiles. Projected to work as chajja for windows & walls to protect from heavy rain & sunrays.
- **Shading device**-roof projections & small chajja.
- **Ventilation / light**-sufficient light & air is provided inside from door & windows.
- **Landform** – flat land.
- **Materials**-cement , stones (dressed) , bricks , wood (door , windows , frames , beams , columns , rafters.



Fig 15: view of house



1.10 Observations , findings , inferences –**1.0.1 Wada**

Fig 16: back side view of structure

Fig 17: Windows & roof purlins rafters

Sr.no	1.8.1.1	1.8.1.2	1.8.1.3
Wada	Deshmukh wada	Jogalekar wada	Joglekar wada
Orientation	N-s oriented	N-s oriented	N-s oriented
Built form	Rectangular	Rectangular	Rectangular
Wall	400mm. all sides exposed to sun. stone used	400 mm. from foundation to plinth –stones used. & From plinth bricks used for construction	300 mm. For foundation dress stone masonry, from plinth rubble masonry stone used. Then brick work done.
Roof	Mangalore tiles, A.c sheets. Sloped roof	Sloped roof, Mangalore tiles.	Sloped roof with Mangalore tiles ,
Materials	Dress stone masonry, wood , bricks	Stone, bricks, wood. At F.F. Façade is totally constructed in wood.	Cement, stone (dressed, undressed) , bricks , wood , etc.
Open space	No courtyard , open space is around the structure	Open space is available at front & at back, no courtyard.	Central open to sky courtyard. At front & at back there is a verandah
Ventilation & light	Sufficient light comes from doors balconies , big windows , otta , cross ventilation done	At f.f. Sufficient light comes from front facade windows , also cross ventilation occurs	Sufficient light & air comes inside from court , big windows & at f.f there is a front façade which is made up from wooden windows

1.9.2. Old houses-

Sr.no	1.8.2.1	1.8.2.2
Old houses	Surekha Niwas	Shinde Niwas
Orientation	N-s oriented	E-w oriented
Built form	Rectangular. G+1 structure , flat land	Rectangular. Ground floor structure. Plinth level is 150 mm , it is a small structure
Wall	600mm. Foundation- dress stone masonry , then brick work At f.f. brick work is done , having wooden facades windows for light & ventilation plinth level 450 mm	450 mm thick stone walls. Dress stone masonry is used.
Roof	Sloped roof , Mangalore tiles	Sloped roof , Mangalore tiles used

Materials	Cement , stone , wood , bricks , stone used in large scale	Stone, bricks, wood, etc.
Open space	No courtyard ,big open space at front & at back of structure	Open space at front & back side
Ventilation & light	Sufficient light & air come inside at ground floor through small windows. At f.f. windows At front facades and big windows at back wall form cross ventilation.	Sufficient light & air comes inside from small windows & doors.

1.11 Inference and findings -

- From case studies and matrix it is observed that most of the structures are north -South oriented, with rectangular plans.
- Having sloped roof due to heavy rainfall with Mangalore tiles.
- Stones are used for constructions, front facades made with big wooden windows for light and ventilation.

2 Understanding the context-

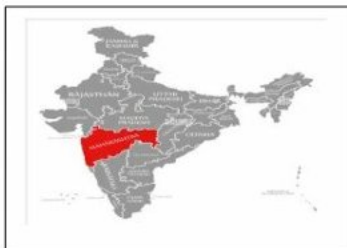


Fig 18: map of India highlighting Maharashtra

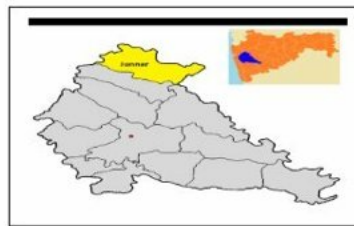


Fig 19: map of Maharashtra highlighting Junnar.



Fig 18: map of Junnar

- Villages- 183
- Population –36,567 (2011)
- Language- Marathi

2.1 historical background-

Junnar is an ancient village and therefore there are so many old structures such as Wada, forts, two floor houses, and ground floor houses, with their original characteristics of Maratha architecture. Junnar has heritage places and historical background, as it has 2000years old prosperous history as Junnar was sub capital of Satvahana dynasty. There is the birthplace of Chhatrapati Shivaji Maharaja, Shivneri fort, and other six forts. So many ancient temples, caves, wada etc.

2.2 geography-

Junnar is located in the northern part of pune district. Latitude is $19^{\circ}.00'$ to $19^{\circ}.24'$ north and longitude is $73^{\circ}.40'$ to $74^{\circ}.18'$ east. Geographical area of Junnar s 1579.84 sq. in Junnar there are 183 villages and one urban area. Western part has irregular geography. Harishchandragarh is located at north-western corner, a highest point (1422 m) and lowest point (600m) is located at south-east corner. Kukadi and Meena are the main rivers in this zone. There are five dams as irrigation projects like pimpalgavjoga dam, Manikdoh, Yedgaon, Vadaj reservior, they provide irrigation facility to the Junnar.

2.3 Climate-

Junnar come in the zone of hilly isohytral slope. It has rainfall in between 50 to 250 cm. climate of Junnar is warm and humid. Over course of the year, temperature typically varies from 53°F to 96°F and is rarely blow 47°F or above 100°F . wet season is warm, harsh, windy, and cloudy and the dry season is hot and mostly clear.

2.9 Social, Economic, Cultural Factors-

Junnar is one of the tourist attraction in Maharashtra, as it has historical significance, there are so many waterfalls observed in rainy season. Daryghat, Naneghat are tourist spot of them, there are ancient temples like Kukadeshwar and holy places as Ozer, Lenyadry, kaprdikeshwar temple at Otur, bull Samadhi at Ale. Number of cave groups as Amba-Ambika cave, Bhutleni, Shivneri caves, Lenyadry caves, manmodi caves, and Tulja caves are neighborhood to this area, hence tourism is one of the source of economy in Junnar. Sugar factory, Shri Vighnagar Sahakari Sakhar Karkhana, is located here and therefore it promote to sugarcane farming. Agriculture is the main occupation of the residents.

Junnar is also known for its cultural activities like narayangaon is famous for Tamasha fad, Tamasha is a traditional folk dance of Maharashtra.

3 Introduction to warm and humid climate-

Characteristics of this climate are high humidity, strong sun, glare from the sky and horizon, there is the long monsoon period with heavy rainfall. Solar radiations in such a area, Due to vapors in air and cloud cover defused radiations reach to earth surface and intense radiation on clear day.

4. Settlement pattern of Junnar –

Similar to other villages Junnar also start develop around the river ‘‘Kukadi’’, from ancient time. There are two rivers Kukadi and Meena around this research area. Two National highway pass are passing through it NH-50 (Pune – Nasik) running north-south n eastern part of Junnar.NH-222 (Ahmednagar- Kalyan) runs east –west in Northern part of Junnar. Due to huge forest and rough topography west part of it shows low density of roads.

Mostly houses observed rectangular in plan and sloping roof with covering of Mangalore tiles as suitable to climate. Structures are situated on both sides of roads, secondary roads. With width of houses parallel to road length. Due to radiation of sunrays mostly structures having one common wall, hence in summer shadows of adjoining structures are helpful in cooling of roads, otta, and courtyards. Most of the structures are north-south oriented very few structures

oriented according to area available for construction. Green plants seen at least two sides of structures in front and backyards.

Kukadi river flows in North side of research area, where agricultural land is present and barren land present on south-west side of Junnar village.

Settlement pattern of research area is a combination of linear pattern and cross shape pattern as houses present.

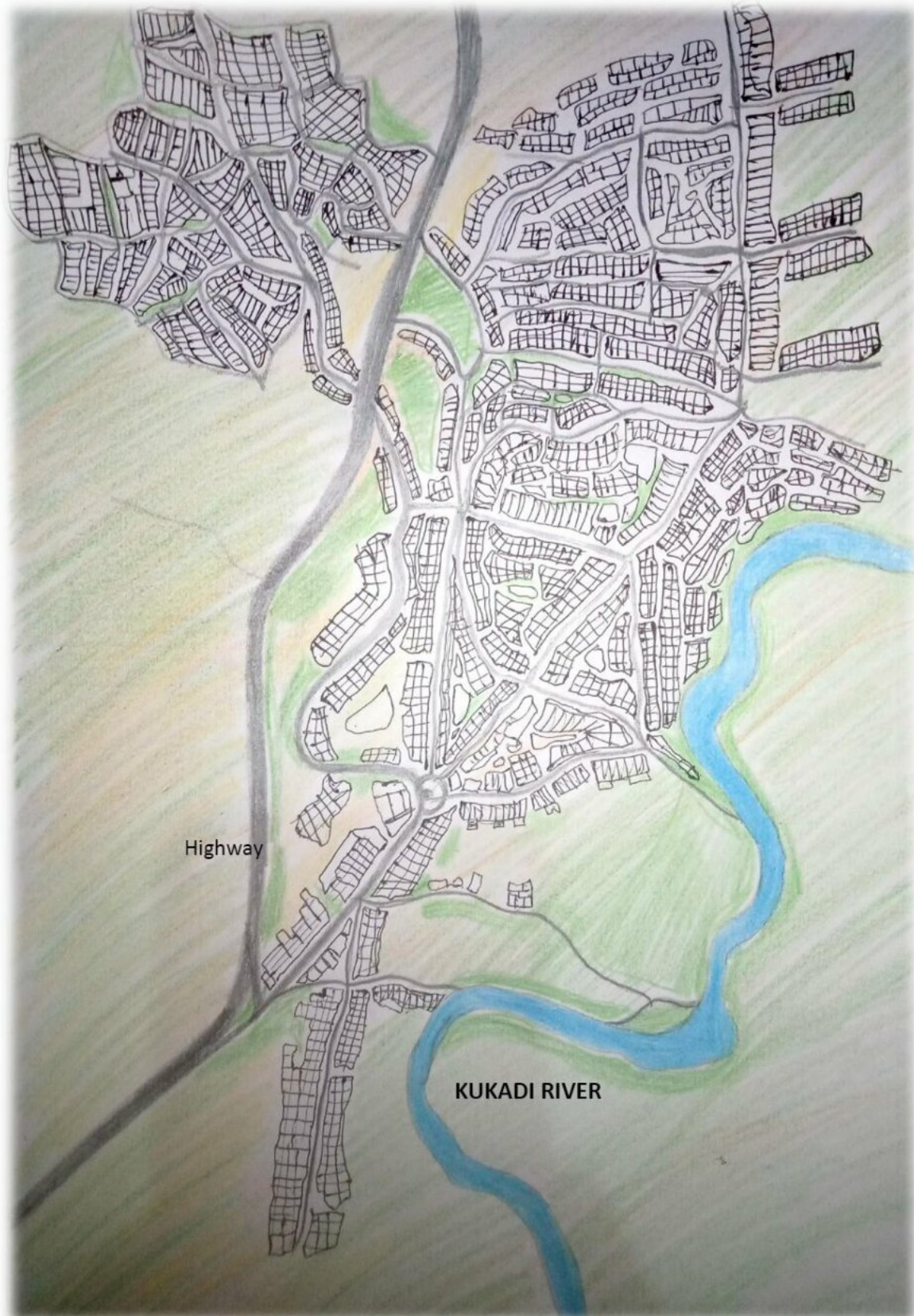
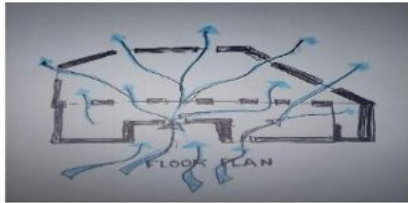
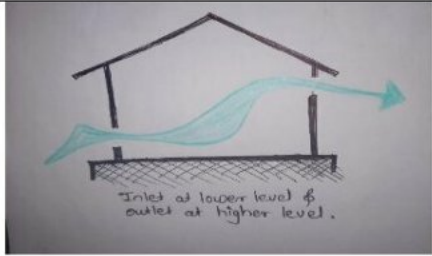


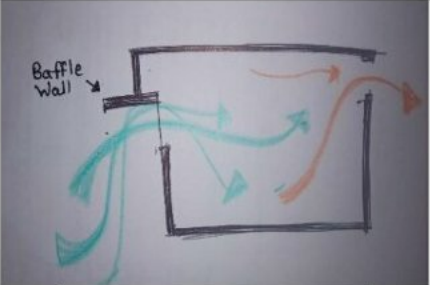

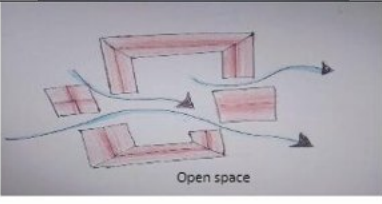
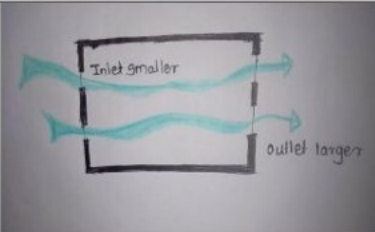
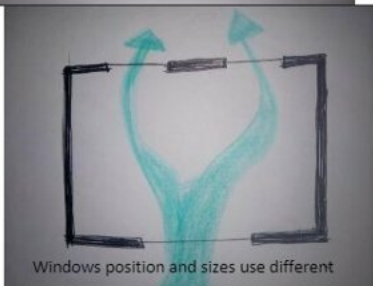
Fig 21: settlement pattern map research area Junnar)

5. Introduction to building problems in warm & humid climate-

The problems faced by some inhabitants find out during live case studies are mostly old structures walls are plaster with mud, and its need to be regularly redecorate with same materials. Due to mud used if there is no proper waterproofing done, water come inside by capillary action. In this area winds with dust particles flows in winter , structures having Mangalore tiles with sloping roof most of time this dust enter through the open spaces like courtyard and from below the Mangalore tiles where small gaps present between battens and tiles.

6. Techniques for controlling temperature, sunlight, heavy rainfall in Junnar-

	Techniques	Conceptual Sketches
Temperature control	<ul style="list-style-type: none"> Temperature is controlled by various methods by using various materials for wall roof, openings , etc. 	
Orientation and street width	<ul style="list-style-type: none"> N-S orientation is ideal for blocking solar radiation. In summer to avoid solar heat during late morning and early afternoon road width should be appropriate. 	
Built form	<ul style="list-style-type: none"> Mostly square and rectangular plans are best, the structure should be long and narrow to allow cross ventilation. 	
Building covers	<ul style="list-style-type: none"> Due to heavy rainfall sloping roof is best to remove water from roof surface. Mangalore tiles are the traditional element as it help to resist heat and also keep structure cool during summer. Vents at roof used to induce ventilation and remove out rising hot air. Broken tiles can be used for roof to reflect harsh rays from sun. 	
Walls	<ul style="list-style-type: none"> The walls should designed to promote air flow so as to counter the prevalent humidity. Baffle walls, both inside and outside can help to divert the flow of wind inside. 	

	<ul style="list-style-type: none"> • They should be protected from the heavy rainfall prevalent in such areas. • Careful water proofing and drainage of water is necessary in design due to heavy rain. 	
<p>Shading devices</p>	<ul style="list-style-type: none"> • Shading devices are very essential in such areas, due to heavy rainfall and harsh sunlight's. • Chajja and roof projections and plants near to wall. 	
<p>Open space (courtyard, otta)</p>	<ul style="list-style-type: none"> • • Courtyards play important role in rising hot air away. • If possible structure should be spread out over the site to create open space between to promote free air movement. 	 <p>Open space</p>
<p>Surrounding landscape</p>	<ul style="list-style-type: none"> • • Various types of plants used which are capable to protect structure from heavy rainfall, sun glare, and heat. • Though temperature is not very high free plants are applicable for shading. • Water-bodies are not essential because they increase humidity. 	
<p>Openings (window, door)</p>	<ul style="list-style-type: none"> • Openings like door, windows, vents should be covered by overhangs like chajja. • Outlets at higher level serve to draw out hot air. 	
<p>Ventilation</p>	<ul style="list-style-type: none"> • Cross ventilation plays important role in warm and humid climate. • All door, windows should kept open for maximum ventilation. • Various sizes of openings are used like inlets are small as compared to outlets. 	 <p>Windows position and sizes use different</p>

6.1 To resist heat gain-

Mostly used materials which reflect the heat, concrete and bricks in which bricks are observed in old constructions. The materials which take long time to heat up are good for such a climate. Shading of building is necessary.

6.2 To promote heat loss-

Devices used to promote heat loss like windows, courtyards, are well ventilated and try to reduce humidity level as possible. Sufficient ventilation required throughout the day.

7. Conclusion-

1. During case studies and after study find out the solutions of modern problems faced by inhabitants because most of the structures were 80 to 100 years old.
2. Finding out the renovation techniques which are suitable for them.
3. In order to build suitable structure in present and in future according to surrounding factors.

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ROLE OF OPENINGS IN DIFFERENT CLIMATIC ZONES IN THE VIEW OF SUSTAINABILITY

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Abstract: Openings such as windows allow natural light and ventilation into the structure. Doors are designed to provide entry and exit in the building. The openings play a vital role in thermally insulating the structure and they connect the building and the environment. The aim of the research is to study the role of the openings in different climatic zones to make the building sustainable. The objectives include to study sustainable Architecture Principles, to collect information about the planning strategies in climatic zones, to study case studies of different climatic zones. The case studies are based on the following parameters that is location, orientation, size, number of openings, material, height of the openings in different climatic zones. According to the climatic zones the ratios and proportions vary. Research is useful to the architects, students, and designers which will give a great approach to design the opening in the sustainable point of view in the different climatic zones.

Keywords: Sustainable Architecture, Sustainable Architecture Principles, Climatic Zones

1. Introduction :

Openings play a very important role in different climatic zones and for people living in these climatic zones to save energy into the structure in the form of natural ventilation into the structure considering sustainability. Interests in the sustainability and climate and comfort of the humans into the structure.

Literature-1 The basic principles of sustainable Architecture The sustainable Architecture is Creating and responsibly sustaining healthy environment, responding to ecological need, making optimal use of energy without overexploitation of natural resources.

Literature-2: Understanding Climate for Sustainable Building Design –A Case Study in Warm Humid Region in India. Understanding climate for energy efficiency or sustainable architecture. The paper identifies options of integrated climatic considerations as an integral part of planning and building design taking the case study of Tiruchirappalli, India.

Literature-3 Investigating Sustainability in hot and dry climate- courtyard houses in Iran. Parameters of central courtyard houses such as orientation, scale, proportion, courtyard components, and material were compared.

All of them focused on design principles of the building as a whole and not the openings particularly in their research. It is important to the designers to know the role of the openings in the building in the climatic zones of India so that they implement it into their design and which will save the energy into the building.

2.Aim: To study the role of openings in different climatic zones to make the building sustainable.

3.Objectives:

- 1.To study sustainable Architecture Principles.
- 2.To collect information about the planning strategies in climatic zones in India.
- 3.To study different climatic zones case study and analyze it.

4.Need of the Topic

- The researchers had not thought about the materials, the sizes, the orientation of the opening in the particular climatic zones of India considering sustainability.
- They studied on the how the shading devices can be done in particular climate but not on the heights of the orientation and sizes of the openings according to sustainability.
- Research is useful to the architects which will give a great approach to them in the sustainable point of view to design the opening in the different climatic zones of India

5.Scope:

- The purpose of the research is to identify the openings in different climatic zones of India considering sustainability.
- Studying on the 5 climatic zones of the India in 5 different cities of India.
- The location, orientation, size, material, height of the openings in 5 climatic zones of India.





6.Limitations:






- It deals with the study of a single building in a city not all the cities or states under the particular climatic zones.
- It deals with the old structure in the particular climatic zones.
- Research deals with only two components of sustainable architecture that is energy saving into the structure, thermal comfort into the structure and climate responsive openings.

7.Methodology:

- Studying structures of Hot and dry climate, Hot and humid climate, Composite Climate, Temperate Climate, Cold climate
- Case study of structure in each climate
- Analysis of case studies

Wherever possible try to ensure that the size of the text in your figures (apart from superscripts/subscripts) is approximately the same size as the main text (12 points).

Sr. No	Parameters of Openings	Climate Zones of India				
		Hot and dry Jaisalmer, Rajasthan	Hot and humid Thuckalay Tamil Nādu	Composite Gual Pahari Gurgaon ,Delhi	Temperate Bangalore Karnataka	Cold Leh, Himachal Pradesh
1	Introduction	This Haveli was commissioned to serve as the residence of Diwan Mohata Nathmal, the PM of Jaisalmer. Its Architecture and miniature is very famous	Padmanabhapuram is a town and was the erstwhile capital of the kingdom of Travancore, ruled by the king Rama Verma and the palace antiques, Armory, wood work is very famous	The building is a one among the 3 building complexes and is residential block	It is a research institute that specializes in the fields of energy, environment and sustainable development.	The house was built for Babu Dorje and his family. Mr. Dorje was the engineer behind the construction of the airport of Leh in 1948
2	Structure Name	Nathmalji-ki-haveli. Year-1885A.D. Architects-Hathi and lulu 	Padmanabhapuram palace. Year-1601 C. E 	Guest House of Solar energy center. Year-1988 	Energy research Institute Year-2001 	Dorje House Year-Early 1900's 
3	Orientation of opening	East-west	North-south	North-west	North-east	South
4	Sizes of openings	Inlet-large Outlet-small	Large -lower level, small at higher level	Large arch window	Normal size opening	Small openings
5	Heights of opening	Low door height More sill heights	0.6m max sill level	Normal 2.1m-doors and no sill to external windows.	sill 0.9m from floor 2.1m-doors	sill 0.9m from floor 2.1m-doors
6	Number of openings	Window-75 Door-40 Courtyard-2	Window-300 Door-125 Courtyard-6	Window-25 Door-20	Window-20 Door-30	Window-8 Door-10

7	Types of opening	Jali Window, Doors, Courtyards	Windows Doors Courtyards	Large Windows, Doors	Windows doors	Windows Doors
8	Plans of the structures					
9	Material of opening	Yellow sand stone	Hard wood panel with colored mica	Aluminum panel	Aluminum panel	Wooden panel
10	Inference	The traditional architecture has the sustainable architecture principles dwelled into it. The courtyard is the main element seen. The Nath-malli-ka-mahal in Jaisalmer is energy efficient. The Number of openings are more at the short side of the structure. The sizes and the heights differ according to the climatic factor to achieve thermal comfort into the structure. Ratio-1:0.20	The Padmanabhapuram palace in Tamil Nādu saves energy into the structure as it has proper openings according to the climatic conditions. The traditional architecture has the sustainable architecture principles dwelled into it. The courtyard is the main element seen.. The sizes and the heights differ according to the climatic factor to achieve thermal comfort into the structure. Ratio-1:0.20	The Guest house in Delhi has large openings windows which circulate air into structure and is energy saving building with maintaining thermal comfort. The sizes and the heights differ according to the climatic factor to achieve thermal comfort into the structure. Ratio-1:0.17	The energy research institute (TERI) is a sustainable building which saves energy and the openings are in n-e direction and ventilation by solar chimneys. Ratio-1:0.18	The Dorje house has small openings from south street and the warmth in the structure is maintained as it is traditionally constructed house and the openings into the structure circulate adequate air into the structure and achieves thermal comfort into the structure. The materials are very keenly used according to the climatic condition. The sizes and the heights differ according to the climatic factor to achieve thermal comfort into the structure. Ratio-1:0.1

9. Conclusion:

- The openings play a very important role in thermally comforting the structure. The traditional architecture has the sustainable architecture principles dwelled into it.
- The courtyard is the main element seen in most of the structures of the different climate zones of India.
- It is Investigated that the openings are orientated in such a way that it saves the energy into the structure and also increase thermal capacity into the structure which is one of the sustainability principles.
- The ratio and proportions vary according to the climatic conditions.
- The materials are very keenly used according the climatic condition.
- The sizes and the heights differ according to the climatic factor to achieve thermal comfort into the structure.

10. Reference:

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The Impact Of Lockdown On The Movement Of Disabled People In Rural Region- Akole Taluka

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Abstract: The study aims to analyze the effects of lockdown on physically challenged people for accessing public-built structures and the study is particularly in the Akole Taluka of A.Nagar district under Maharashtra to find the challenges for current architectural practice in the ground reality of that rural region. The objectives of the study are to investigate the various types of public-built structures that were open in lockdown as emergency services, analyze them, identify which were physically accessible for disabled people, identify which architectural elements are required within the built spaces based on their disability consideration factor, and analyze how barrier-free accessible built environment play's a major role in an individual's life. The methodology of this research is conducted through primary data is collected through a live case study, observations, and secondary data is collected through literature review. The study does not include mental, intellectual, multiple disability information and does not include data rather than emergency services that were opened in lockdown. The study concluded that the emergency services were not physically accessible to everyone in the first wave of lockdown, that lockdown had affected physically challenged people on their physical as well as mental health, and they face lots of challenges regarding accessibility, it causes that they are lagging behind and struggling due to a lack of access to services. This research is helping to implement architecture elements in design and to be useful for physically challenged people, for disability law enforcement officers, for strengthening PWD's law, architects, decision-makers, and local people who do not think about a universal approach.

Key Words: Covid-19, Accessibility, Barriers, Physically disabled, Rural Context.

Introduction: At the moment of a Covid pandemic physically challenged people are face difficulty related to accessing the services, which causes their discomfort, inconvenience and it is affecting their physical as well as mental health. In lockdown situations, all individuals were faced a lot of difficulties related to their daily activities, but the people most affected were disabled. Vaccination is the need of every individual in this situation and it is the right of every individual to get vaccinated. But the question arises can every person get a vaccine without struggling to get in? This question is motivated to find out the truth. India went into a lockdown on March 25, 2020, to combat the spread of COVID 19 infections and reduce the pressure on healthcare systems. Lockdown was required in those circumstances, but it affected every individual's life very badly. The people with disabilities in that situation were facing several types of difficulties, the most important was related to the accessibility of built spaces. It was not only the lockdown that caused them to face access-related issues but otherwise, also they have the same problems for accessing the services that they always need to rely on others. But because of the rule that we called social distancing people are not ready to come across and help them. This situation helps us to realize that these people needed architectural building elements within the built spaces. This research will help to implement architecture elements in design and help to make strengthen the law of enforcement.

Aim: To analyze the effects of lockdown on physically challenged people for accessing public-built structures.

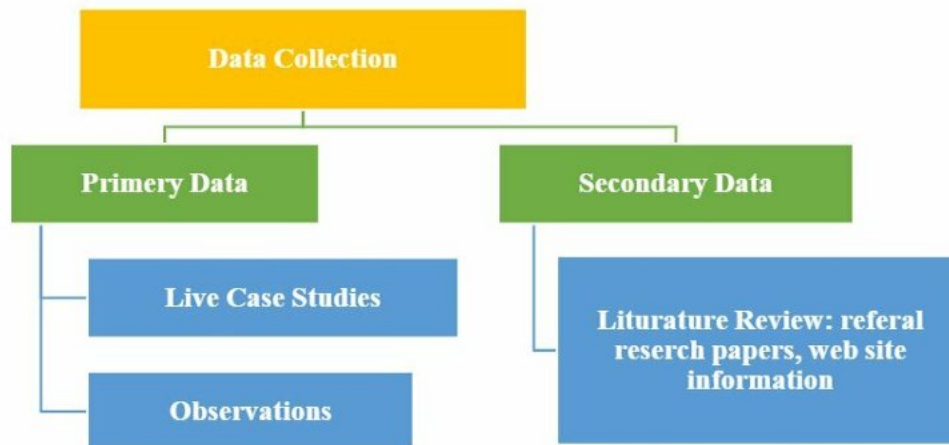
Objectives:

1. To investigate the various types of public-built structures that were open in lockdown as emergency services.
2. To analyze them and identify which were physically accessible for disabled people.
3. To identify which architectural elements are required within the built spaces based on their disability consideration factor.
4. To analyze how barrier-free accessible built environment play's a major role in an individual's life.

Scope: The purpose of the study is to analyze the public-built spaces that were built to consider the disabled keep in the mind. Sample for studying are public-built spaces that were open in lockdown as emergency services such as primary hospitals, vaccination centers, covid centers, banks, grocery stores. This topic includes information about Architectural built elements that are required for physically challenged people. The study is particularly in the Akole Taluka of A.Nagar district under Maharashtra.

Limitations: The study will not include information about mental, intellectual, multiple disabilities. not included data rather than emergency services that were open in lockdown.

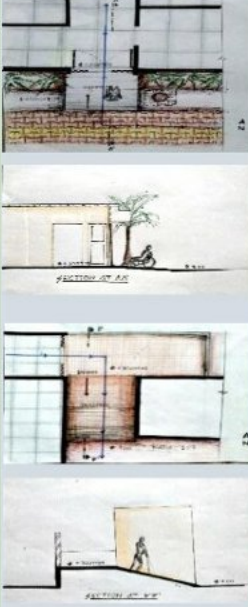




Methodology:


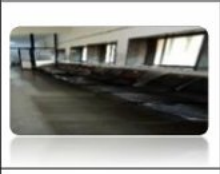
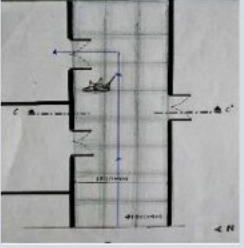
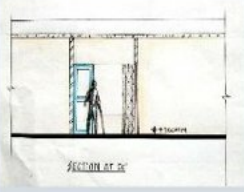





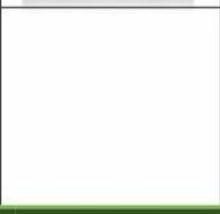










Need Of The Topic: Previously researchers had not thought about all emergency services opened up in lockdown and did not include data on all physically challenged people. That's why data does not include information on physically challenged people struggling for access. This research is useful for physically challenged people, for disability law enforcement officers, for strengthening PWD's law, architects, decision-makers, and local people who do not think about a universal approach.

Matrix:

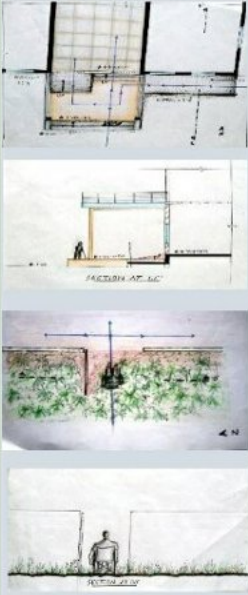



Building Typology	Vaccination Center	
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Name	Rural Hospital Akole			
Location	Rural Hospital Akole, Tal. Akole, Dist. Ahmednagar			
Architectural Building Elements	Description	Photograph	Remark	Inference
Entrance And Exit 	<ul style="list-style-type: none"> • 2 ramps are provided one is for entry and the another is for the exit. • There are no handrails. • Steps are not provided for entry or exit. 	 	<p>The exit ramp is not in proper ratio because of that there is a difficulty for a wheelchair user to run a wheelchair through a ramp and railings are not given it causes difficulty for visually impaired people.</p>	<p>Many architectural elements are missing in the structure and lack of access through the elements is why physically challenged people face a lot of challenges for accessing the vaccination center. There is a need for stairs and railings which are a very primary need to access services. There is a need for a toilet that is accessible to everyone and the door should be like this that is not be opened in the corridor. There is a need to provide guide floor material, textual signals, and migration chairs.</p>
Flooring	<ul style="list-style-type: none"> • Non-Slip resistant materials are used for flooring 		<p>A physically challenged person can easily get access with their mobility equipment.</p>	<p>For exit ramp the ratio used is 1:7 there is a need to provide a 1:12 ratio ramp.</p>
Exterior	<ul style="list-style-type: none"> • Some trees are planted on the periphery of the building block and some of them are planted in front of the building block to create shade for the outdoor seating. 		<p>There is an outdoor seating area below the tree and the exterior area is accessible for physically disabled people.</p>	
Pathway	<ul style="list-style-type: none"> • Worm brick concrete floor blocks are used. 		<p>The pathway is accessible and barrier-free for physically challenged people.</p>	


Toilet	<ul style="list-style-type: none"> The universal toilet is not there. 		<p>There is a provision of the toilet but it is not accessible for physically challenged people.</p>	
Light Ventilation	<ul style="list-style-type: none"> Large windows are provided for lighting and ventilation purpose. 		<p>Light and ventilation are good and enough.</p>	
Corridor  	<ul style="list-style-type: none"> The corridor is large or unobstructed with a seating area. The width of the entry and exit corridor is 1800 mm. The corridors are a width of 2500 mm which leads towards the online registration for vaccines. 	 	<p>The corridor is large and unobstructed enough space for the circulation of mobility devices. But the door in the corridor which leads toward the vaccination area opens outward in the corridor creates an obstruction for the mobility devices.</p>	
Guide Floor	<ul style="list-style-type: none"> No guide floor material is provided. 		<p>Guiding floor material is not there to guide visually impaired people.</p>	
Door	<ul style="list-style-type: none"> Doors are open from outside in the corridor, which leads towards the vaccination area. 		<p>The main door is accessible for mobility devices but the door in the corridor which opens outward in the corridor creates an obstruction for the mobility devices.</p>	
Textural Indication	<ul style="list-style-type: none"> There is no kind of textural indication. 		<p>Visually impaired people suffer because there is no textural indication.</p>	
Evacuation	<ul style="list-style-type: none"> There is no provision for an Evacuation chair. 		<p>There is no evacuation chair for mobility-impaired people, if any emergency happened then they might be face difficulty.</p>	
Building Typology	Vaccination Center			
Name	Jilha Parishad Prathmik Kendra Shala Akole Mule.			








Location	Jilha Parishad Prathmik Kendra Shala Akole Mule, Tal-Akole, Dis- A.Nagar, Maharashtra 422601.			
Architectural Building Elements	Description	Photograph	Remark	Inference
Entrance And Exit 	<ul style="list-style-type: none"> A huge gate is provided for the entrance. Steps and ramp are provided but they aren't in good condition. The railings are not proper in condition. 		There is no good flooring to access through that gate with mobility equipment. Steps are provided without railings that are completely damaged, the ramp has also been damaged and not in proper ratio. The railing is not in the right condition and all these things cannot be used by physically challenged people.	There are missing architectural elements, damaged flooring, and lack of access by the elements which is why physically challenged people struggle for access. There is a need for good flooring. There is a ramp with a 1:6 ratio so there is a need to provide a 1:12 ratio ramp and railing which is a primary need to get access to any building.
Flooring	<ul style="list-style-type: none"> Shahabad tile is used for flooring. For circulation, there is damaged flooring. 		The flooring is completely damaged which causes difficulty for physically challenged people.	Proper pathways, the accessible door, should be accessible toilet which is accessible for everyone. Need to provide guide floor material, textual indication, and evacuation chair.
Exterior	<ul style="list-style-type: none"> There are large trees within the periphery of the building block. 		There is an outdoor seating area below the tree but the outer area is not accessible for mobility equipment due to the floor.	
Pathway	<ul style="list-style-type: none"> Mud floor is used for pathways. 		Disabled people face difficulty because there is no flat surface.	
Toilet	<ul style="list-style-type: none"> The universal toilet is not there. 		There is a provision of the toilet but it is not accessible for physically challenged people.	
Light Ventilation	<ul style="list-style-type: none"> Windows and doors are provided for natural ventilation. 		There are enough windows for natural ventilation.	




Corridor	<ul style="list-style-type: none"> The flooring of the corridor is damaged. 		The flooring is completely damaged which makes it difficult for physically challenged people to enter the corridor.	
Guide Floor	<ul style="list-style-type: none"> No guide floor material is provided. 		Guiding floor material is not there to guide visually impaired people.	
Door	<ul style="list-style-type: none"> A double wooden door is provided. 		The width of the door is not wheelchair accessible so people with disabilities face difficulties.	
Textural Indication	<ul style="list-style-type: none"> There is no textural indication. 		Visually impaired people suffer because there is no textural indication.	
Evacuation	<ul style="list-style-type: none"> There is no provision for an Evacuation chair. 		There is no evacuation chair for mobility-impaired people, if any emergency happened then they might be face difficulty.	
Building Typology	Vaccination Center			
Name	Zilla Parishad Ahmednagar Primary Health Sub-Center Nawalewadi, Tal. Akole, Dis. A. Nagara			
Location	Vittal nagar nawalewadi Tal. Akole, Dist. Ahmednagar, Maharashtra 422601.			
Architectural Building Elements	Description	Photograph	Remark	Inference

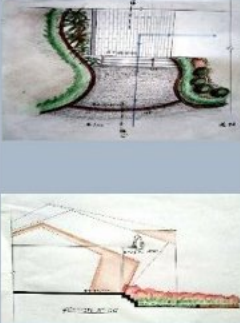






<p>Entrance And</p> 	<ul style="list-style-type: none"> • For the main entrance, a huge metal gate is provided. • Separate gate is provided for main entry and exit. • A ramp and staircase are provided for the building entrance. 		<p>The ramps are not in proper ratio because of that there is a difficulty for a wheelchair user to run a wheelchair through a ramp and railings are not given extra rail causing difficulty to visually impaired users.</p>	<p>Some architectural elements are there but not in the proper ratio, some architectural elements are missing, and randomly grown grass all create a barrier for physically challenged people. Here they used 1:6 and 1:3 ratio ramp but There is a need for a ramp in a proper ratio which is 1:12. The ramp has railings on both sides with an extended railing that is 0.30 meters across the top and bottom of the ramp, and there is a need for landing space. Need of non-slippery tiles and exterior pathway without obstacles and accessible floor material. Need to provide an accessible toilet and evacuation chair, guide floor material in the corridor, and Textual indication.</p>
<p>Flooring</p>	<ul style="list-style-type: none"> • Ceramic floor tile (glossy finish) is used. 		<p>The floor is slippery which makes it difficult to use mobility equipment.</p>	
<p>Exterior</p>	<ul style="list-style-type: none"> • Large open space in front of vaccination center. • A huge compound wall is used to create a visual barrier. • Some linearly planted flowering plant is there on the right side of the building block. • There are no huge trees in the periphery of the building block. 		<p>The exterior area is accessible for physically challenged people but the exterior area which leads towards the exit gate there is messy grown grass which creates an obstruction for physically challenged people.</p>	






Pathway	<ul style="list-style-type: none"> • Worm brick concrete floor blocks are used for the exterior floor. • There is messy grown grass on the pathway which leads towards the exit gate. 		<p>The pathway is accessible and barrier-free for physically challenged people. But the pathway which leads towards the exit gate there is messy grown grass which creates an obstruction for physically challenged people.</p>
Toilet	<ul style="list-style-type: none"> • The universal toilet is not there. 		<p>There is a provision of the toilet but it is not accessible for physically challenged people.</p>
Light Ventilation	<ul style="list-style-type: none"> • Windows and doors are provided for natural ventilation. 		<p>There are enough windows for natural ventilation.</p>
Corridor	<ul style="list-style-type: none"> • The corridor is large or unobstructed. 		<p>The corridor is large and unobstructed enough space for the circulation of mobility devices.</p>
Guide Floor	<ul style="list-style-type: none"> • No guide floor material is provided. 		<p>Guiding floor material is not there to guide visually impaired people.</p>
Door	<ul style="list-style-type: none"> • A metal sliding door is provided for the entrance. • And other doors are wooden single doors. 		<p>There is not enough landing space in front of the door so it is difficult for disabled people to get in through the door.</p>
Textural Indication	<ul style="list-style-type: none"> • There is no textural indication. 		<p>Visually impaired people suffer because there is no textural indication.</p>
Evacuation	<ul style="list-style-type: none"> • There is no provision for an Evacuation chair. 		<p>There is no evacuation chair for mobility-impaired people, if any emergency happened then they might be face difficulty.</p>


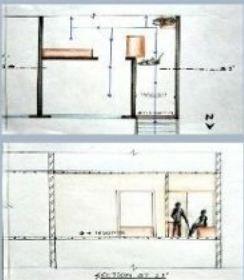


Building Typology	Covid Center	
Name	Prathmik Arogya Kendra Sugaon Khurd, Tal-Akole, Dis-A.Nagar.	
Location	Sugaon Khurd, Tal-	

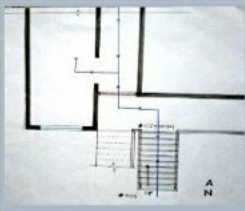



Akole, Dis-A.Nagar, Maharashtra 422601.				
Architectural Building Elements	Description	Photograph	Remark	Inference
Entrance And Exit  	<ul style="list-style-type: none"> There are stairs and ramps for entry and exit. 		<p>The ramps are not in proper ratio because of that there is a difficulty for a wheelchair user to run a wheelchair through a ramp and for railings extra rail are not given it causes difficulty to visually impaired users.</p>	<p>Some architectural elements are there but not in the right ratio and some architectural elements are absent which is why disabled people face a lot of challenges to entering the Covid center. Here is a ramp with a 1:5 and 1:4 ratio but needs to provide a ramp with a 1:12 ratio with handrails and extra rail on top and bottom and with an extended railing that is 0.30 meters across the top and bottom of the ramp. Need to provide non-slippery tiles an accessible toilet and guide floor material, an evacuation chair, textual indication. There is a need to remove obstructions in the entrance which is created because of the floor mat.</p>
Flooring	<ul style="list-style-type: none"> Ceramic floor tile (glossy finish) is used. 		<p>The floor is slippery which makes it difficult to use mobility equipment.</p>	
Exterior	<ul style="list-style-type: none"> There is only one tree is on the site. There is a large open space in front of the covid center which acts as a parking space. 		<p>The Exterior area is accessible for physically challenged people.</p>	
Pathway	<ul style="list-style-type: none"> Worm brick Concrete floor block is used. 		<p>The pathway is accessible and barrier-free for physically challenged people.</p>	
Toilet	<ul style="list-style-type: none"> The universal toilet is not there. 		<p>There is a provision of the toilet but it is not accessible for physically challenged people.</p>	
Light Ventilation	<ul style="list-style-type: none"> Doors and windows are used for natural ventilation. Artificial light and ventilation are also used there. 		<p>Light and ventilation are good and enough.</p>	


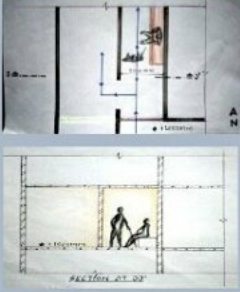



Corridor	<ul style="list-style-type: none"> The corridor is large and unobstructed. 		The corridor is large and unobstructed enough space for the circulation of mobility devices.	
Guide Floor	<ul style="list-style-type: none"> No guide floor material is provided. 		Guiding floor material is not there to guide visually impaired people.	
Door	<ul style="list-style-type: none"> For entrance, there is a sliding metal gate and a wooden double door is provided. 		The door is accessible for mobility equipment but there is a floor mat that creates an obstruction.	
Textural Indication	<ul style="list-style-type: none"> There is no kind of textural indication. 		Visually impaired people suffer because there is no textural indication.	
Evacuation	<ul style="list-style-type: none"> There is no provision for an Evacuation chair. 		There is no evacuation chair for mobility-impaired people, if any emergency happened then they might be face difficulty.	
Building typology	Covid Center			
Name	Vithal Lawns			
Location	Akole Bypass Road, Vitthal Nagar, Tal-Akole, Dis-A.Nagar, Maharashtra 422601.			
Architectural Building Elements	Description	Photograph	Remark	Inference

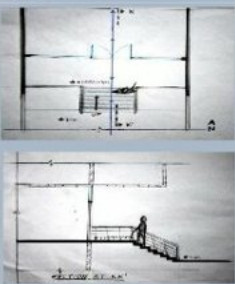






<p>Entrance And</p> 	<ul style="list-style-type: none"> For the main entrance, there is a large sliding metal gate is provided. There are stairs for entry and exit. 		<p>The entrance is not wheelchair accessible because there is no provision of a ramp, Railing is not there to support visually impaired people.</p>	<p>The structure has missing architectural elements and a lack of access through built space which is why physically challenged people are finding it difficult to enter the Covid center. There is a need to provide a ramp with proper ratio with handrails and extra rail on top and bottom and with an extended railing that is 0.30 meters across the top and bottom of the ramp. Need to provide non-slippery tiles for the interior flooring and paving blocks for exterior pathways. Need to provide an accessible toilet and guide floor material, an evacuation chair, textual indication. And proper windows must be provided.</p>
<p>Flooring</p>	<ul style="list-style-type: none"> Ceramic floor tile (glossy finish) is used. 		<p>The floor is slippery which makes it difficult to use mobility equipment.</p>	
<p>Exterior</p>	<ul style="list-style-type: none"> Large open spaces for parking and there are many trees on the exterior. 		<p>The exterior area has lavish greenery but there is a shallow slope no plain floor to operate mobility devices.</p>	
<p>Pathway</p>	<ul style="list-style-type: none"> Muram stone is laid on the surface of the soil. There is a mud floor for the pathway. 		<p>Difficulty while operating a mobility device.</p>	
<p>Toilet</p>	<ul style="list-style-type: none"> The universal toilet is not there. Toilet block is almost 6m away from the main building block. 		<p>There is a provision of the toilet but it is not accessible for physically challenged people and it is almost 6m away from the building block.</p>	
<p>Light Ventilation</p>	<ul style="list-style-type: none"> There are large openings without a window for natural ventilation. Artificial light and ventilation are used there. 		<p>Without a window, that big opening increases the cold at night in that building block.</p>	
<p>Corridor</p>	<p>-</p>	<p>-</p>	<p>-</p>	





Guide Floor	<ul style="list-style-type: none"> No guide floor material is provided. 		Guiding floor material is not there to guide visually impaired people.	
Door	<ul style="list-style-type: none"> For entrance, a large sliding metal gate is provided. And rolling shutter is provided for the toilet. 		The gate is accessible for mobility equipment but the floor is not flat which causes difficulty for physically challenged people.	
Textural Indication	<ul style="list-style-type: none"> There is no kind of textural indication. 		Visually impaired people suffer because there is no textural indication.	
Evacuation	<ul style="list-style-type: none"> There is no provision for an Evacuation chair. 		There is no evacuation chair for mobility-impaired people, if any emergency happened then they might be face difficulty.	
Building typology	Healthcare			
Name	Shinde Hospital			
Location	Shinde Hospital, Akole, Maharashtra 422601, India.			
Architectural Building Elements	Description	Photograph	Remark	Inference
Entrance And Exit	<ul style="list-style-type: none"> Steps are provided. There is no provision of a ramp. 		The entrance is not wheelchair accessible because there is no provision of a ramp, And for railings, extra rail is not given it causing difficulty to visually impaired users.	There are obstructions for circulation of mobility devices, no access from the building elements, and absence of architectural elements in design which is why disabled people do not get access. There is a need to provide a ramp with proper ratio with handrails and extra rail on top and bottom and with an extended railing
Flooring	<ul style="list-style-type: none"> Ceramic floor tile (glossy finish) is used. 		The floor is slippery which makes it difficult to use mobility equipment.	

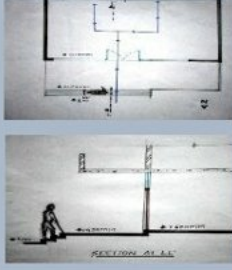







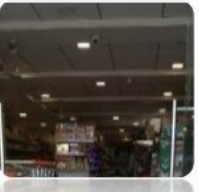
<p>Exterior</p>	<ul style="list-style-type: none"> There is not enough space for parking and there is no kind of landscape. 		<p>There is no plain floor it causes wheelchair person face difficulty to get in.</p>	<p>that is 0.30 meters across the top and bottom of the ramp. It is necessary to provide non-slippery tiles for the interior flooring and paving blocks for the exterior pathway. The corridor should provide without obstacles. Accessible toilet and guide floor materials, an evacuation chair, textual signs must be provided.</p>
<p>Pathway</p>	<ul style="list-style-type: none"> There is a shallow slope on the pathway. The ground soil floor is there. 		<p>People with disabilities face difficulties due to a lack of flat surfaces.</p>	
<p>Toilet</p>	<ul style="list-style-type: none"> Universal toilet is not there. 		<p>There is a provision of the toilet but it is not accessible for physically challenged people.</p>	
<p>Light Ventilation</p>	<ul style="list-style-type: none"> Doors and windows are used as natural ventilation. And artificial light and ventilation are also used. 		<p>Light and ventilation are good and enough.</p>	
<p>Corridor</p> 	<ul style="list-style-type: none"> The seating desk and reception desk create obstruction in the corridor. And footwear is also created obstruction. 		<p>There is a seating desk and the reception desk creates an obstruction for mobility device users.</p>	
<p>Guide Floor</p>	<ul style="list-style-type: none"> There is no guide floor material provided. 		<p>Guiding floor material is not there to guide visually impaired people.</p>	
<p>Door</p>	<ul style="list-style-type: none"> For entrance, a rolling shutter is provided. Wooden and glass single door is also used there. 		<p>There is not enough landing space in front of the door so it is difficult for disabled people to get in through the door.</p>	
<p>Textural Indication</p>	<ul style="list-style-type: none"> There is no textual indication. 		<p>Visually impaired people suffer because there is no textural indication.</p>	






Evacuation	<ul style="list-style-type: none"> Evacuation chair is not there. 		<p>There is no evacuation chair for mobility-impaired people, if any emergency happened then they might be face difficulty.</p>	
Building typology	Healthcare			
Name	Shree Saibaba Hospital			
Location	Shree Saibaba Hospital, Akole, Maharashtra 422601, India.			
Architectural Building Elements	Description	Photograph	Remark	Inference
Entrance And Exit 	<ul style="list-style-type: none"> Steps are provided. There is no provision of a ramp. 		<p>The entrance is not wheelchair accessible because there is no provision of a ramp. And for railings, extra rail is not given it causing difficulty to visually impaired users.</p>	<p>There is not enough circulation space for mobility equipment and the absence of architectural elements in design that's why people with disabilities are having difficulty accessing services.</p>
Flooring	<ul style="list-style-type: none"> Ceramic floor tile (glossy finish) is used. 		<p>floor is slippery which makes it difficult to use mobility equipment.</p>	<p>There is a need to provide a ramp with proper ratio with handrails and extra rail on top and bottom and with an extended railing that is 0.30 meters</p>
Exterior	<ul style="list-style-type: none"> There is space for parking but there is no landscape. 		<p>Physically challenged people get access to the exterior areas without getting difficulties.</p>	<p>across the top and bottom of the ramp. It is necessary to provide non-slippery tiles for the interior flooring. The corridor should provide without obstacles it should be large.</p>
Pathway	<ul style="list-style-type: none"> Worm brick Concrete floor blocks are used. 		<p>Because of concrete floor blocks, there is no kind of issue to run mobility devices.</p>	<p>Accessible toilet and guide floor materials, an evacuation chair, textual</p>









Toilet	<ul style="list-style-type: none"> Universal toilet is not there. 		<p>There is a provision of the toilet but it is not accessible for physically challenged people.</p>	<p>signs must be provided. Need to provide more windows for natural ventilation.</p>
Light Ventilation	<ul style="list-style-type: none"> There are very few windows for natural ventilation. And artificial light and ventilation are used. 		<p>Because of the narrow area and minimum circulation space, there is the issue of natural light and ventilation.</p>	
Corridor 	<ul style="list-style-type: none"> There is not enough space for circulation. The seating desk creates obstruction in the corridor. 		<p>Because of minimum circulation space and seating desk, there is no space to enter a mobility device.</p>	
Guide Floor	<ul style="list-style-type: none"> There is no guide floor material provided. 		<p>Guiding floor material is not there to guide visually impaired people.</p>	
Door	<ul style="list-style-type: none"> For entrance, a metal rolling shutter is provided. 		<p>The door is accessible for mobility equipment but there is a floor mat that creates an obstruction.</p>	
Textural Indication	<ul style="list-style-type: none"> There is no textural indication. 		<p>Visually impaired people suffer because there is no textural indication.</p>	
Evacuation	<ul style="list-style-type: none"> Evacuation chair is not there. 		<p>There is no evacuation chair for mobility-impaired people, if any emergency happened then they might be face difficulty.</p>	
Building Typology	Grocery Shop			
Name	D K supper market akole			


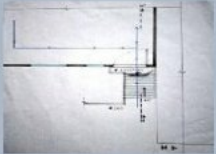
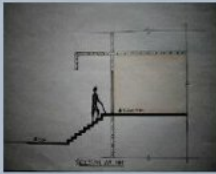



Location	D K Supper Market Akole, Maharashtra 422601, India			
Architectural Building Elements	Description	Photograph	Remark	Inference
Entrance And Exit 	<ul style="list-style-type: none"> There are several steps to reach a height of 1050mm. There is no provision for the ramp. 		<p>The entrance is not wheelchair accessible and the Railing is not proper for Visually impaired users.</p>	<p>There is an absence of architectural elements within the structure which causes inconvenience to disabled people for entering the service. There is a need to provide a ramp with proper ratio with handrails and extra rail on top and bottom and with an extended railing that is 0.30 meters across the top and bottom of the ramp.</p>
Flooring	<ul style="list-style-type: none"> VCT (vinyl composition tile) material is used for flooring. 		<p>The tiles are non-slippery so there is no difficulty to use mobility equipment.</p>	<p>Grocery store furniture should be low in height so it is easy for wheelchair users and circulation space min 1.50m to 1.80m to allow easy passage of two wheelchairs without any obstructions, may passage have a width less than 1.50m but not less than 0.90m. Guide floor materials, an evacuation chair, textual signs must be provided. Need to provide more windows for natural ventilation.</p>
Furniture	<ul style="list-style-type: none"> Grocery store furniture is not are in low height. 		<p>All Furniture is not wheelchair accessible.</p>	
Exterior	<ul style="list-style-type: none"> Long entry passage is provided for entrance. There are no trees in the entry area. 		<p>The Exterior area is accessible for physically challenged people but there, is no kind of landscape.</p>	
Pathway	<ul style="list-style-type: none"> Worm brick Concrete floor blocks are used. 		<p>The pathway is accessible and barrier-free for physically challenged people.</p>	
Toilet	<ul style="list-style-type: none"> There is no provision for the toilet. 		-	
Evacuation	<ul style="list-style-type: none"> There is no provision for an Evacuation chair. 		<p>There is no evacuation chair for mobility-impaired people, if any emergency happened then they might be face difficulty.</p>	




<p>Light Ventilation</p>	<ul style="list-style-type: none"> • A full-height spider glass is provided for the entrance. • And there is mechanical ventilation, no windows for natural ventilation. 		<p>There are not enough windows for natural ventilation.</p>	
<p>Circulation</p>	<ul style="list-style-type: none"> • There is not enough space in between the furniture. 		<p>There is not enough space for mobility-impaired people to operate their mobility devices.</p>	
<p>Door</p>	<ul style="list-style-type: none"> • A glass door is provided for entry and exit. 		<p>There is not enough landing space in front of the door so it is difficult for disabled people to get in through the door.</p>	
<p>Guide Floor</p>	<ul style="list-style-type: none"> • No guide floor material is provided. 		<p>Guiding floor material is not there to guide visually impaired people.</p>	
<p>Textural Indications</p>	<ul style="list-style-type: none"> • There is no kind of textural indication. 		<p>Visually impaired people suffer because there is no textural indication.</p>	
<p>Building Typology</p>	<p>Grocery Shop</p>			
<p>Name</p>	<p>Dhananjay super shoppe</p>			
<p>Location</p>	<p>Kolhar Ghoti Rd, Akole, Maharashtra 422601</p>			
<p>Architectural Building Elements</p>	<p>Description</p>	<p>Photograph</p>	<p>Remark</p>	<p>Inference</p>

<p>Entrance And Exit</p> 	<ul style="list-style-type: none"> Steps are provided. There is no provision of a ramp. 		<p>The entrance is not wheelchair accessible and the Railing is not proper for Visually impaired users.</p>	<p>There is an absence of architectural elements within the structure and some built elements create an obstruction for mobility equipment which causes inconvenience to disabled people for entering the service. There is a need to</p>
<p>Flooring</p>	<ul style="list-style-type: none"> VCT (vinyl composition tile) material is used for flooring. 		<p>The tiles are non-slippery so there is no difficulty to use mobility equipment.</p>	<p>provide a ramp with proper ratio with handrails and extra rail on top and bottom and with an extended railing that is 0.30 meters across the top and bottom of the ramp. Grocery store furniture should be low in height</p>
<p>Furniture</p>	<ul style="list-style-type: none"> Grocery store furniture is not are in low height. 		<p>All Furniture is not wheelchair accessible.</p>	<p>so it becomes easy for wheelchair users and circulation space min 1.50m to 1.80m to allow easy passage of two wheelchairs without any obstructions, may passage has a width less than 1.50m but not less than 0.90m. It is necessary to provide paving blocks for the exterior pathway. Guide floor materials, an evacuation chair, textual signs must be provided. need to provide more windows for natural ventilation.</p>
<p>Exterior</p>	<ul style="list-style-type: none"> There is not enough parking space and no any kind of landscape. 		<p>There is not plain surface for movement of wheelchair.</p>	
<p>Pathway</p>	<ul style="list-style-type: none"> Mud floor is there. 		<p>There is no any kind of artificial flooring natural flooring is there because of that there is no plain floor.</p>	
<p>Toilet</p>	<ul style="list-style-type: none"> There is no provision for the toilet. 		<p>-</p>	
<p>Evacuation</p>	<ul style="list-style-type: none"> There is no provision for an Evacuation chair. 		<p>There is no evacuation chair for mobility-impaired people, if any emergency happened then they might be face difficulty.</p>	
<p>Light Ventilation</p>	<ul style="list-style-type: none"> Mechanical light and ventilation are provided and spider glass is provided in front of the shop for light. 		<p>There are not enough windows for natural ventilation.</p>	

Circulation	<ul style="list-style-type: none"> There is not enough space in between the furniture. 		There is not enough space for mobility-impaired people to operate their mobility devices.	
Door	<ul style="list-style-type: none"> A glass door is provided for entry and exit. 		There is enough space for landing but there is a riser to enter through the door which causes difficulty for people with disabilities.	
Guide Floor	<ul style="list-style-type: none"> No guide floor material is provided. 		Guiding floor material is not there to guide visually impaired people.	
Textural Indications	<ul style="list-style-type: none"> There is no kind of textural indication. 		Visually impaired people suffer because there is no textural indication.	
Building typology	Bank			
Name	Ahmednagar District Central Co-Operative Bank			
Location	SH44, near Sarda Petrol Pump, Akole, Maharashtra 422601			
Architectural Building Elements	Description	Photograph	Remark	Inference
Entrance And Exit	<ul style="list-style-type: none"> Steps are provided for entry of bank and ATM and there are no ramp and railings. 		The entrance is not wheelchair accessible because there is no provision of a ramp, Railing is not there to support visually impaired people.	There are missing architectural elements and some built elements create barriers for mobility equipment that causes people with disabilities to struggle a lot. There is a need to provide a ramp with proper ratio with handrails and extra rail on top and bottom and with an extended railing that is 0.30 meters across the top and bottom of the ramp. It is necessary to provide
Flooring	<ul style="list-style-type: none"> Ceramic floor tile (glossy finish) is used. 		The floor is slippery which makes it difficult to use mobility equipment.	
Elevators	<ul style="list-style-type: none"> The elevator is not provided. 		Wheelchair users face difficulty because there is no provision of an elevator.	

Furniture	<ul style="list-style-type: none"> The height of the bank desk and cash counter is not low. 		The height of furniture is high which causes difficulty for wheelchair users.	non-slippery tiles for the interior flooring and paving blocks for the exterior pathway. The corridor should provide without obstacles. Accessible toilet and guide floor materials, an elevator, an evacuation chair, textual signs must be provided. Need of accessible furniture.
Exterior	<ul style="list-style-type: none"> A long passage is for entry. Liner trees are planted at one side of the site to create shade for parking. 		Natural flooring is there because of that there is no plain floor it causes wheelchair person face difficulty to get in.	
Pathway	<ul style="list-style-type: none"> Mud floor is there. 		Difficulty while operating a mobility device.	
Toilet	<ul style="list-style-type: none"> There is no public toilet. 		-	
Light Ventilation	<ul style="list-style-type: none"> Large windows and ventilators are provided. Mechanical light and fans are provided. 		Light and ventilation are good and enough.	
Corridor	<ul style="list-style-type: none"> The plastic grass mat is spread on the floor which creates an obstruction in the corridor. 		There is an obstruction in the corridor so it is difficult for physically challenged people to get enter through a corridor.	
Guide Floor	<ul style="list-style-type: none"> No guide floor material is provided. 		Guiding floor material is not there to guide visually impaired people.	
Circulation	<ul style="list-style-type: none"> There is enough space for circulation and an Adequate seating arrangement. 	 	There is enough circulation space for physically challenged people to operate their mobility devices.	
Door	<ul style="list-style-type: none"> A metal folding door is provided for the entrance and the other are single and double wooden doors. 		There is a step in front of the door so there is not enough landing space in front of the door so it is difficult for people with disabilities to enter through the door.	

Textural Indication	<ul style="list-style-type: none"> There is no kind of textural indication. 		Visually impaired people suffer because there is no textural indication.	
Evacuation	<ul style="list-style-type: none"> There is no provision for an Evacuation chair. 		There is no evacuation chair for mobility-impaired people, if any emergency happened then they might be face difficulty.	
Building typology	Bank			
Name	State Bank Of India			
Location	Akole Karkhana Road, Maharashtra India, Akole, Maharashtra			
Architectural Building Elements	Description	Photograph	Remark	Inference
Entrance And Exit  	<ul style="list-style-type: none"> Steps are provided for entry of bank and ATM, the railing is provided only one side of the stair on the other side there is a wall where railings are not provided. There is no ramp. 		The entrance is not wheelchair accessible as there is no provision for the ramp. For railings, extra rail is not given and railings are only given on one side of the stairs causing difficulty to visually impaired users.	There is a lack of architectural elements which makes it difficult for physically challenged people to access the service. There is a need to provide a ramp with proper ratio with handrails and extra rail on top and bottom and with an extended railing that is 0.30 meters across the top and bottom of the ramp. It is necessary to provide non-slippery tiles for the interior flooring. The circulation space should provide large and without obstacles. Accessible toilet and guide floor materials, an elevator, an evacuation chair, textual signs must be provided.
Flooring	<ul style="list-style-type: none"> Ceramic floor tile (glossy finish) is used. 		The floor is slippery which makes it difficult to use mobility equipment.	
Elevators	<ul style="list-style-type: none"> The elevator is not provided. 		Wheelchair users face difficulty because there is no provision of an elevator.	
Furniture	<ul style="list-style-type: none"> The height of the bank desk and cash counter is low. 		Wheelchair users do not face difficulties as the height of furniture is low.	

Exterior	<ul style="list-style-type: none"> There is not enough parking space and no kind of landscape. 		Physically challenged people get access to the exterior areas without getting difficulties.
Pathway	<ul style="list-style-type: none"> Worm brick concrete floor blocks are used. 		Because of concrete floor blocks, there is no kind of issue to run mobility devices.
Toilet	<ul style="list-style-type: none"> There is no public toilet. 		-
Light Ventilation	<ul style="list-style-type: none"> Windows are provided for natural ventilation. Mechanical light and fans are provided. 		Light and ventilation are good and enough.
Corridor	-		-
Guide Floor	<ul style="list-style-type: none"> No guide floor material is provided. 		Guiding floor material is not there to guide visually impaired people.
Circulation	<ul style="list-style-type: none"> There is not enough circulation space. 		There is not enough circulation space to run mobility devices.
Door	<ul style="list-style-type: none"> Metal and wooden door is provided for the entrance. 		There is a step in front of the door so there is not enough landing space in front of the door so it is difficult for people with disabilities to enter through the door.
Textural Indication	<ul style="list-style-type: none"> There is no kind of textural indication. 		Visually impaired people suffer because there is no textural indication.
Evacuation	<ul style="list-style-type: none"> There is no provision for an Evacuation chair. 		There is no evacuation chair for mobility-impaired people, if any emergency happened then they might be face difficulty.

Conclusions: Emergency services aren't physically accessible to everyone, Because of the lack of architectural elements in the design, there is a need to provide at least a basic architectural building element with a proper ratio that gives access to built spaces for physically challenged people. This little bit of change can make their lives happier.

References: <https://pubmed.ncbi.nlm.nih.gov/32587166>

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STUDY OF VALUES ASSOCIATED WITH RURAL OPEN SPACES (VILLAGES OF WESTERN MAHARASHTRA)

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Abstract: The definition of open space varies according to the context in which it is situated. Open space in rural areas like agricultural land, coastal land, river bank, hills and hill slopes, temple and its surrounding etc. are most closely connected with the natural environment, tradition and culture of the land. These open spaces have values and significance in themselves and in their wider context. Open spaces are significant for public enjoyment, recreation and education. Values associated with Rural Open Spaces viz. Functional, Educational, Aesthetical, Ecological, Socio- cultural, Economic are important and interconnected. Use of these open spaces and their importance varies among people. Due to the urbanisation, human intervention and impact of calamities, characteristics and identity of the rural open spaces are changing. This issue evokes the sensitivity towards rural open spaces. Case study of villages in Western Maharashtra gives experience and insight into the issue which helps in summarising the importance of values associated with rural open spaces.

Keywords: Rural open space, values

1. Introduction:

Rural open spaces are of different variety and have special and different characteristics where people live, work and take part in social and recreational activity. Rural open spaces can be enriched with natural beauty and help to maintain the ecosystem. Some of these spaces have features which are valuable for archaeology. They may have history and have association with the local communities. Relation of people with rural open spaces changes over time period and their values varies among people.

This paper provides insight into the use of Open Spaces in the Villages of Western Maharashtra and summarises the significance of various values associated with Open Spaces.

1.1 Aim:

To study the values associated with open spaces in the Villages of Western Maharashtra.

1.2 Objectives:

1. To understand the rural open spaces in Indian Context.
2. To understand the rural open spaces in the context of Maharashtra.

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3. To identify and categorised the rural open spaces.
4. To study and analyse the activity associated with open spaces in the Villages of Western Maharashtra.

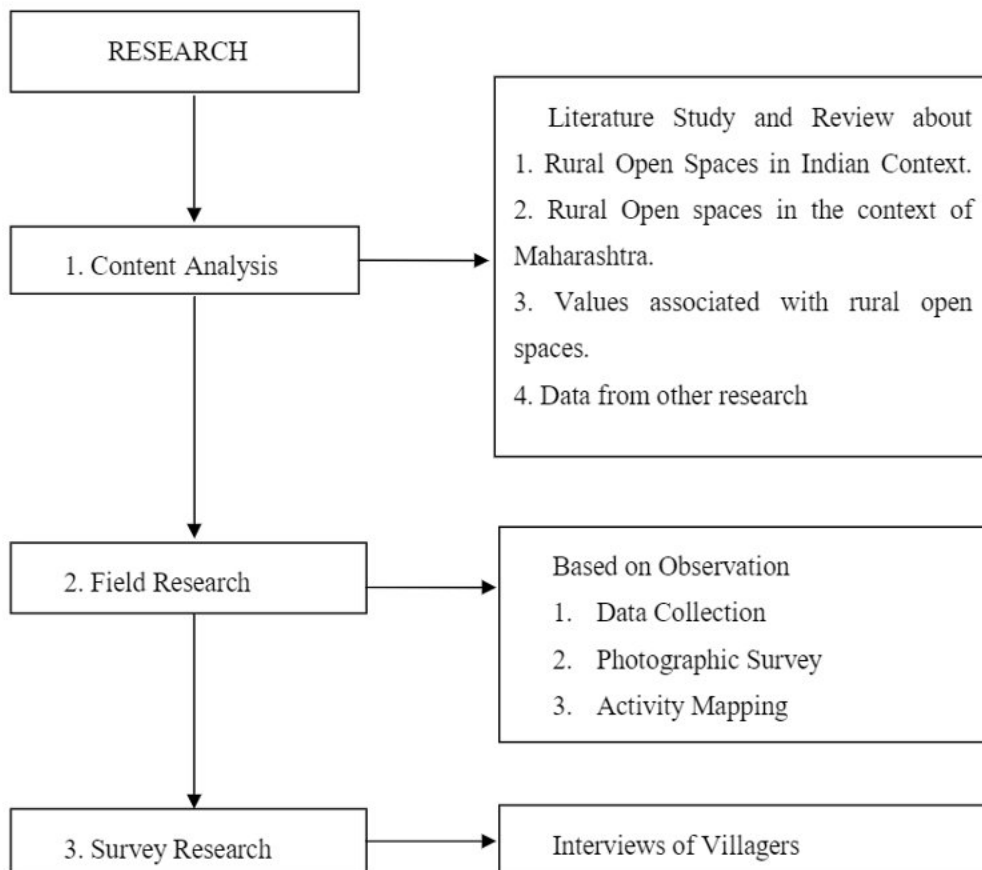
1.3 Research question:

- Which are the landscape values associated with rural open spaces?
- What is the significance of these values?

1.4 Scope and limitations:

- Scope of the study includes the study of Rural Open Spaces and its importance to the village communities.
- Study is limited up to the study of values associated with Rural Public Open Spaces in the villages of Western Maharashtra.

1.5 Research methodology:



2. Literature review

2.1. Indian villages – settlement and structure

Village is the basic unit of Rural society in India. The Vedic period in India prevailed approximately from 1500BC to 500BC. In this period Aryans emerged in the ancient land of India. Vedic civilisation was took place in the north and north western part of India, near the river Saraswati. Aryans cleared the forest near the Gangetic plains and settled down to form the Vedic civilisation. In the Vedic civilisation agriculture gained the importance, land and cattle became very important. By the end of the letter Vedic age, agriculture had become the main occupation of the Vedic Civilisation. Their involvement in agriculture led to the formation of village. Many villages together form the kingdom. These kingdoms later merged with each other to form large kingdom. The Vedic civilisation was highly organised at social as well as political level. From the Vedic period village is the basic unit of rural society in India. The caste system had emerged during the Vedic age which is still in practice in the villages. Group of families and collection of dwellings and cultivated land are the principal physical features of the villages.

2.2. Gandhian concept of rural development

Mahatma Gandhi as a visionary of India had a very clear perception of its villages and made an emphatic assertion that “India lives in her seven and half lakh of villages. He further believed that India will have to live in villages, not in towns, in huts not in palaces. He held this conviction by saying that, “If Villages perish, India will perish too”. Rural development as outlined by Gandhiji contained self sufficiency, Inter-dependence for other wants and development of village industries. Gandhiji’s ideal villages belong to the Pre-British period, when Indian villages were the small republics undisturbed by the periodical visitations of barbarious hordes. This republican character of the villages was destroyed by the British rule. Gandhiji aimed at the attainment of village Swaraj which is a complete republic, independent of its neighbours for its own vital wants and get interdependent for many others in which dependence is a necessity. Thus every village’s first concern will be to grow its own food crop and cotton for its cloth. It could have a reserve for its cattle, recreation and playground for adults and children. Then if there is more land available, it will grow useful money crops, thus excluding ganga, tobacco, opium and the like. The village will maintain a village theatre, school and public hall. It will have its own water works ensuring clean water supply. The village envisaged by Gandhiji could be constructed on the basis of the principles of public hygiene and sanitation. The houses which are to be built with locally available material will have sufficient light and ventilation. Each house or cottage shall have a courtyard to grow vegetables for domestic consumption and to house cattle. The village street and lanes will be kept clean.

Gandhiji was very keen to bring about maximum regional self-sufficiency in regard to food, clothing and shelter in rural areas. To solve poverty he emphasised not only agriculture but also cottage and small scale industries. He focused his attention on non agricultural aspects of the rural economy also. He wanted diversified economic activities in the villages and thus stood for all around development of rural India.

2.3. Villages in Maharashtra – Open Space Structure

Maharashtra the land of the Marathi speaking people located in the north centre of Peninsular India. Maharashtra is the third largest and most advanced state in India. Maharashtra falls into three broad geographic divisions. The Konkan is the coastal lowland running from just north of Bombay (Mumbai) to Goa. Inland from this area the Western Ghats, a line of hills that parallels the west coast of India.

Villages in Maharashtra are enriching by natural resources. A typical village in Maharashtra is a collection of mud-stone-and straw dwellings surrounded by agricultural fields. Agriculture is the basic source for livelihood. Few families are settled in the agricultural fields for convenience. Few villages are surrounded by mountain ranges. A local well or nearby pond or river provides water for most villages. Some larger villages have running water. A council of elected elders, called a panchayat, governs most villages. The panchayat has the power to hear complaints and administer punishments. Few villages in Maharashtra do not have proper approach road and public transport facilities and are dependent on other villages or nearby city for school and medical facilities. Temple premises are the space for celebrating various cultural and religious activities which facilitates social awareness through entertainment and help to develop the social bonding.

2.4. Categories and types of rural public open spaces

Rural open spaces can be categorised as follows

a) Open Space in Vicinity of Water Resources

- River bank / Ghats
- Stream , Lake
- Canal
- Dam / Back Water
- Well and its surrounding
- Public Water Supply

[http://en.wikipedia.org/wiki/Category:Villages in Maharashtra](http://en.wikipedia.org/wiki/Category:Villages_in_Maharashtra)

- b) Open Spaces for Social Interaction
- Main Road, Internal Lanes, Pathways
- Temple and its Surroundings
- Chawdi / Par
- School Ground
- Play ground, Health Club / Akhada
- Market Place
- Space for Fair, Religious Week

c) Virgin Open Spaces

- Hills and Hill slopes
- Scrub Land
- Grazing Yard
- Sacred Grooves
- Forest

2.5. Values associated with rural open spaces and its significance

- **Functional Value:** It is the service provided by open space and therefore prevention of open space is necessary eg. Protection of water quality, minimisation of soil erosion.
- **Aesthetical:** Aesthetic value can be easily understood by us when we experience the beauty of the open space. People admire natural open spaces and it relieves the work stress and hence protecting open space is important.
- **Ecological:** Open spaces supports the various local unique species of plant and animal and their association which are valuable and hence ought to be protected.
- **Socio cultural:** Open space eg. Temple and surrounding premises, river banks etc. provide space to relax, interact, play, engage in physical activities.

Economic: Many people visit forests, beaches, mountains, rivers, lakes, and streams for extended vacations or for shorter period for relaxation. These open spaces serve income generating activity. Agriculture fields forms the backbone of economic activity.
Natural Resource Management, PGDESD syllabus, IGNOU.

All these values are interconnected and its importance varies among people.

3. Case studies

Criteria for selection

Both cases village Dholwad and village Mandede are in Pune, Maharashtra so able to give visits to the villages and convenient for communication and understanding villagers feelings and their association with the open spaces.

Both spaces are different in location context, geographical features and natural surroundings. Both spaces have different open space structure and typology of open spaces which helps to gives insight and understanding of the subject.

Format for case study

- Regional Context
- Local Context
- Socio-cultural Context
- Ecological Context
- Present Open Space Structure of the Village
- Present Activity Pattern in the Village
- Visual Analysis of Open Spaces
- Analysis of Open Spaces

3.1 Case 1 – Village Dholwad

Location: - 100 Km. from Pune on Pune- Nashik Highway. Dholwad is a mid-sized (population is 3500 people) village located in Junnar taluka in the district of Pune in the state of Maharashtra.

3.1.1 Regional context

Village Dholwad is located in Pune region. Pune District is in the western region in Maharashtra in India. Pune district lies in the Western Ghats or Sahyadri mountain range and it extends on to the Deccan Plateau on the east. Pune stands on the leeward side of the Western Ghats.

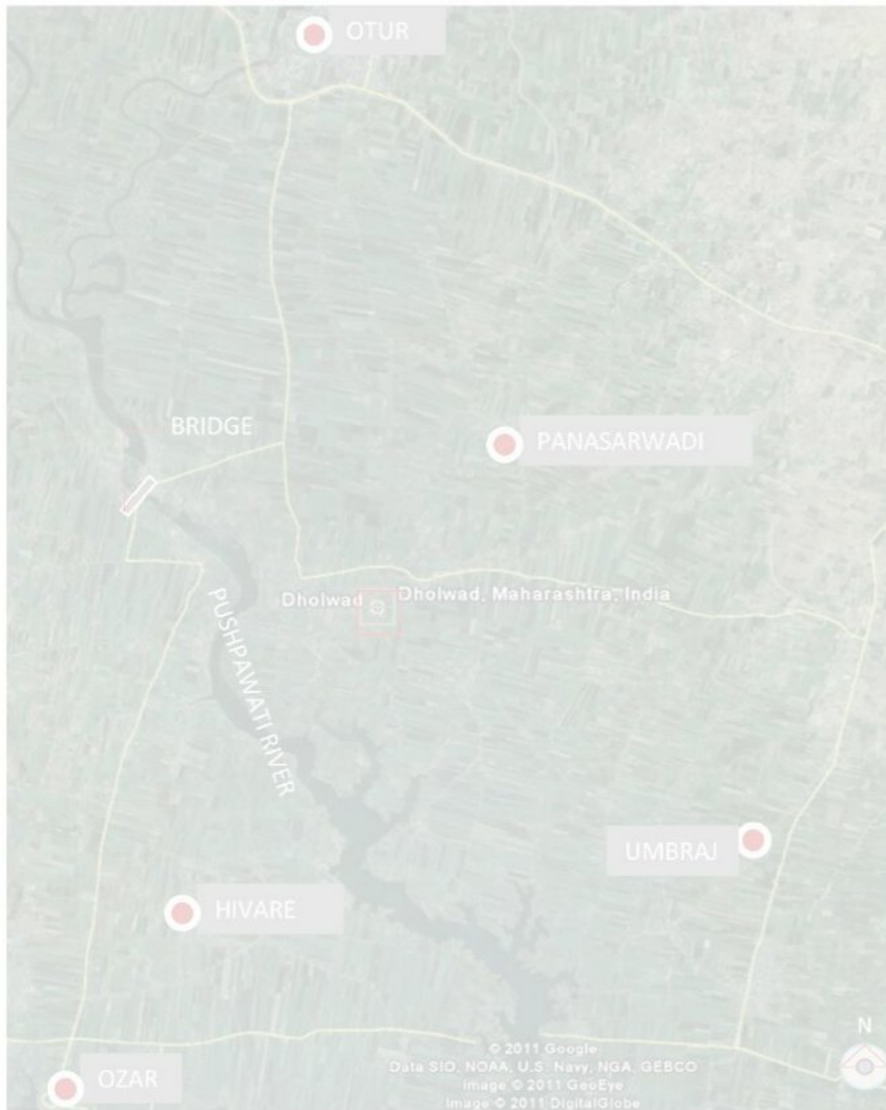


Fig.2 Local Context of Village Dholwad.

3.1.3 Socio cultural context

Village Dholwad is located on a East bank of River Pushpawati. Small Ghat is built on the river which is used for washing, drying. Previously ghat was also used for bathing but now every house has a gram panchayat water connection. Temples are built on the bank of river. Agriculture is the basic source for livelihood. Youngsters from the village do job/working in the Pune, as village is near from the Pune city and have many opportunities.

3.1.4 Ecological context

LAND: Village is enriched by river Pushpawati, a natural source of water which facilitates the agriculture. Most of the agricultural land is under cultivation of sugarcane crop.

WATER: Village is settled on the bank of the river. Previously river water was directly used for drinking purpose but now every house has a water connection in the house.

VEGETATION: Most of the land is under cultivation of crops. Various plants and bird species are found along the bank of the river.

3.1.5 Present open space structure

River Pushpawati flows north-south. Village Dholwad is settled along the east bank of the river. Village fields surround the settlement and are within walking distance. Dwellings in the village are built very close to one another with small lanes for passage of people and small vehicles. Village has nucleated settlement near the river. Along the river bank open space is assigned to temples and fair. Small ghat built on the river is used for washing clothes, cattle. Basic business is agriculture for the village; therefore dispersed settlements are seen in the farms. Dholwad is connected through horizontal linkages with other villages which are Ozar, Otur, Umbraj, Hivare, Pansarwadi.

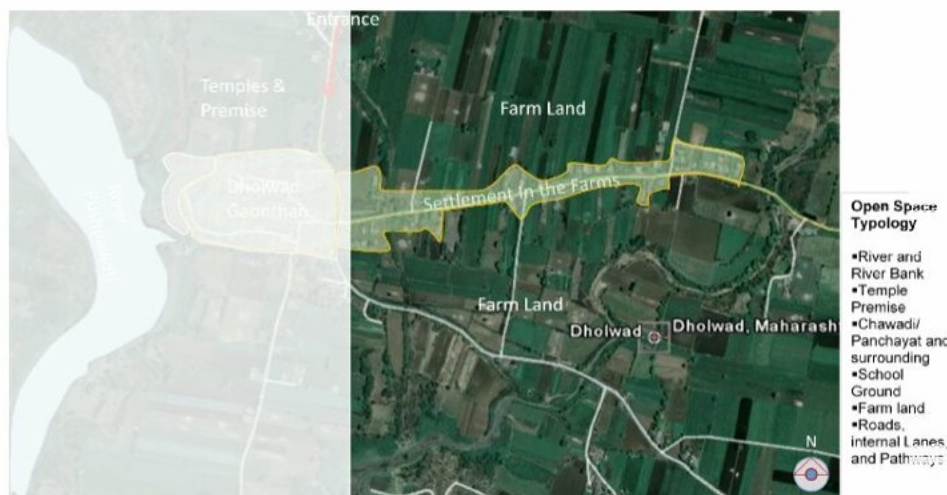


Fig.3 Open Space Structure of Village Dholwad

3.1.6 Present activity pattern

Major activity in the village is farming. Farm fields surround the nucleated settlement. For convenience and because of lack of space few families are settled in the fields along the road. An open space along the river is assigned for temples and religious activity and also for fair. Children use the open space in temple premises for playing. A ghat on the river is used by the village women for washing, drying and also relaxes for a while. Various religious activities are carried out in the temples and premises throughout the year.

Image source: Google earth



Fig.4-a Activity Pattern in Village Dholwad.

One of the temples built on the bank of river is the Goddess Malganga Temple. In Navratri a person from each house of the village is devoted for the worship of Goddess for nine days. The person is not allowed to go home and in the village and he have to live in the temple and temple premises in the service of god till Dashera. The person can go outside the village Dholwad from the periphery of the village but not from within the village. It is a rule in the village from long time and it is still carried out for nine days. On Dashera a tenth day of Navratra festival, a grand ritual takes place in the temple.



Fig.4-b Activity Pattern in Village Dholwad.

3.1.7 Visual analysis of open spaces



Fig.5 Way to the Village Dholwad



Fig.6 Entrance to the Village Dholwad



Fig.7 Central open space in front of the Panchayat Office



Fig.8 Way to the temples premises and to the Ghat on the River



Fig.9 Temple premise on the Bank of the River Pushpawati



Fig.10 Temples along the River Pushpawati

Photograph source: Visit to the village Dholwad, Junnar, Pune.

Pravara Rural College Of Architecture, Loni



Fig.11 River Pushpawati



Fig.12 Internal Lanes connecting dwellings and other open spaces



Fig.13 Chawadi and Panchayat Office



Fig.14 Primary and Secondary School Ground

Photograph source: Visit to the village Dholwad, Junnar, Pune

Pravara Rural College Of Architecture, Loni



Fig.15 Agricultural Fields








Fig.16 Linkages to the Agricultural Fields and to the other villages





Inferences from the visuals




- Variations in use of open spaces and user group .
- Landscape treatment is attempted for temple premise and locally available material is used (eg. Stone for steps).
- Two parts in the village, one is nucleated settlement and other is farm land.





3.1.8 Case Study – 1- Analysis






CASE STUDY - 01

3.1.8 ANALYSIS OF OPEN SPACES IN THE VILLAGE DHODWAD, JUNNAR, PUNE									
TYPES OF OPEN SPACES	VISUALS	ACTIVITY	NATURAL ELEMENTS ASSOCIATED WITH OPEN SPACES			VALUES ASSOCIATED WITH OPEN SPACES			
			LAND	WATER	VEGETATION	FUNCTIONAL	AEETHETIC	SOCIOCULTURAL	ECOLOGICAL
RIVER PUSHPAWATI AND RIVER BANK	 Sculptural land form along the river bank.  Ghat on the river	<ul style="list-style-type: none"> Small ghat built on the river is used for washing clothes and cattle's. In summer children and also men enjoy swimming in the river. 	<ul style="list-style-type: none"> Slightly sloping land towards river covered with vegetation creates sculptural quality along the bank. Top soil washed from the uplands to become the silt of the river. 	<ul style="list-style-type: none"> Free flowing river enrich the natural landscape of the village Dhodwad. River water is the major supporting element for agriculture. River is the natural drainage way. 	<ul style="list-style-type: none"> Dense natural vegetation along the river bank increase the scenic quality of the space and helps in soil stabilization and water retention. 	<ul style="list-style-type: none"> Microclimate moderation. Natural food source and habitat for birds and animals. 	<ul style="list-style-type: none"> Gives experience of natural landscape. Sight and sounds of water evoke a sense of pleasure. 	<ul style="list-style-type: none"> Provides outdoor recreational activities like swimming, community gathering, relaxing. The behavior of species (flora & fauna) gives villagers an important indications of events that are of social, environmental or agricultural significance. 	<ul style="list-style-type: none"> Soil and adequate water supply are essential to all living organism hence contributes in maintaining the ecosystem.
TEMPLE AND ITS SURROUNDINGS ALONG THE RIVER BANK	 Way to the Temple Premises.  God idols at the river bank  Open space for fair	<ul style="list-style-type: none"> Various religious activities are carried out in the temples and premises throughout the year. Part of the open space is assigned for fair which held in month of March-April otherwise it is cricket/football ground for children. 	<ul style="list-style-type: none"> Various temples are placed on a flat terrain along the river. This open space is connected with the upland core village with stone paved pathway and steps. 	<ul style="list-style-type: none"> Temples on the background of free flowing River Pushpawati gives picturesque quality to the space. 	<ul style="list-style-type: none"> Coconut trees planted along the pathway and steps leading to the temples creates avenue. Natural vegetation along the bank of the river temper the heat. 	<ul style="list-style-type: none"> It is a buffer zone between the river and village which facilitate various religious activity. 	<ul style="list-style-type: none"> Temples on the background of flowing river and riverside lush green vegetation gives the picturesque quality to the space. 	<ul style="list-style-type: none"> Facilitates the community gathering through religious and cultural activities and help to enhance the social bonding. Through these activity traditional local rituals and social customs are forwarded to the next generation. 	<ul style="list-style-type: none"> Religious beliefs associated with natural elements helps in their conservation.

3.1.8 ANALYSIS OF OPEN SPACES IN THE VILLAGE DHOLWAD, JUNNAR, PUNE									
TYPES OF OPEN SPACES	VISUALS	ACTIVITY	NATURAL ELEMENTS ASSOCIATED WITH OPEN SPACES			VALUES ASSOCIATED WITH OPEN SPACES			
			LAND	WATER	VEGETATION	FUNCTIONAL	AEETHETIC	SOCIOCULTURAL	ECOLOGICAL
CHAWATI	 Chawati  between the Panchayat Office and Panchayat office	<ul style="list-style-type: none"> It is a place for every day gathering of male community for reading news paper, chatting and discussions. A council of elected elders called Panchayat hear the complains, social issues and give the decision. 	<ul style="list-style-type: none"> Open space in the core of village surrounded by houses. 		<ul style="list-style-type: none"> Quality of the space is govern by a Pipal tree 	<ul style="list-style-type: none"> Space for community gathering. 	<ul style="list-style-type: none"> Central access leads to the village at one side and at another side leads to the agricultural fields is adorned by trees with tree pits (Chawati) at the entrance. 	<ul style="list-style-type: none"> It is a place for social gathering especially for men community. In case of any complaint, social issue whole village is gathered in the central open space to hear the decision taken by the Panchayat. 	<ul style="list-style-type: none"> Two canopy trees at the entrance temper the heat. Villagers and visitors relax for a while under the tree.
SCHOOL GROUND	 Primary School and school Ground  Secondary School	<ul style="list-style-type: none"> Ground is used for P.T. to the school children. Children play on the ground before school and after school after the recess. Children play on the ground on Sunday and also in the vacations. 	<ul style="list-style-type: none"> Primary school is very near from the entrance to the village. School ground which is a rammed earth is enclosed by the tree. Newly developed secondary school is surrounded by agricultural field. 	<ul style="list-style-type: none"> Gram Panchayat water supply to the school. 	<ul style="list-style-type: none"> Ashoka trees provide the enclosure to the Primary School ground. It acts as a visual, sound barrier and temper the heat. Secondary school ground is also enclosed by tree which is in front of the school building and surrounded by agricultural fields. 	<ul style="list-style-type: none"> School ground provides free play area to children to explore various games and it contributes to their physical developments. 	<ul style="list-style-type: none"> School grounds are enrich with the natural surroundings which relieves the stress and set the mood. 	<ul style="list-style-type: none"> Farther ground with natural surroundings provides a space to children for playing, learning sharing which helps children to socialize 	<ul style="list-style-type: none"> Farther ground surrounded by natural landscape with minimum human intervention does not create any bad impacts on ecosystem.

3.1.8 ANALYSIS OF OPEN SPACES IN THE VILLAGE DHOLWAD, JUNNAR, PUNE									
TYPES OF OPEN SPACES	VISUALS	ACTIVITY	NATURAL ELEMENTS ASSOCIATED WITH OPEN SPACES			VALUES ASSOCIATED WITH OPEN SPACES			
			LAND	WATER	VEGETATION	FUNCTIONAL	AESTHETIC	SOCIOCULTURAL	ECOLOGICAL
AGRICULTURAL FIELDS		Farming is the major activity in the village.	Farm fields surrounds the nucleated settlements. Few families are settled in the fields.	Presence of flowing river facilitates the farming. Natural lakes in the fields make the farming easy.	Due to the availability of water main crop is sugar cane in the village. Seasonal crops (Wheat, Rajan, Ground nut, vegetables) are also cultivated in the fields.	Agricultural fields and presence of water make the village self sustainable. Source of food and timber.	Nucleated village settlements surrounded by agricultural fields with presence of river and lakes give the experience of natural landscape.	In winter in the village Punam festival celebrates diversity of crops when food prepared from their farms are offered to the village goddess in gratitude for showering her blessings for a diverse harvest.	Presence of water and vegetation temper the heat. Extensive farming may cause soil erosion, loss of soil and increase in sedimentation in the river. Pushpawati.
									
GRAZING YARD		Cattle grazing	Crops grown on fields which are not under crop cultivation is provides the grazing yard. Vegetation along the river bank and along the road is also a preferred option for grazing.	Vegetation grown in the rainy season is the best for cattle.	Some time cattle are purposely left free in the agricultural field for grazing so that fields get cleared off for crop cultivation.	Varied grasses with varied shades of green is visual pleasure in the rainy season.	Milk of the cattle which are left free for grazing is considered to be healthy and good for human consumption than the milk of the cattle who eat grass in the shed.	Open spaces which are used as grazing yard supports significant biodiversity.	

3.1.9 ANALYSIS OF OPEN SPACES IN THE VILLAGE DHOLWAD, JUNNAR, PUNE									
TYPES OF OPEN SPACES	VISUALS	ACTIVITY	NATURAL ELEMENTS ASSOCIATED WITH OPEN SPACES			VALUES ASSOCIATED WITH OPEN SPACES			
			LAND	WATER	VEGETATION	FUNCTIONAL	AESTHETIC	SOCIOCULTURAL	ECOLOGICAL
CREMATORIUM	 	Farming is the major activity in the village.	Cremation ground is located near river. It is a barren land with some seasonal vegetation around it.	After cremation rituals related with water are carried out along the river bank.	In the premises of cremation ground trees of Babool are seen.	Agricultural fields and presence of water make the village self sustainable. Source of food and timber.	After cremation people take bath in the river which is ritual. Till three days various rituals take place in which flowing river have the importance.	Due to the cremation there is no vegetative growth in and around the cremation ground.	
MAIN ROAD, INTERNAL LANES, PATHWAYS	 	Connectivity and movement.	Dholwad is connected through roads with other villages which are Ozar, Olur, Unluraj, Hware, Pansarwadi.	Nalas/ stream along road with dense vegetation.	Roads are adorn by the roadside agricultural fields.	Road facilitate the pedestrian and vehicular movement in the village and to the surrounding villages and Pune city.	Free flowing roads with natural surrounding creates interest in the movement.	Connectivity within the village and with other villages and to the city provides scope of interaction and information.	External roads are of tar which exerts heat. Vehicular movements may affect the wild species (flora and fauna).

3.1.8 ANALYSIS OF OPEN SPACES IN THE VILLAGE DHOLWAD, JUNNAR, PUNE									
TYPES OF OPEN SPACES	VISUALS	ACTIVITY	NATURAL ELEMENTS ASSOCIATED WITH OPEN SPACES			VALUES ASSOCIATED WITH OPEN SPACES			
			LAND	WATER	VEGETATION	FUNCTIONAL	AESTHETIC	SOCIOCULTURAL	ECOLOGICAL
RIVER PUSHPAWATI AND RIVER BANK	 <p>Scrubland along the river</p>  <p>Ghat on the river</p>	<ul style="list-style-type: none"> • Small ghat built on the river is used for washing clothes and cattle's. • In summer children and also men enjoy swimming in the river. 	<ul style="list-style-type: none"> • Slightly sloping land towards river covered with vegetation creates sculptural quality along the bank. • Top soil washed from the uplands to become the silt of the river. 	<ul style="list-style-type: none"> • Free flowing river enrich the natural landscape of the village Dholwad. • River water is the major supporting element for agriculture. • River is the natural drainage way. 	<ul style="list-style-type: none"> • Dense natural vegetation along the river bank increase the sonic quality of the space and helps in soil stabilization and water retention. 	<ul style="list-style-type: none"> • Microclimatic moderation. • Natural food source and habitat for birds and animals. 	<ul style="list-style-type: none"> • Gives experience of natural landscape. • Sight and sounds of water evoke a sense of pleasure. 	<ul style="list-style-type: none"> • Provide outdoor recreational activities like swimming, community gathering, relaxing. • The behavior of species (flora & fauna) gives village an important indication of events that are of social, environmental or agricultural significance. 	<ul style="list-style-type: none"> • Soil and adequate water supply are essential to all living organism hence contributes in maintaining the ecosystem.
TEMPLE AND ITS SURROUNDINGS ALONG THE RIVER BANK	 <p>Way to the Temple Premises</p>  <p>God idols at the river bank</p>  <p>Open space for fair</p>	<ul style="list-style-type: none"> • Various religious activities are carried out in the temples and premises throughout the year. Part of the open space is assigned for fair which held in month of March/April otherwise it is cricket/football ground for children. 	<ul style="list-style-type: none"> • Various temples are placed on a flat terrain along the river. This open space is connected with the upland core village with stone paved pathway and steps. 	<ul style="list-style-type: none"> • Temples on the background of free flowing River Pushpawati gives picturesque quality to the space. 	<ul style="list-style-type: none"> • Coconut trees planted along the pathway and steps leading to the temples creates avenue. Natural vegetation along the bank of the river temper the heat. 	<ul style="list-style-type: none"> • It is a buffer zone between the river and village which facilitate various religious activity. 	<ul style="list-style-type: none"> • Temples on the background of flowing river and riverside lush green vegetation gives the picturesque quality to the space. 	<ul style="list-style-type: none"> • Facilitates the community gathering through religious and cultural activities and help to enhance the social bonding. • Through these activity traditional local rituals and social customs are forwarded to the next generation. 	<ul style="list-style-type: none"> • Religious beliefs associated with natural elements helps in their conservation.

3. Case studies

3.2 Case 2 – Village Mandede

Location: - 45 Km. from Pune on ahead from Paud village. Mandede is a small village(population is 1200 people) located in Mulshi taluka in the district of Pune in the state of Maharashtra.

3.2.1 Regional Context

Village Mandede is located in Pune region.

3.2.2 Local Context

Village is surrounded by hills from South West and North West. Adjacent village to the Mandede is Andeshe. The way to Mandede is from village Paud in Mulshi taluka.

2011Google- Map Data @ 2011 Europa Technologies



Fig. 17 Mandede located in Pune region in Western Maharashtra, India.



Fig. 18 Local context of village Mandede *Image source: Google earth*

3.2.3 Socio Cultural Context

Settlement within the village Mandede is divided in six divisions depending on the cast and location in the village and according to that name is given and also from the features in the settlement. The divisions are Malwadi, Dhumal Wadi (settlement of people having surname Dhumal), Jeeva Veer Wadi (settlement of people having surname Veer), Parakhe Wadi, Ram Wadi (settlement of Matang people with temple of Lord Rama, Datta Wadi (settlement with temple of Lord Datta), and settlement of Harijan. Various religious and cultural activities are carried out in the village. Agriculture is the basic source for livelihood. Youngsters from the village works in the Pune city. Within the village there are three schools, two of which are primary schools and one is up to standard seventh. For further study the children have to go to Khechre Dairy (which is out of the village and have school up to standard tenth) or to Paud village (school up to standard twelfth).

Village do not have public transport facility. Market place is at village Paud. Village has small provision stores but for buying fruits, vegetables and medicines they have to go to the village Paud.

3.2.4 Eological Context

LAND: It is a sloping terrain surrounded by hills. Slope is from South West and North West. Hill slopes are covered with natural vegetation and other land is under cultivation of rice. Few land from the village is bought by the outsiders for farmhouses.

WATER: A natural stream coming flowing from the hills is the main source of water for the village. Slowly the stream got dry in the summer. Wells constructed along the stream are the source of water for agriculture and from the wells water is uplifted to the overhead water tank which is constructed in Ramwadi and from the water tank water is distributed to the whole village for domestic purpose. In the summer from month of March to May villagers suffer from the shortage of water.

VEGETATION: Hill slopes are enriching by natural vegetation. Mango plantation is the main money giving crop for the villagers. Rice crop is cultivated on the farmland. Cultivation of crop is depends on the rain.

3.2.5 Present Open Space Structure

Village Mandede is surrounded by hills from South-West and North-West. Village has dispersed settlements surrounded by the agricultural fields. Settlements and agricultural fields are connected by pathways. Dwellings in the villages made up of mud, brick are built very close each other with small lanes for passage of people. Stream flows from the hills is the main source of water for village.



Fig. 19 Open Space Structure of village Mandede

3.2.6 Present Activity Pattern

Village settlements are divided in six divisions. Settlements are surrounded by agricultural fields. Farming is the major activity in the village which is dependent on rain water. Mango is the money giving crop in village which has sell out of the village and other crop is rice which also has demand in the city. Rice crops are cultivated in the month of June and after four months crop is ready for cutting. Raw rice is then taken to the mill for final product. Various cultural and religious activities are taken place in the temple premises. In the temple of Lord Rama Ramnavamee is celebrated with a five days reading of religious scriptures. Village has school up to standard seventh; children have to go to Paud village or Pune for further study.

3.2.7 Visuals of Open Spaces in the village Mandede



Fig. 19 Way to the Village Mandede



Fig. 20 Mango Plantation and Rice Farms Adorn Road



Fig. 21 Village is Surrounded by Hills



Fig. 22 Stream Flowing Through the Village



Fig. 23 Use of Stone for Construction



Fig.24 Sanitation

within Settlement



Fig. 25 Internal Lanes within Settlements



Fig. 26 Use of Natural Resources in the Village



Photograph source: Visit to the village Mandede, Mulshi, Pune



Inferences from the visuals


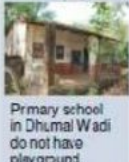


- Village is enriched by natural surroundings which is picturesque and refreshing.
- Dispersed settlements surrounded by farm land.
- Use of locally available materials (eg. Wood, stone, rice staw) for building houses.
- Use of wood as a fuel.
- Human interventions are limited in natural landscape.

3.2.8 Case Study -2- Analysis

CASE STUDY - 02

3.2.8 ANALYSIS OF OPEN SPACES IN THE VILLAGE MANDEDE, MULSHI, PUNE									
TYPES OF OPEN SPACES	VISUALS	ACTIVITY	NATURAL ELEMENTS ASSOCIATED WITH OPEN SPACES			VALUES ASSOCIATED WITH OPEN SPACES			
			LAND	WATER	VEGETATION	FUNCTIONAL	AESTHETIC	SOCIOCULTURAL	ECOLOGICAL
HILLS AND HILL SLOPES	 <p>Hills and hill slopes gives the spatial character to the village.</p>	<ul style="list-style-type: none"> -Cattle are taken to the hill slopes for grazing. -Wood as a fuel is collected from hill slopes and surrounding. 	<ul style="list-style-type: none"> -Hills surrounding the village gives enclosure to the village. 	<ul style="list-style-type: none"> -Hills maintain the water flow in the stream which is the main source of water for village. 	<ul style="list-style-type: none"> -Vegetation on the hills and hill slopes captures and slowly releases huge amount of water during non rainy period. 	<ul style="list-style-type: none"> -Provide water and soil. -nursing crop fields both in hills and plains by providing soil and nutrients. -Contributes to pollution control and climate moderation. -Support biodiversity. 	<ul style="list-style-type: none"> -Gives experience of beauty of nature. -Natural surroundings relieves work stress. 	<ul style="list-style-type: none"> -Provide outdoor recreational activities like trekking, hunting. -The behavior of species (flora & fauna) gives villagers an important indications of events that are of social, environmental or agricultural significance. 	<ul style="list-style-type: none"> -Provide habitat for birds, pollinators, soil organisms. Maintain biodiversity. -Moderate weather extremes and impacts.
STREAM	 <p>Source of water for village</p>	<ul style="list-style-type: none"> -Major natural source of water for village.  <p>Crematorium along the stream</p>	<ul style="list-style-type: none"> -Flowing from the hilly terrain. 	<ul style="list-style-type: none"> -Flowing stream provide the water for domestic and agricultural purposes. 	<ul style="list-style-type: none"> -Vegetation along the stream support biodiversity. 	<ul style="list-style-type: none"> -Source of water for village. -Protecting watershed for downstream irrigation and water supply installations. 	<ul style="list-style-type: none"> -Gives visual pleasure. -Rhythmic sound set the mood and gives listening pleasure. 	<ul style="list-style-type: none"> -After cremation rituals are carried out along the stream. 	<ul style="list-style-type: none"> -Support variety flora and fauna.

ANALYSIS OF OPEN SPACES IN THE VILLAGE MANDEDE, MULSHI, PUNE									
TYPES OF OPEN SPACES	VISUALS	ACTIVITY	NATURAL ELEMENTS ASSOCIATED WITH OPEN SPACES			VALUES ASSOCIATED WITH OPEN SPACES			
			LAND	WATER	VEGETATION	FUNCTIONAL	AESTHETIC	SOCIOCULTURAL	ECOLOGICAL
AGRICULTURAL FEILDS	 <p>Rice Farms and Mango Plantation</p>	<ul style="list-style-type: none"> -Farming is the basic source of livelihood. -Agricultural fields are taken by outsiders for developing the farmhouses. 	<ul style="list-style-type: none"> -Village settlements are surrounded by agricultural fields. -Few farmhouses are maintained and in use and others are not maintain and lands are barren. 	<ul style="list-style-type: none"> -Wells constructed along the stream support s the farming 	<ul style="list-style-type: none"> -Mango is the money giving crop in the village which is the source to fulfilled the need of other food grains by mode of exchange. -Other crop cultivated in the village is rice which is dependent on rain water. 	<ul style="list-style-type: none"> -Source of food and timber. 	<ul style="list-style-type: none"> -Varied shades of green gives visual pleasure. -Natural surroundings relieves work stress. 	<ul style="list-style-type: none"> - when food grains (any product from the farm) are prepared from the farms, it is offered to the village goddess in gratitude and then it is taken to sell. 	<ul style="list-style-type: none"> -Temperature moderation. -Use of pesticides in the farm degrade the soil and water quality. -Harmful for wild life. -Change in land use affect the ecosystem.
TEMPLE AND ITS PREMISES	 <p>Ram-Krishna mandir in Dhumal Wadi</p> <p>Ram Mandir in Ramwadi</p>	<ul style="list-style-type: none"> -Religious and cultural activities are carried out in the temple and its premises. Ex. Reading of religious scripture for a week on Ramnavamee. Fair is held in the premises of temple of Goddess Khairai on the birthday of lord Hanuman. 	<ul style="list-style-type: none"> -Temples are located in the settlements which are divided in six divisions. 	-	<ul style="list-style-type: none"> -Mango trees and trees with good canopy are seen in the temple premises. 	<ul style="list-style-type: none"> -Place for religious and cultural activities. 	<ul style="list-style-type: none"> -Gives visual pleasure. -Rhythmic sound set the mood and gives listening pleasure. 	<ul style="list-style-type: none"> -Facilitates the community gathering through religious and cultural activities and help to enhance the social bonding. -Through these activity traditional local rituals and social customs are forwarded to the next generation. 	<ul style="list-style-type: none"> -Religious beliefs associated with natural elements helps in their conservation.

3.2.8 ANALYSIS OF OPEN SPACES IN THE VILLAGE MANDEDE, MULSHI, PUNE									
TYPES OF OPEN SPACES	VISUALS	ACTIVITY	NATURAL ELEMENTS ASSOCIATED WITH OPEN SPACES			VALUES ASSOCIATED WITH OPEN SPACES			
			LAND	WATER	VEGETATION	FUNCTIONAL	AESTHETIC	SOCIOCULTURAL	ECOLOGICAL
SCHOOL GROUNDS	 <p>Primary school in Ramwadi have ground for PT and play</p>  <p>Primary school in Dhimal Wadi do not have playground.</p>	PT. and prayer is conducted on the ground. Children enjoy playing on ground before school and in the recess.	-School ground is a rammed earth and enclosed by compound wall and surround or by natural vegetation	-School have Grampanchayat water connection	-Schools are surrounded by natural vegetation	-School grounds provides play area without equipment to explore various games and contributes to the physical development.	-School ground are surrounded by natural settings which relieves the stress and set the mood.	- Earthen ground with natural surrounding provide a space for children to explore various games, space for interaction sharing which helps to socialize.	Earthen grounds surrounded by natural environment with minimum human intervention does not creates any bad impacts on ecosystem.
MAIN ROADS, INTERNAL LANES AND PATHWAYS	 <p>Road to Manduke</p>  <p>Pathways within the settlement:</p>	Connectivity and movement	Linkages on hilly terrain creates interest.	Stream along the road with vegetation.	Roads are adorned by road side mango plantation and agricultural fields	Road facilitates the pedestrian and vehicular movement in the village and to the surrounding villages and Pune city	Curvilinear roads on the hilly terrain creates interest in the movement	Roads and pathways connects the settlements which are dispersed in six divisions which provide the scope of interaction and information, helps to enhance social bonding.	External road is of less interest otherwise all other internal linkages are of more interest creating minimum impacts on natural surrounding.

4. Inferences

- Scale and Typology of Open Spaces

Variation in scale of open spaces is observed (chawadi/ panchayat to river and river bank, school ground to hills and hill slopes). Villages have various types of open spaces most of which are enriched by natural elements with minimum /without human intervention. Usage and user group of these open spaces changes as per time in a day.

Activity pattern in the villages is governed by the type of open space, its location in the village and its usage.

- Association with Natural Element

Indigenous people/villagers still basically rely on wild and traditionally cultivated plant species to supply their needs in terms of food, fibre, fuel wood, wood for houses, medicinal plant etc.

Mountains/hills and their vegetation surrounding the villages provide water and soil to the villages and also contributes to pollution control and climate stabilisation by carbon sequestration. (Carbon sequestration refers to the provision of long term storage of carbon in the terrestrial

communities/ecosystem so that carbon dioxide build up in the atmosphere gets reduced or slows down)

- Relationship with Culture

In village culture species and nature have inspired songs, superstitious beliefs, stories and folktales, dance and drama, poetry, traditional crafts, local rituals, names of places and even family names.

In the villages, behaviour of species (flora and fauna) gives villagers an important indication of events that are of social, environmental or agricultural significance. eg. If insect Murugan is seen then it is considered as vehicle of the God Murugan and it indicates that it will rain soon.

- Landscape Treatment and Material

Special thought or efforts are not given for the landscape development of open spaces. Locally available materials are used for landscape treatment.

eg. Stones are used for constructing tree pit/chawadi, bund in the field, retaining wall etc.

- Threats

Replacement of indigenous varieties of crop species with new hybrids that are higher yielding but less resistant to pests, local conditions and need more fertilisers. Fertilisers, pesticides used in agricultural fields degrade the soil and water resources by sedimentation. It is also harmful to many wild animals.

As many villages are enrich by natural surroundings, people from the nearby cities invests in land as a site for development schemes for human settlements, it changes the land use. It destroys the existing ecosystem. Changes in land use changes the level of atmospheric carbon dioxide which cause the climate change followed by invasive species and air pollution.

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