

**TOWN CENTER -
AN APPROACH TO REINSTATE TRANQUEBAR**

THESIS REPORT

Submitted by

SOWMYA. P (17136003)

**Under the guidance of
DR. KIRUTHIGA**

in partial fulfillment for the award of the degree of

B. ARCH (Bachelor of Architecture)



**SCHOOL OF PLANNING ARCHITECTURE AND
DESIGN EXCELLENCE**



MAY 2022

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BONAFIDE CERTIFICATE

Certified that the Thesis titled “Town center – an approach to reinstate Tranquebar” is the bonafide work of Ms. **SOWMYA. P (17136003)** who carried out the Thesis work under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other thesis on the basis of which a degree or award was conferred on an earlier occasion on this or any other UG student.

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1. THESIS – A SEARCH

1.1 AREA OF INTEREST

Heritage means any object that has been inherited over time. Heritage is not something restricted only to architectural monuments or remains of old pottery or literature or a few old coins. Heritage can be defined as clues that lead us to a bygone era. They can provide us a wealth of knowledge to learn from, about the lifestyles and challenges that our ancestors had to cope with. Heritage can take the following three forms – **Natural, Socio-cultural and Architectural**. The latter being man-made. While the natural and architectural heritage are tangibles, socio-cultural is the intangible tradition and customs that have been passed down the generations. Thus, to remain connected to the past becomes important for the vast information and knowledge.

India, our country, has a wealth of culture and heritage strewn in every square inch of its land. For posterity to feel the same sense of pride and belonging, it's important to preserve. Preserve, not only the natural resources but also historic relics in any way possible, books, photographs and more effectively, physically. This very fact of existence of the age-old relics can instil values for the future generations through time-less qualities. In India, preservation and conservation attempts have begun a few decades ago, some have been successful while the rest of them due to beauracritic red tapism have let the historic monuments face deterioration and thoughtless demolition to make way for “development”. This gradual erosion of heritage and valuable ancient knowledge needs to be controlled by more effective measures and more importantly with the help of charges and enthused participation of the natives, as it is they, who experience the culture first hand and thus can feel for the conservation process more intensely. This feeling must eventually find the right kind of procedural strategy to materialize the intangible.

In this backdrop, **Tranquebar/ Trankebar/ Tarangambadi** serves a very good example of negligence leading to destruction and deterioration of heritage.

1.2 REASON OF CHOICE

Tarangambadi is a small fishing town on the Coromandel Coast, Nagapattinam district, Tamil Nadu. It is often called as the Queen of the Coromandel Coast. Etymology of the name suggests **Tarangam-** means waves in ancient Tamil and Sanskrit, **-padi** could mean a village or singing in Tamil. Thus, the name could be translated as ‘The wave village’ or ‘The singing waves’.

In the 17th century, the Danish East India Co., headed by admiral **Ove Gjedde**, acquired trading rights from the ruler, **Raja Raghunath Nayak**. Ove Gjedde initiated the construction work for the newly acquired colony called

Trankebar/Tranquebar. He began with the **Dansborg Fort**, the 2nd biggest Danish fortification in the world (1st biggest is in Copenhagen). This was followed by several other buildings for residential and religious purposes such as the **Zion Church**, the **New Jerusalem Church** etc., Being a trading post, the town saw the confluence of various races and communities. Today, it is a small, quaint town where Hindus, Muslims and Christians live in a closely knit traditional settlement.

Trankebar is testament to the Danish culture in the Indian sub-continent for the past 400 years and this makes it unique among the other traditional Indian settlements. The town assumes great importance for the Danes and the Indians alike. Apart from the architectural marvels, the town exhibits cultural diversity and a unique coastal fringe. It has been proved to be one of the world's fewest **Ozone-rich beaches**.

Such a town years to be preserved and restored. The lack of funds primarily and secondly lack of public and government support impede the process of restoration. This town has been victim of managerial **negligence**, incompetence and natural disasters such as **Tsunami** and numerous cyclones, at the cost of losing not only the lives and livelihood of the inhabitants but also centuries of heritage that dates back to the Dravidian kings, the Islamic rulers, the Danish and the British colonizers. There is a need to preserve and restore individual buildings but more importantly to rejuvenate the town to its past glory of a 'prosperous trading post'. This should be the ultimate goal as this will ensure that both the culture and the lives of the people, who are constantly struggling to make ends meet, are restored.

1.3 THE PROJECT – SEARCH HYPOTHESIS

Trankebar was announced as a heritage town to be promoted for rural tourism by the Government of Tamilnadu in the year 1993. Here it becomes important to re-assess and rediscover the town as it lacks basic infrastructure for the residents, leave alone tourism. The town provides a perfect canvas for architectural challenges in the light of heritage being taken to the next dimension. It would be interesting to draft observations and conclusions through architectural explorations of how a new layer added to the existing fabric could add or restore the town's glory. The search here would be to conceive a vision for the future of Trankebar which is in a state of flux, making way for progress.

1.4 AIM

The project aims at proposing a Town center that acts as a new node that facilitates the town's day to day lifestyle and improves the tourism potential that the town is striving to achieve.

1.5 OBJECTIVE

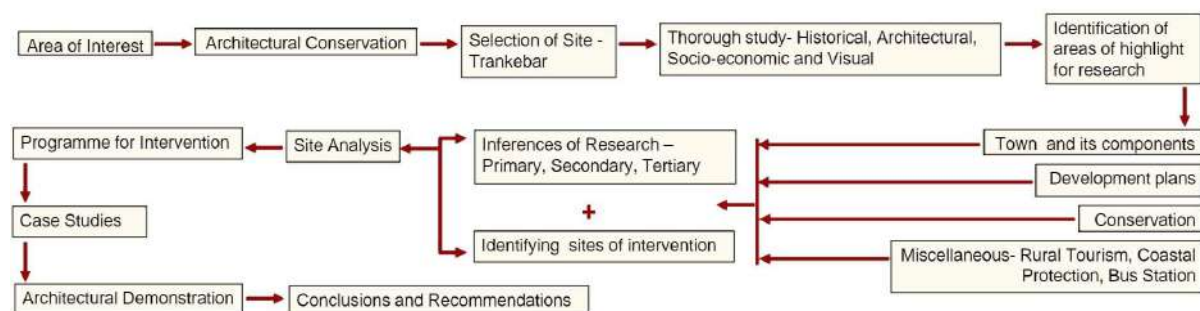
1. To reinstate the historical importance of the town through study that can provide clues for future development.
2. Regenerate the cultural resonance by adopting the philosophy of Conservation and develop the town as a prospective revenue generator through tourism and hence uplift the general standard of living of the town dwellers.
4. Re-architect the day to day lives of the citizens of this sleepy town as a result of the above attempts.

1.6 INFERENCES

- The area of interest for this thesis lies in heritage conservation and development of heritage town.
- The project has been sited in a heritage tow called Trankebar, a fishing town in Nagapattinam, Tamilnadu.
- The project deals with the design of a new town centre that aims at becoming a new identity for the town of Trankebar.
- The search in the project is the process of designing, in a historic setting. That will become a landmark for the future.
- By attempting to resolve issues related to the town both in terms of conservation, tourism and community needs it accounts to be more than a project.

1.7 METHODOLOGY

The following diagram shall briefly summarize the methodology adopted to carry out the whole process.



1.8 PROJECT PROPOSAL: NEW TOWN CENTRE

- ❖ Taluk headquarters
- ❖ Tourist information Centre
- ❖ Guest house with banquet hall and catamaran boating
- ❖ Market: Retail shops, departmental store and a fish auction space.

2. LITERATURE STUDY

2.1 GEO-PHYSICAL CHARACTER

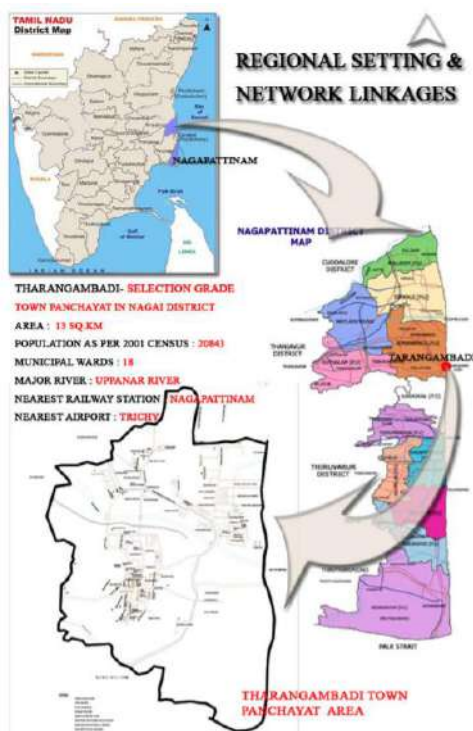
2.1.1 LOCATION

Longitude 79° east Latitude 11°05 north Tarangampadi lies along the east coast of Tamil Nadu in Nagapattinam district. Tarangampadi is at a distance from Chennai, Pondicherry, Nagapattinam and Karaikal are 296 Kms, 125 Kms, 48 Kms and 15 Kms respectively. It is about 30 Kms south-east of Mayiladuthurai, 45 Kms south-east of Chidambaram.

The town is bounded by Manikapangu village in the north, N.H 45A road or the East Coast Road (ECR) on the west. On the south and the east are the natural boundaries – the Uppanar river and the Bay of Bengal respectively, marking the town's limits.

2.1.2 REGIONAL SETTING AND NETWORK LINKAGES:

It is located at a distance of 35 Km north of Nagapattinam and 100 Km south of Pondicherry abutting the Bay of Bengal. Tharangambadi is located on the National Highway (NH 45A) connecting Pondicherry and Nagapattinam. It lies 15 kms north of Karaikal, near the mouth of a tributary named Uppanar of the Kaveri river.



Tharangambadi is well connected with Nagapattinam, the district head quarters and Chennai, the state head quarters and with other towns of Karaikal, Cuddalore and Velankanni by road transport facilities. The main mode of transportation is buses operated mainly by Government Transport Corporation and by some private agencies. The nearest airport is located in Trichy at a distance of 128 Km. Tharangambadi itself has one railway station connecting Tharangambadi and Mayiladurai but not in much usage as on today. The total road Length within Tharangambadi is 44.043 Km.

Fig 2.1.2 “Regional setting & network linkages of Tharangambadi”

2.1.3 CLIMATE

2.1.3.1 TEMPERATURE

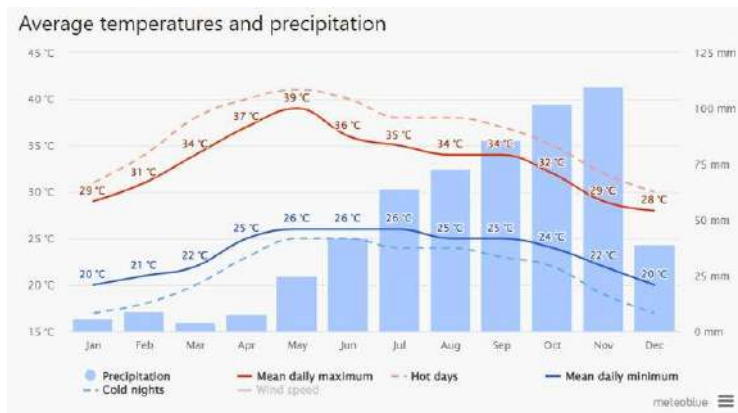


Fig 2.1.3.1 “Average temp & precipitation”

This town experiences a hot and humid climate. The mean monthly maximum is 37.1deg C (June – July). The humidity is very high and the relative humidity varies from 60% to 89% in the month of June.

The "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Tharangambadi. Likewise, "mean daily minimum" (solid blue line) shows the average minimum temperature. Hot days and cold nights (dashed red and blue lines) show the average of the hottest day and coldest night of each month of the last 30 years.

2.1.3.2 RAINFALL

Heavy rain occurs during north east monsoon season. The mean annual rainfall is about 100mm, receiving a heavy rainfall between the months of October and December. The Northeast monsoon, which starts in October and ends in December, contributes about 60% of the total annual rainfall. The southwest monsoon rains from June to September and from March to May accounts equally for the rest of the annual rainfall. The monthly average rainfall in the district was 108.87 mm in 1991-96.

2.1.3.3 WIND



Fig 2.1.3.3 “Wind speed of tharangambadi”

The diagram for Tarangambadi shows the days per month, during which the wind reaches a certain speed. Strong winds on May and June, and eventually calms down.

The southwest winds set in during April, it is the strongest in June and continues till September. Northeast monsoon starts during the month of October and blow till January. Cyclonic storm with varying velocity affects once in 3 or 4 years during the month of November-December. Dust storms, whirl winds and dusty winds blow from various quarters towards the end of May. Both these storms affect plantation crops.

During Southwest monsoon the air is calm and undisturbed. The wind velocity on an average from a height of 10m above ground level 50m/s. The air here has higher ozone content. The prevailing wind direction is N-S. Hence, the preferred orientation of the built form of the proposal should be N-S. Being a coastal area, humidity in the air is almost always high, wind circulation or ventilation is a must to beat the heat and humidity. This has influenced the evolution of a local architecture that tackles climatic challenges.

2.1.4 NATURAL FEATURES

2.1.4.1 WATER FEATURES



Fig 2.1.4.1 “Water feature around Tharangambadi”

Tarangampadi is flanked up by Uppanar river, an estuary, a distributary of Kaveri River, on its southern side. A branch of the estuary was channelled in to the town as a moat for the fortified region of the historic town. This is known as the Buckingham canal, that runs diagonally across the land.

On the eastern side it is lined up by the Bay of Bengal hence the town falls in the Coastal Regulation Zone III. Proximity to the Bay of Bengal makes Trankebar prone to occasional cyclones generated during the NE monsoons and frequent rough winds. The wave current velocity of the Eastern coast in the Nagapattinam District is between 1.8 to 3.6 m/s northerly.

The wave height is normally 1-1.5m and during cyclones the wave height ranges from 4-6m. The annual sea-erosion rate of Trankebar is estimated at 0.65m/year, already a few acres of land has been eroded over centuries. Tsunami is also a significant source of danger for this coastal town.

2.1.4.2 TOPOGRAPHY



The town is **predominantly at mean sea level**. The **southern part** of the town is situated at a **higher elevation** (approximately 1m – 3m above sea level)) compared to the northern part, as a result the effects of the Tsunami were relatively more damaging in the northern part.

Fig 2.1.4.2 “Topography map of Tharangambadi”

2.1.4.3 SOIL AND MINERALS

Soil texture of Cauvery delta zone (CDZ) is predominantly of these types- clayey, clayey loamy, silty lay, sandy clay, loamy, sandy loam and sandy clay. Clayey and clayey loam in the middle of the delta, sand fraction associated clay more towards the sea coast, loaming nature in new delta area and sandy loam in the western parts of the delta are the most prevalent textures. A brief description of the major 10 soil series of the CDZ is given below:

1. Kalathur series
2. Adanur series
3. Kivalur series
4. Sikar series
5. Nedumbalam series
6. Madukkur series
7. Pattukottai series
8. Nagapattinam series
9. Kondal series
10. Padugai series



Fig 2.1.4.3 “Soil scale of coastal alluvium soil”

		Parent material	Soil series
1.	Alluvium	a) River alluvium	Adanur, Kalathur, Alangudi, padugai, Nedumbalam, Peravurani, Sikar, Kondal, Thiruvengadu, Kivalur, Alathur
		b) Coastal alluvium	Sethi, Nagapattinam, Kohur, Valuthalagudi, Melkadu, Killivayal
2.	Gneiss		Budalur
3.	Laterite		Vallam, Mudukulam, Pattukkottai, Madukkur

Table 2.1.4.3 “Showing Parent material & soil series”

Nagapattinam district has two main types of soils called regar preponderates and arenaceous and small percentage of coastal alluvium. The Sediment transportation rate in Tarangambadi is 200,600 cu. M/year.

Being located right on the seafront, the land is highly saline and unsuitable for agriculture. The water table of this area is approximately 3-4 metres below ground level. In the dry season it could drop to 7 metres also. Clay and Lime are locally available minerals used for construction purposes.

2.1.5 FLORA AND FAUNA



Fig 2.1.5 “Flora of Tharangambadi”

Situated in the Kaveri delta, the irrigation facilities permit the cultivation of rice over large areas. Sugar-cane is cultivated here only as a **subsidiary crop**. Among

the littoral species tolerating a certain amount of salinity in the soil and in the water, the following five are the most common on the East coast:

1. Excoercariaagallocha L
2. Clerodendrum inerme Gaerin
3. Acanthus ilicifolius L
4. Solanum trilobatum L
5. Pandanus tectorius Sol.

Terrestrial fauna comprises **cattle, goats**. Domestic animals – **cats, dogs** etc., are very common. **No wild species** can be seen in Tarangampadi. Although snakes – **cobra, viper and krait** could be a rare occurrence. Being a coastal ecosystem, **Fish** species are plenty. Species such as **Carp labeo, Murrel and Hilsa** are found in the estuaries.



Fig 2.1.5 “Fauna of Tharangambadi”

2.2 HISTORY

Tarangambadi is a multi-ethnic habitation situated on the Coromandel coast. It was once the nerve centre of several successive western nationalities that set foot in the area with dissimilar interests including envoys of Danish East India Company, German missionaries in service of the King of Denmark and Moravian Entrepreneurs, much before the arrival of the Europeans, the area was a part of the Pandya Dynasty and was one of the 11 ports in the coast of the Tanjore district. The most ancient structure in Trankebar is the Masilamani Nathar temple dedicated to Lord Siva, built by the then ruler Kulasekara Pandya.

Later the Telugu Nayaks conquered Tanjore, the seat of power and took control of the east coast. The Nayaks under the rule of Raja Raghunath Nayak allowed foreign settlements in their kingdoms to extend their trading possibilities. The

Nayaks were followed by the Marathas. The town also had a group of Arabian traders who settled in the town as goldsmiths, merchants and craftsmen.

In Denmark, the economy was flourishing and was at its best during the reign of Christian IV the emperor who patronised art, trade and a lot of construction activities. It was during this period, in 1618 A.D., that an expedition troop was sent specially to set up a trading colony in Asia under the command of Roland Crappe' and Ove Gjedde.

After trying their luck in Sri Lanka, in 1620, they tried convincing the Tanjore King, Nayak, who agreed to their setting up of a trading post for an annual revenue of Rs.3111 per annum. Danish trade did not flourish as much as the other European establishments in India around the same time did. For e.g., The Dutch, the French and the British who were major stake holders. Nevertheless, it grew into becoming a small Intra-Asian trading network.

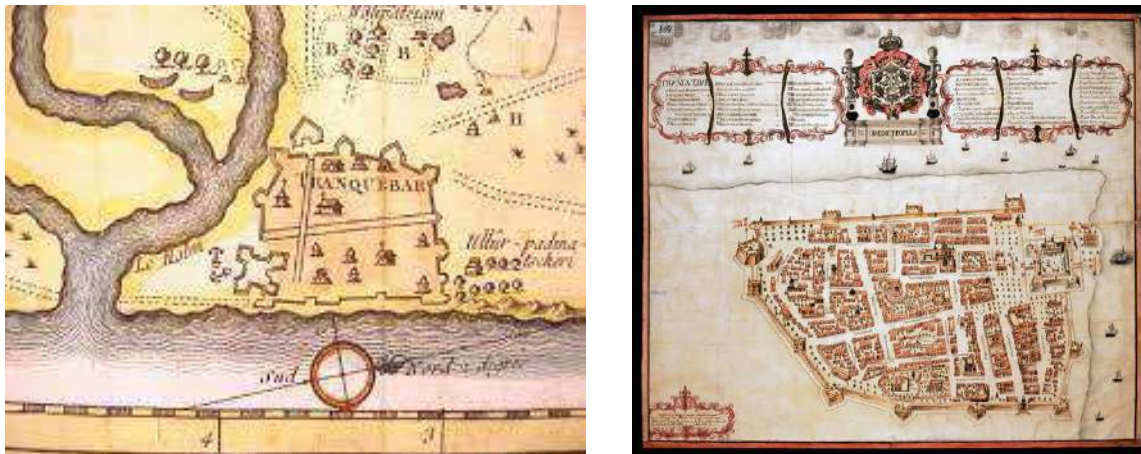


Fig 2.2 “(i) Old maps of Tharangambadi”

The Danes also set up trading posts, offices or factories in Thailand, Malaysia, and in India, in Masulipatnam, Pipli, Balasore and serampore. In a year two ships would come from Copenhagen. The trade included export of textiles, silk and spices. Gradually trade took a backseat and the arrival of Missionaries gave importance to religion and education.

The two pioneer German Lutheran Missionaries – Ziegenbalg and Plutschau, spread the word of Christianity at the same time added to the culture by translating the Bible in Tamil and setting up the first printing press to print the Bible for larger acceptance of the religion. Tranquebar, developed as the origin of Protestant Christians in India.

These missionaries apart from performing their duties gradually grew fonder to the people so much so that they rose to status of noble men in the society and are still regarded as spiritual path breakers in their endeavours. Their presence is important till today as figurines and memorials to commemorate their deeds and services on this land. When the Danish trade was at its best, the Danes temporarily trading in India started to build their palatial houses and settled down in

Tarangampadi. Signs of development of a colonial pattern was beginning with acquisition of land for trade by Ove Gjedde. He was the Admiral of the fleet that came from Copenhagen. He administered the construction of the Dansborg fort in the typical medieval European style.

Tranquebar was controlled by the British in 1801 due to the Napoleonic Wars in Europe, and restored to Denmark following the Kiel Peace in 1814. It was sold, along with the other Danish settlements in India, Serampore and the Nicobars, to Great Britain in 1845. In Danish times Tranquebar was a busy port, but it lost its importance when the railway was opened to Nagapattinam.

The Zion church was consecrated in 1701, which is the oldest Protestant church in India. In 1718, The New Jerusalem Church was constructed. Moravian Brethren missionaries from Herrnhut, Saxony established the Brethren's Garden at Porayar near Tranquebar and operated it as a missionary centre for a number of years. An Italian Catholic Father Constanzo Beschi, who worked in the colony from 1711 to 1740, found himself in conflict with the Lutheran pioneers at Tranquebar, against whom he wrote several polemical works.

The following set of diagrams analyses and traces the evolution of the town to the present day.

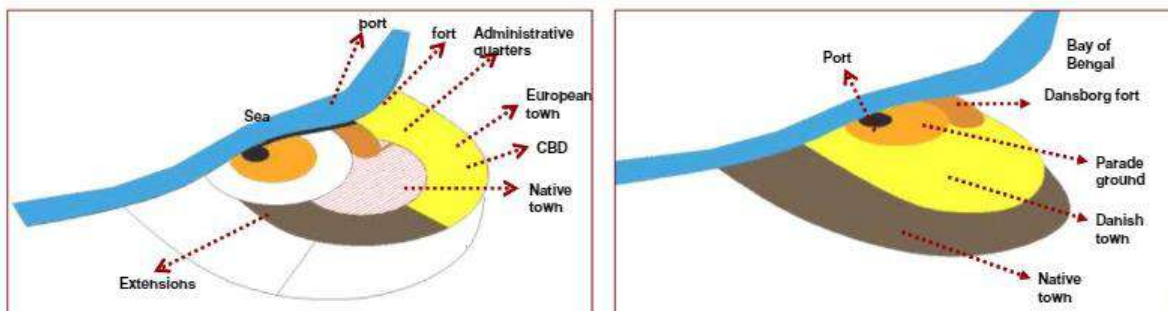


Fig 2.2 “(ii) Evolution of the town”

The Danish colony like any other colonial establishment occurred as a new development as the foreign traders gradually acquired rights to rule their territory, which was often protected with fortifications or guard boundaries. A similar pattern can be seen in Trankebar too, with the establishment of the Dansborg fort. The next set of diagrams prove the process of development where sense of territoriality grew with time due to increasing threats of invasions and wars overthrow the Danish control over Trankebar.

Tharangambadi was a Danish colony between 1620 to 1845. Danish Fort and buildings of Danish architecture are the main attraction of Tharangambadi.

After 225 years of rule, The Danes, sold this land to British East India company in the year 1845. The Danish fort of Dansburg was built in 1620.

Tharangambadi was settled by the Danes for 235 years, and two centuries of Danish heritage have left an important cultural heritage that can still be seen today in colonial houses, churches, cemeteries and most particularly the Dansborg.

2.2.1 QUICK GLANCE INTO HISTORY

- **1306** The Masilamani Nathar Kovil temple was built by Maravarman Kulashekhara Pandian in a small fishing & trading village called Kulashekarapattinam; also referred to as Sadangambadi, Thayangambadi and Tharangambadi.
- **1350** Muslim Traders arrived in Tharangambadi and build a Mosque.
- **1620** After failed attempts to reach an agreement in Ceylon, the Danish trading expedition arrived at Tharangambadi. A treaty between the Company and the Nayak Ragunatha of Thanjavur granted the Danes trading rights and the right to establish themselves at Tharangambadi.
- **1624** Construction of the Dansborg completed.
- **1701** Zion Church constructed.
- **1706** German protestant missionaries, Bar tholomäus Ziegenbalg and Heinrich Plütschau, arrived at the order of the Danish King.
- **1715** First printing press capable of printing a Tamil translation of the New Testament.
- **1718** A Protestant church, the New Jerusalem Church, was constructed by the mission.
- **1730** Silver & copper coin minting began.
- **1732** The Danish Asiatic Company was dissolved. The power passed on to the Danish State. Around 15 surrounding villages were annexed with Tharangambadi as the capital.
- **1845** Tharangambadi sold to the British for 12.5 lakhs Rupees. It remained the British Collector's Headquarters till
- **1860** New facilities like District and Session's Court, Post Office, etc. introduced. 1861 Railway line to Nagapattinam diverted attention away from Tharangambadi and commerce slowed down.
- **1947** India gains independence.

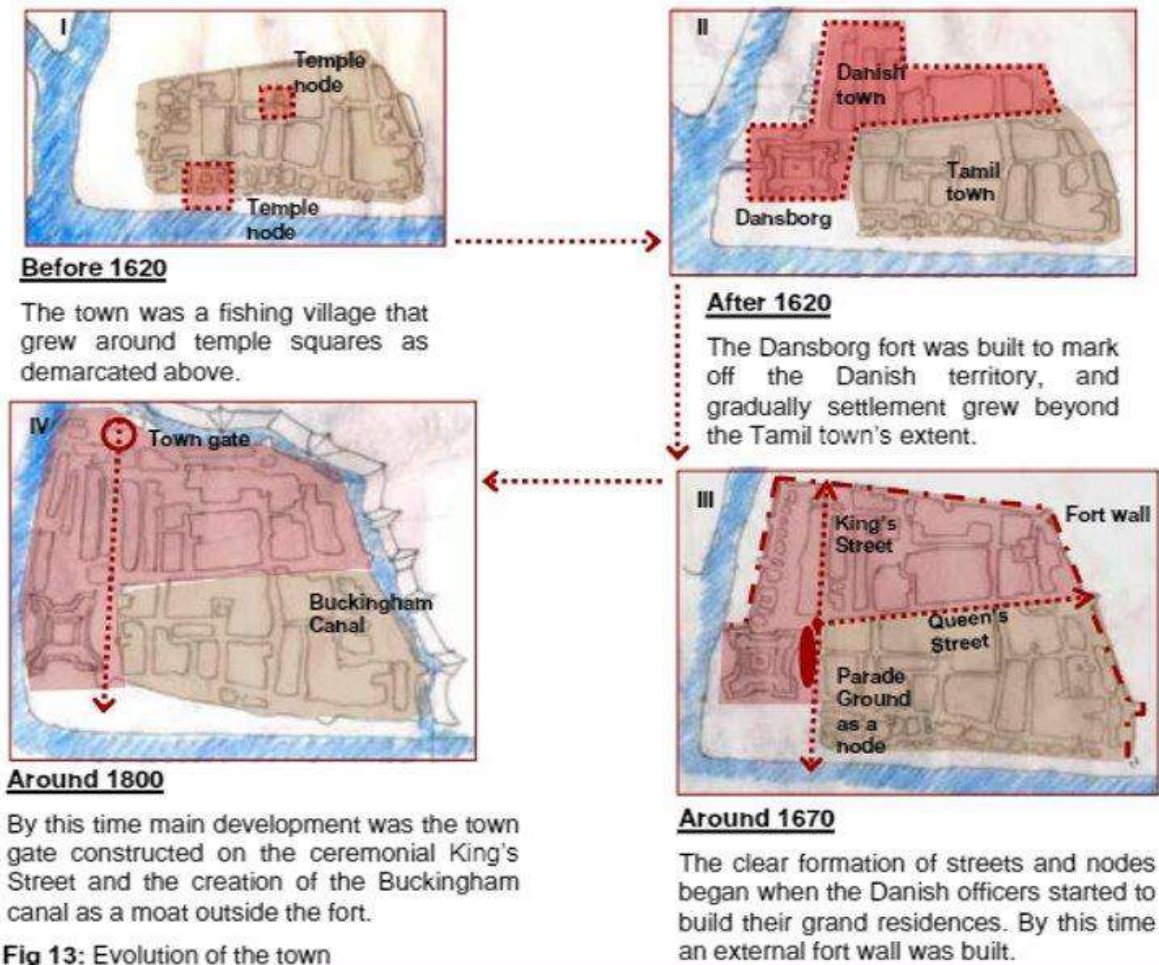


Fig 13: Evolution of the town

Fig 2.2 "(iii) Evolution of town"



Fig 2.2 "(iv) King street"

“King street” or Kongensgade is Tranquebar’s main street and some of the most important buildings of the Danish colony are still there. The main ones are the large Governor’s House, built in 1784, collector’s Bungalow, now refurbished into an elegant Neemrana hotel, and the New Jerusalem Church, built in 1718 by the Lutherin missionary Bartholomaus Ziegenbalg, who is buried there. Monument is Kongensgade is the town’s old Town Gate, built in the baroque style in 1972 with the Danish Royal presiding over the main arch.

Tranquebar was settled by the Danes for 235 years, and two centuries of Danish heritage have left an important cultural heritage that can still be seen today in colonial houses, churches, cemeteries, and most particularly, the Dansborg military fort. Danish heritage in today’s Trankebar is epitomized by the Dansborg Fort built in 1620 by the first Danish expedition that arrived and settled in Tranquebar. It is a solid example of Scandinavian military architecture, similar to other Scandinavian forts.

Dansborg was the administrative and military centre of the Danish East Indies. The fort has been restored and protected under India’s Monuments and Archaeological Sites Act of 1996. Today, Dansborg Fort is a museum containing a varied collection of items from the Danish times of Tranquebar. Tranquebar conserves reminders of Danish heritage, of days when it was a busy trading centre and a rare outpost of Danish culture in the tropical Indian Ocean. The rich cultural heritage of this “Little Denmark” is the cornerstone for a planned candidature of Tranquebar as UNESCO’s World Heritage Site

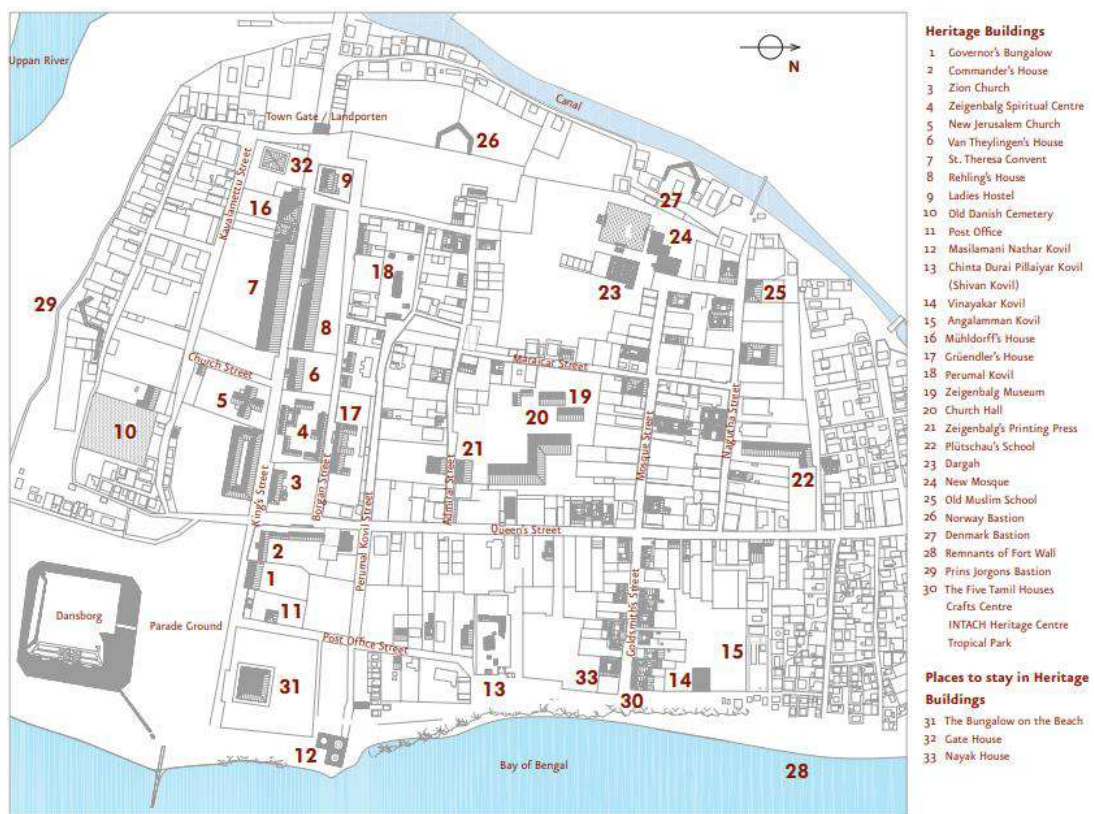


Fig 2.2 “(v) King street”

PRESERVATION OF ARCHITECTURAL HERITAGE

One of the characteristics that sets Tranquebar apart from the neighbouring towns and villages is the Danish colonial architecture - the houses, villas and the fort that remind the visitor of their former presence. The town is perceived as unique because of this architectural setting which is an outcome of a synthesis between Danish and local Tamil vernacular. However, this unique architecture today stands endangered because of development pressures and lack of sensitivity and appreciation. But this is changing.

The movement to preserve and restore this heritage began with the restoration of the Dansborg Fort, the citadel of the old Danish trading post, by the Tamil Nadu State Archaeological Department in collaboration with the Tranquebar Association in 2002. It now houses a museum. The next important step was the restoration of the utterly neglected and desolate former British Collector's Bungalow in early 2005.

Today it is a Neemrana Group heritage hotel called the 'Bungalow on the Beach'. Another old Danish-Tamil style building, on the King Street, the Gate House, is also being restored and converted into a bed and breakfast facility. The next important impetus came with the appearance of the Danish Bestseller Foundation after the tsunami in 2005.

2.3 SOCIO-ECONOMIC CHARACTERISTICS

2.3.1 DEMOGRAPHY

<i>Year</i>	<i>Population</i>	<i>Growth rate</i>
1901	13142	
1911	13268	1.0
1921	11520	-13.2
1931	12796	11.1
1941	11111	-13.2
1951	15016	35.1
1961	14754	-1.7
1971	17318	17.4
1981	18610	7.5
1991	18881	1.5
2001	20843	10.4

Tharangambadi has a population of 20843 as per 2001 census and having male population of 9914 and female population of 10929. Tharangambadi has shown a negative growth between 1911 and 1921, 1931 and 1941, and between 1951 and 1961 whereas it has shown a high growth percentage of 35% between 1941 and 1951. Between 1991 and 2001 it has shown a moderate growth rate of 10%.

Table 2.3.1 "Demography from 1901-2001"

2.3.2 SOCIAL COMPOSITION

The population comprises a collection of 3 main communal groups. There are 30% Muslims, 30% Christians and 40% Hindus. It is this diversity that adds to the cultural richness of the place.

<i>Social Composition</i>	<i>Male</i>	<i>Female</i>	<i>Total</i>	<i>% share to total</i>
SC Population	1220	1330	2550	12.23
ST Population	44	53	97	0.47
Others	8650	9546	18196	87.30
Total Population	9914	10929	20843	100.00

Table 2.3.2 “Social composition of the town”

As per census 2001, SC population is about 12.2 percent of the total population whereas ST population is insignificant which comes around 0.4 percent of the total population.

2.3.3 LITERACY RATE

<i>Literacy levels</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>
Tharangambadi	81.08	86.93	75.85
Nagapattinam dist Urban	83.89	90.47	77.53
Tamilnadu State Urban	82.53	88.97	75.99

Table 2.3.3 “Literacy rate”

As per census 2001, 81 percent of total population (excluding 0-6 years of age) are literates of which male accounted for 87 percent and female accounted for 76 percent. Literacy levels in Tharangambadi and its comparison with state urban and district urban figures are shown above.

2.3.4 GENDER RATIO

Gender ratio in Tharangambadi is much higher than district urban and state urban gender ratio. However, Gender ratio in the case of population below 6 years of age is lower than the general population figures of Tharangambadi. Gender ratio in Tharangambadi is well above 1000 in all the past 4 decades.

<i>Gender ratio</i>	<i>Population 2001</i>	<i>Population below 06</i>	<i>SC</i>
Male	9914	1179	1220
Female	10929	1154	1330
Gender ratio in Tharangambadi	1102	979	1090
In Nagapattinam Urban district	1025	956	1030
In Tamilnadu urban	982	955	1001

Table 2.3.4 “Gender ratio”

2.3.5 ECONOMIC BASE

Tharangambadi is a living heritage town with harmonious amalgamation of lavish Danish and the Tamil vernacular architecture. Tharangambadi is having an ozone rich beach. Primary sector activities like fishing and farming along with Tourism is the major contributors to the economy of this town. It attracts large number of domestic and foreign tourists to visit Dansborg fort, Land gate, Zion church, New Jerusalem church, Bungalow on the beach, Tamil monuments like Masilamani Nathar Temple, Shivan Temple and one Old mosque.

<i>Year</i>	<i>Domestic</i>	<i>Foreign</i>	<i>Total</i>
2004-05	68670	7630	76300
2005-06	61582	10868	72450
2006-07	63452	11198	74650
2007-08	64000	16000	80000

Table 2.3.5 “Economic base from 2004-2008”

2.3.6 OCCUPATIONAL PATTERN

Major work force in Tharangambadi is still engaged in primary sector activity like fishing and agriculture and its dependency on primary sector is more when compared to district urban and state urban areas. Its economic base is again reflected in its dependency on other service related activity like Tourism which is more or less equivalent to the Cuddalore district. However, non-workers percentage to total population is very high when compared to total population.

<i>Area</i>	<i>Indicators</i>	<i>Primary</i>	<i>Household Industry</i>	<i>Others</i>	<i>Total workers</i>	<i>Non workers</i>
Tharangambadi	% to total workers	21.9	2.4	75.7		
District Urban	% to total workers	20.0	2.2	77.8		
State Urban	% to total workers	14.0	6.3	79.6		
Tharangambadi	% to total population	6.5	0.7	22.6	29.9	70.1
District Urban	% to total population	6.4	0.7	24.9	32.0	68.0
State Urban	% to total population	5.3	2.4	29.9	37.5	62.5

Table 2.3.6 “Occupational Pattern”

2.3.7 TOURISM POTENTIAL

The majestic Dansborg Fort, the New Jerusalem Church and the quaint Danish homes off King's Road in Tranquebar are popular sightseeing spots. The first building that welcomes the visitor at the entrance of the town is an old gateway with wooden doors, built by the Danish in 1792. The arch leads to the main street of the town, called King Street. Along this grandly named Road is a memorial at the spot where the Danes landed. A short walk towards the beach brings you Danish Governor Bungalow built in 1784 and is interestingly, still the largest building in Tranquebar. Opposite the bungalow is the magnificent Dansborg, the Danish fort, built in 1620. This is a stunning piece of Viking architecture, with enclosing stonewalls and cannons facing the sea. The fort has now been converted into an archaeological museum which is under the control of Archeological survey of India (ASI).

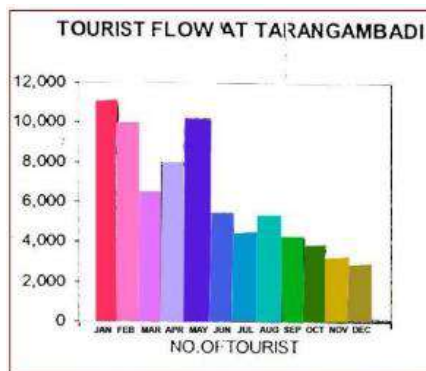


Table 2.3.7 “(i) Tourist flow at Tharangambadi”

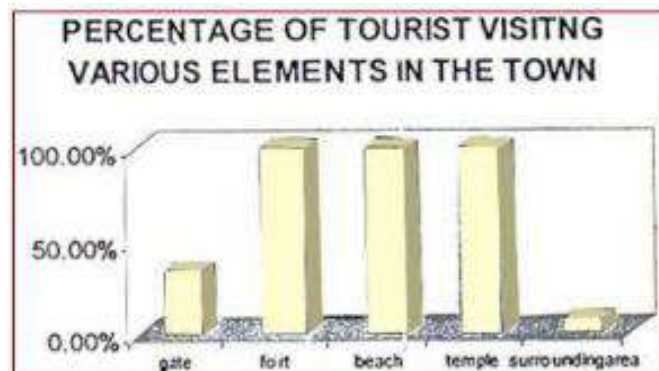


Table 2.3.7 “(ii)% of tourist visiting various elements in the town”

Tharangambadi with quiet and peaceful beach location along with well-developed infrastructure (once the schemes mentioned above gets implemented) can form the part of a tourist circuit with Chidambaram, Pichavaram, Poompuhar, Karaikal, Vellanhami, Gangaikondacholapuram, Dharasuram and Thanjavoor.

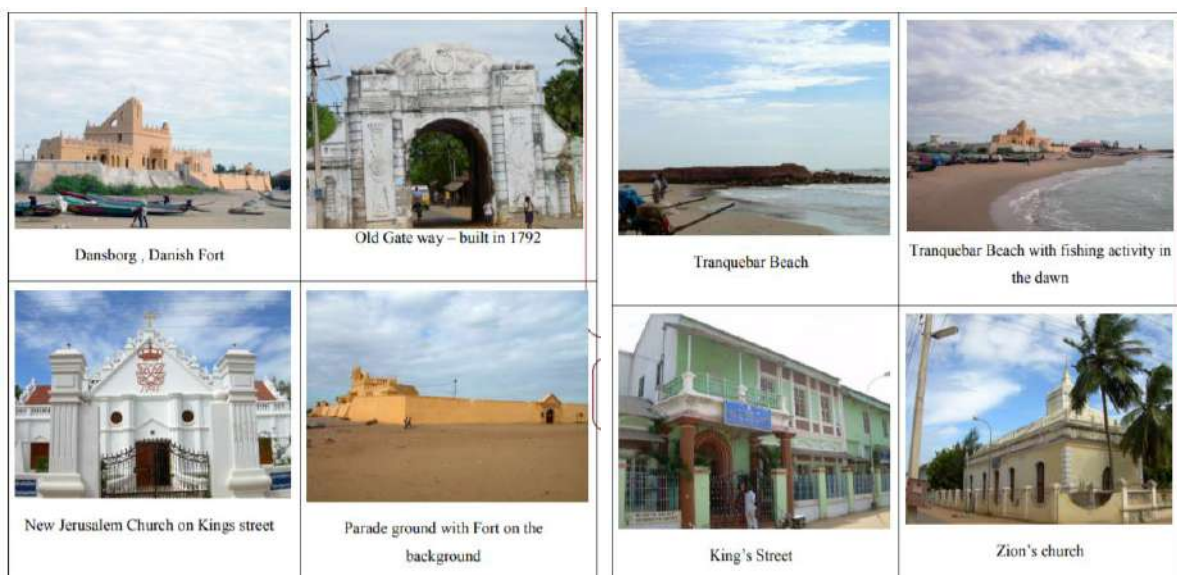


Table 2.3.7 “(iii) Various tourist spots in the town”

2.4 POLITICAL FRAMEWORK

Administrative arrangement in the district as follows – Nagapattinam district comprises 6 Taluks, 11 Blocks and 497 villages. Community Development Blocks in the district are: Sirkazhi, Kollidam, Sembanarkoil, Kuttalam, Mayiladuthurai, Thirumarugal, Nagapattinam, Kilvelur, Talanayar and Vedaranniyam. The hierarchy of administrative arrangement, there are 3 Municipalities, 10 Town panchayats and 433 Village Panchayats in the district. Tarangambadi holds the position of one of the Town Panchayats and has an active traditional panchayat of fishermen that plays a key administrative and decision-making role for the community. Its jurisdiction is spread over 24 traditional panchayats as given below:

- | | |
|-------------------|----------------------|
| 1. Tarangampadi | 13.Pudukuppam |
| 2. Chandrapadi | 14.Madavaimedu |
| 3. Chinnurpettai | 15.Periyandipettai |
| 4. Kuttiyandiyur | 16.Chinandipettai |
| 5. Vellakovil | 17.Chavadikuppam |
| 6. Perumalpettai | 18.Keelamoovarakarai |
| 7. Pudupettai | 19.Keezhakarai |
| 8. Thalampettai | 20.Thirumullaiivasal |
| 9. Chinnangudi | 21.Thoduvai |
| 10.Vanagiri | 22.Koolaiyar |
| 11.Chinnavanagiri | 23.Pazhayar |
| 12.Poombuhar | |

2.5 PHYSICAL INFRASTRUCTURE

Infrastructure facilities play an important role in fostering economic growth and enhancing public welfare. By and large, the infrastructure may be divided into two categories:

- **Physical infrastructure** including Water supply, Drainage, Sewerage, Solid Waste Management, Electricity, Telecommunications and so forth;
- **Socio-economic** infrastructure including Education, Health, other Community facilities, Cold storages, Warehouses, Markets, Banks and Financial Institutions.

This chapter deals with Physical Infrastructure which includes Water Supply, Sewerage and Sanitation, Storm water drainage, Solid Waste Management.

2.5.1 WATER SUPPLY SOURCES

Tharangambadi has safe drinking Water Supply Scheme initiated in 1984 with 2 wells as a source and in 2006; one additional well has been added for supplying water to the residents in Tharangambadi. Two wells are located in Porayar Iyyanar Koil whereas one well is located in Thillaiadi Village Panchayat. One bore well laid in 2005 in T. Manalmedu Village Panchayat is not in usage as on today due to reported water contamination. 24 public wells are used by the residents for non domestic usage.

In Porayar Iyyanar Koil well No.01, one Monoblock 5 HP pump set is in operation since 1984. One more 2 HP submersible pump set is added for operation as a standby since 2006. In Porayar Iyyanar Koil well No.02, one Monoblock 4 HP pump set is in operation since 1984. One more 2 HP submersible pump set is added for operation as a standby since 2006. In Thillaiyadi well No.03, 2 HP submersible pump set is in operation since 2006.

In order to reduce water scarcity, “Combined Water Supply Scheme 133” has been initiated by TWAD board, and it is in operation since December 2007 with Kollidam as a source. The source is located at a distance of 60 Km from Tharangambadi in Pappakudi cauvery river bed. Overall, Tharangambadi supplies 2 lakh litres from well source and 8 lakh litres from TWAD CWSS source, resulting in a combined supply of 1 MLD.

2.5.2 SEWERAGE AND SANITATION

Tharangambadi currently has no underground sewerage system. Night soil is disposed normally through individual toilets with septic tanks and low cost sanitation facilities. 3500 assessments out of nearly 5200 assessments (67%) within the town have individual toilets with septic tank as safe mode of disposal whereas remaining 33% has no sanitation facilities. For Public purpose, 2 public convenience units have been constructed along with one Pay and Use in the Bus

stand. Operation and Maintenance of one of the two public conveniences mentioned above is handed over to SHG. The road side drains constructed are used for disposing both waste water and rainwater. Two Sullage tankers of 6000 and 1000 litres capacity is available for septic tank cleaning with the Town Panchayat.

2.5.3 STORM WATER DRAINAGE

The total length of the Storm Water Drains constructed within Tharangambadi is around 2 Kms which is single side brick lining drains. Only 5 % of the existing roads are covered by Pucca storm water drains.

<i>Storm water drainage</i>	<i>2009-10</i>	<i>2013-14</i>	<i>2018-19</i>	<i>2023-24</i>
Tharangambadi existing SWD	2.000	2.000	2.000	2.000
Storm water drain demand	57	57	57	57
Gap	55	55	55	55

Table 2.5.3 “Estimated storm water drainage in next two years”

2.5.4 SOLID WASTE MANAGEMENT

2.5.4.1 GENERATION AND COLLECTION

Town Panchayat in partnership with NGO’s INTACH & Bestseller Foundation India started a new venture in August 2006 for Solid Waste Management. The idea was to improve the town and its sanitary conditions. The first step was to introduce solid waste management to improve the quality of urban environment. A system of cleaning of the streets in the neighbourhood and a door-to- door collection of segregated waste followed by recycling and composting the collected waste, was put in place. Old town of Tranquebar (including the Market Area and 15 Streets in Poraiyar (Near By town-Thendral Nagar, Ganesha Street, Gnanapillai Street, Hospital Street, Sandhaveli Street, Sivan vadaku and therku Streets, Thota mella and kila Street, Bust stand street, Market Street, Om sakthi Koil Street, Pattunoolar Street, Kattunayakan Street, Veerappapillai Street) were covered in solid waste management. Tharangambadi Town generates around 5.5 ton of Garbage per day at the rate of 247 grams per capita per day. Waste is being collected in all the 18 wards. 24% of the total assessments are covered under Door to Door waste collection system and 24% of the total assessments are actively involved in waste segregation at source. Waste collected is segregated into degradable, non-degradable and recyclable and its details are shown below. Town generates nearly 1.5 MT recyclable wastes per month like old plastic item, milk cover, oil cover, water bottle, TV cover, cardboard box, glass etc. 50 concrete waste bins are placed all over the town for collection purpose. Tharangambadi town has 100 trolleys of 100 litre capacity each and further

proposed to purchase additional 100 trolleys for waste collection purpose. Dumper placers are placed at Tharangambadi bus stand, Poraiyar bus stand and in Poraiyar Market of 1200 litre capacity each. Tharangambadi Town Panchayat has the staff strength of 15 sanitary workers. Other than departmental workers, a team of 3 supervisors, 3 male and 20 female workers, one Team leader and one Co-ordinator were employed by INTACH and Bestseller Foundation India. As a part of collection system, 5 pushcarts and 9 tricycles are engaged in primary waste collection.

2.5.4.2 DISPOSAL AND TREATMENT FACILITIES

One refuse collector, one tractor trailer and one power tiller and trailer are in operation for secondary waste collection system and disposal. A compost yard is located in Ayyanar Kovil Street, Poraiyar in an area of 4.31 acres and it is in operation since 2006. Aerobic and vermi compost methods are followed to produce manure from biodegradable waste. 6 rectangular tanks have been constructed for aerobic composting whereas 10 tanks have been constructed for vermi composting. Dumping yard is located in Kazhvanthitu, Poraiyar in an area of 2 acres. However, scientific land fill site is not available in this Town Panchayat. Only 24% of the total assessments are covered by Door – Door collection system, Only 24% of the total assessments are involved in waste segregation and State inadequacy (1 person per 3 Km against the standard norm of 1 person per 0.5 Km).

2.6 SOCIO-ECONOMIC INFRASTRUCTURE

The Socio-economic infrastructure determines the development status of any human settlement and this chapter covers Health, Education, Recreation and other amenities.

2.6.1 HEALTH

Tharangambadi has 2 government hospitals one in Poraiyar and another one in Tharangambadi. Each hospital has 4 doctors with bed strength of 20 in Poraiyar and 10 in Tharangambadi. In addition, 3 clinics are there in ward Nos. 11, 07 and 08. Primary health centers are located in Porayar, Tharangambadi and in Erukkatancheri.

2.6.2 EDUCATION

Tharangambadi has 4 higher secondary schools located in ward Nos 06, 07 (2 Nos) and in 13. Two high schools are located in ward Nos 05 and 07. Three middle schools are located in ward Nos. 17 and 10. In addition, 12 primary

schools are there in Tharangambadi, out of which one is Panchayat union primary school and remaining are management schools.

2.6.3 RECREATION

Tharangambadi has 2 parks located in Tharangambadi, Borgan Street, Terasa School & Inside TP Office. Tharangambadi has one approved layout in Valiyar theru in ward No.08 where community hall has been constructed. One more approved layout is located in ward No.04 which needs to be developed.

2.6.4 OTHER AMENITIES

Tharangambadi has banking facilities provided by Indian Bank in ward No. 06, City Union Bank in ward No.15 and Central Co-op Bank in ward No. 08. One community hall is there in ward No. 08 and one more community hall is proposed near new bus stand. Town has no markets and one private market is there in ward No 11. Town has one Slaughter house in an area of 750 Sq. ft in ward No.15 constructed in 2006- 07. Existing Town Panchayat office is located in ward No.07 and has no space available for further extension as suggested by Town Panchayat officials. Town has 5 burial grounds located in Sandhavalli Street - Poraiyar in an area of 1 acre, Itchaladi Street – Poraiyar in an area of 0.5 acre, Tharamgambadi in an area of 1 acre, Erukatancheri in an area of 0.5 acre & Sathankudi in an area of 250 Sq.ft.

2.6.5 PROBLEMS AND ISSUES

<i>Sector</i>	<i>Issues</i>
Social Infrastructure	<ul style="list-style-type: none"> • Town has no major recreational parks and playgrounds • All the 5 Burial grounds have infrastructure inadequacies • Town has no market infrastructure and it depends on private market in ward No.11 • Existing Town Panchayat office has no Space available for its expansion. • Town has no remunerative assets like commercial complexes other than shops under construction in Bus stand.

Table 2.6.5 “Sector & Issues”

2.7 COASTAL REGULATIONS

Category III (CRZ -III): Areas that are relatively undisturbed and those which do not belong to either Category I or II. These will include coastal zone in the areas (developed and undeveloped) and also areas within Municipal limits or in other legally designated urban areas which are not substantially built up Regulations:

- The area up to 200m from the HTL is be earmarked as 'No Development Zone'. No construction shall be permitted in this zone except for repairs of existing authorized structures not exceeding existing FSI, existing plinth area and existing density. However, the following uses may be permissible in this zone-agriculture, horticulture, gardens, pastures, parks, play fields, forestry and salt manufacture from sea water.
- Development of vacant plots between 200 and 500m of High Tide Line in designated areas of CRZ-III with prior approval of Ministry of Environment and forests permitted for construction of hotels/beach resorts for temporary occupation of tourists / visitors.

Construction/ reconstruction of dwelling units between 200m and 500m of the High Tidal Line permitted so long as it is within the ambit of traditional rights and customary uses such as existing fishing villages and gothans. Building permission for such Construction/reconstruction will be subject to the conditions that the total member of dwelling unit shall not be more than twice the number of existing units; total area covered on all floors shall not exceed 9 meters and construction shall not be more than 2 floors.



A figure-ground of the fortified area, the orange line indicates the original fort wall layout while the magenta and blue lines indicate 500m and 200m mark from the seashore

2.8 INFERENCES

- The evolution plans show the continuity of the original street character and building morphology that pre-existed the Danish establishment in Trankebar.
- The town generally had a grid iron pattern pertaining to the position of the temples that often form the center of most towns in Tamilnadu.

- The Danes added to the town’s fabric by adding fort, new houses forming the new street, and much later added the town ramparts that gave it the medieval character of a fortified town.
- Although gradually just as any other colonization settlement, Trankebar too developed as a town housing the rich within the rampart including the Missionaries, Danes, Muslim merchants etc., While the general public and fishermen continued to live in hamlets outside the fortification.
- The town is surrounded by vast agricultural land.
- The town has an East-West street network that meet the sea shore.
- All the houses and public buildings open out on to the East-West streets, there are fewer North-South streets although the buildings also open out on to these streets.
- The pre-dominant orientation is North-South.
- The town has a very strong socio-cultural character apart from its architectural heritage, hence any kind of intervention must accommodate and incorporate the needs and way of life of the residents

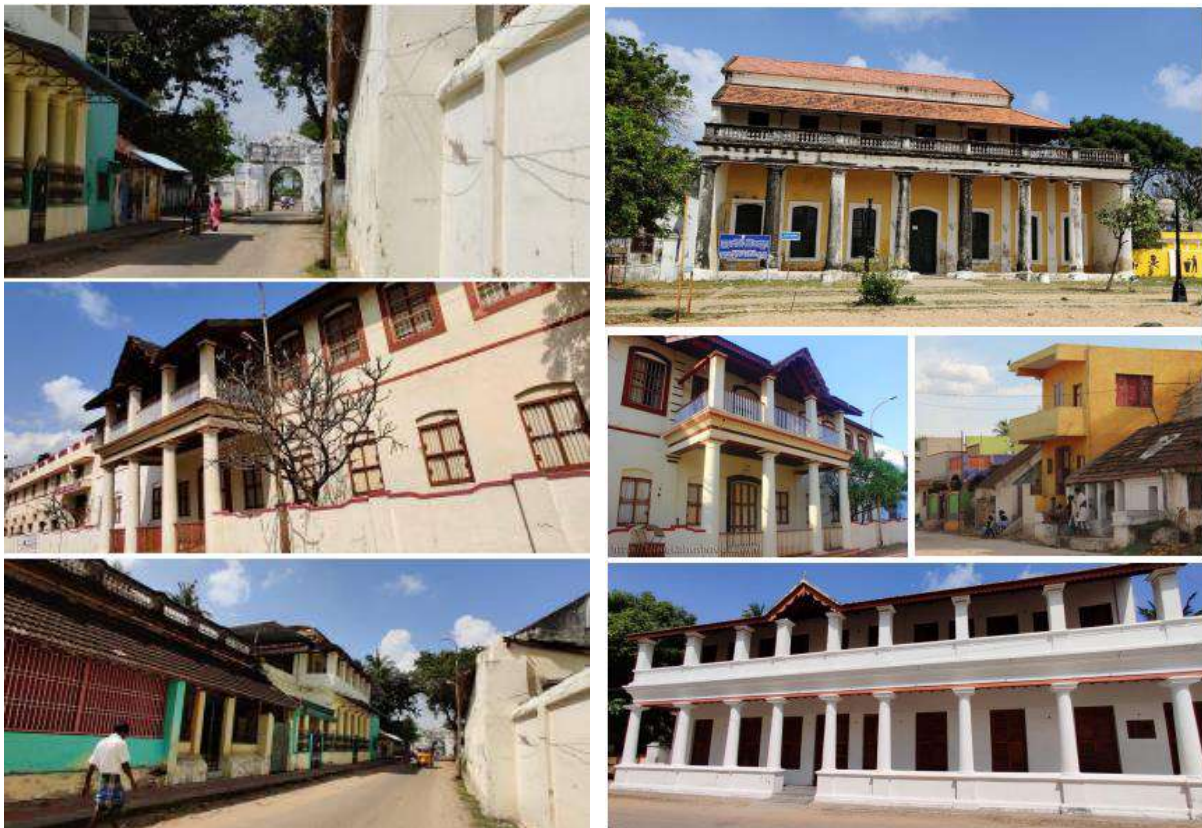


Fig 2.8 “Building typologies of Tharangambadi”

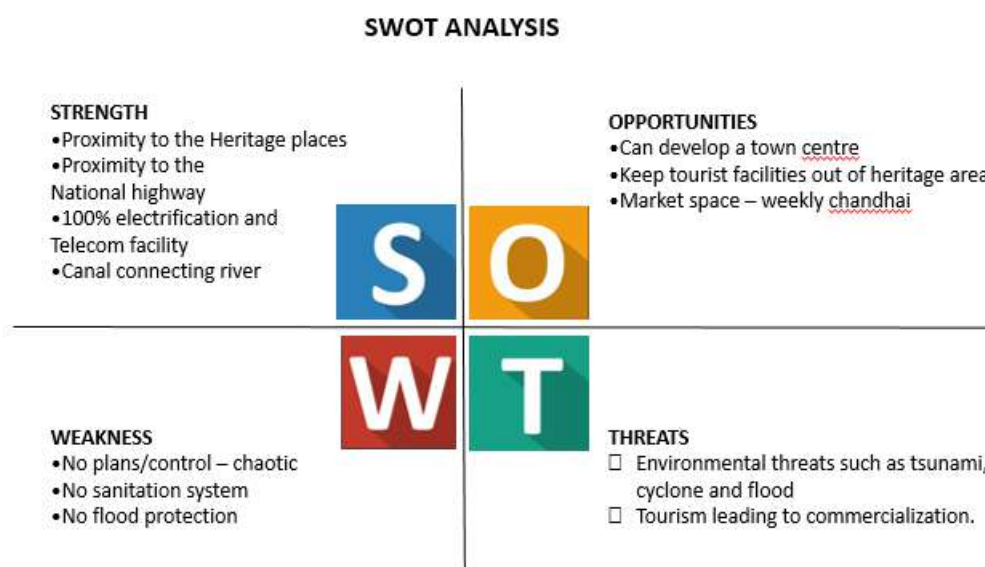
2.9 ISSUES AND POTENTIALS

2.9.1 ISSUES

- The town is a heritage site, having understood the various strands of culture and heritage that tie town together, it is genuinely a cause of concern if such a town is left to decay and then eventually vanish from our memories.
- The town has to be rescued from the state of deterioration.
- The town outside the erstwhile for wall is in chaotic state, there is no sense of entry of orientation to mark the arrival to a place of such great value and importance.
- There is a lack of basic infrastructure and amenities like public conveniences, park, playgrounds in the town, it promotes tourism but not that effectively. Tourism is another vital part of its economy hence, in view of the future there needs to be adequate provision of hospitality and recreational facilities that adds on a life to the town.

2.9.2 POTENTIALS

- The town has great natural resources that can be tapped to be promoted as a great destination to be.
- The town's USP is its simple and pristine character, in spite of a lot of urbanization in the nearby towns, it has retained a lot of the original character and that needs to be preserved and repackaged for the present day.
- It also has many tourist spots, thus recreational, commercial and hospitality proposals will definitely be a hit.



- In the design of the buildings, naturally it was not only the prevailing European architectural thinking that set the trend. The possibilities of the **available materials**, and especially the **need to adapt to the climate** were also taken into account. Their buildings are **climatically viable**.
- Although they initially used their style, they found that flat roofs was more suitable and in later period of construction, this has been adopted. The portico and verandahs were added in order to break the sun's rays. These verandahs and fenced flat roofs were splendid places for walking in the evenings when it is cool and the breeze from the sea could be enjoyed.
- On several roofs, a cube shaped room was built which was used as a terrace bedroom to enjoy the cool breeze at night times.
- Here the European builder wisely drew on the experience of the Indian themselves, gained over thousands of the years. In the hot, damp climate of Trankebar, it was especially **important to provide shade and ensure good natural ventilation**.

Comparison	Danish buildings	Tamil buildings
Axis	All typologies follow a scheme of axuality for spatial organization and follow symmetry.	Axis is used to the extent of visual linearity, but axis of symmetry is avoided or not seen.
Form	Square and rectangular forms for rooms, while the roof scape is predominantly pitched, with occasional treatment with decoration, parapet, etc.,	Square and rectangular forms for rooms, while the roof scape is predominantly pitched, with occasional treatment with decoration, parapet, etc.,
Spatial configuration	Spaces arranged in a manner that they appear monumental, yet maintain the human scale. Use of open spaces as transitional spaces. The residences did not have scope for future expansion.	Spaces were linearly laid out. There was scope for future expansion. Human scale was maintained. Courtyards acted as transition spaces.
Fenestration	Windows were tall and slender, more light could come in. Courtyards were also used to bring light into the space. Cross ventilation is provided in some cases.	Windows were only in the front and the rear, the rest of the house was lit by courtyards. But the roof slope was great, so radiation could be blocked this led to dingy and musty indoor spaces. But because of the linear form, cross ventilation is encouraged.
Materials	Brick, wood and tiles	Thatch, brick, used blocks , tiles, terracotta etc.,
Frontage	Emphasis is on seeing the whole building as one in a single glance.	Frontage is done with great care, decorated columns, windows, doors, parapet etc., There is also the provision of thinnai seater that adds to the human scale.

Table 2.9.2 “Comparison of Tamil and Danish buildings”

Thus, from the comparison, inference is that the building typology in such a climate must ultimately answer the problems and discomforts caused by the local conditions before aesthetics come into play. It is interesting to note how even the Danes adapted the local style of building to create a new style of the land.

3. SITE ANALYSIS



Fig 3 “Site pictures”

3.1 SITE CHARACTERS



Fig 3.1 Site with neighboring context”

- The site is bounded by Buckingham canal on the eastern side while it is limited by Uppanar river in the south.

- These natural features offer enough potential to be developed as Public recreational zones.
- The site is cut through by the NH-45A that comes right into the town forming a dangerous L-junction, where there is also a bus stop and a cluster of shops to add to the chaos of the scene. Also this chaos upsets the entrances and the ambience of a heritage town like Trankebar.
- The south-east side of the site has a Rao Bahadur Memorial pillar marking the beginning of king street, a major connection to the town. This path rises over a bridge that connects the town to its external periphery.
- The king street also meets a road that connects the NH 45A and on this connecting road there is a small Town panchayat office.
- The characteristic feature of the site is thus the concentration of activities as a NODE that is contained out of the fortified area, retaining the tranquility within the town.

3.2 SITE DETAILS

- **Sun and wind:** Being a coastal town, there is abundant wind and sun energy
- **Drainage and waste management:** The site doesn't have any organized drainage system.
- **Electricity:** The whole area has been electrified there is although shortage of electricity during the summers.
- **Water:** Potable water has been supplied by water tankers, since the ground water reserves are saline and non -potable
- **Public utilities:** The site lacks wayside amenities such as public toilets, water taps, signage, information booths etc.,
- **Commercial requirements:** Although there is row of shops, they have only come up as organic set of shops and encroachments, hence there is no organized market place.
- **Parking spaces:** Although vehicular traffic within the town is minimum, there are other vehicles that keep coming – there are tourist vehicles and no. Of two wheeler users, for these vehicles there is no planned parking space as such and in the future this requirement is only going to increase.

3.3 ACTIVITY AND CIRCULATION

- The circulation pattern when the town is much more systematic than the periphery of the town here there is a lot of chaos as the pedestrian vehicular movement clash. Since the streets and roads are not developed to have lane separation for pedestrians, cyclists and vehicles, the movement in most part of the town is one of mixed nature.

- The canal is actively used by the poorer fishermen whose huts and houses are along the canal, it becomes convenient for them to dock their boats closer to their home.
- The NH 45A is the distinct vehicular movement zone in the site, but it brings interstate traffic too close to the town and its inhabitants, adding to the inconvenience rather than ease.

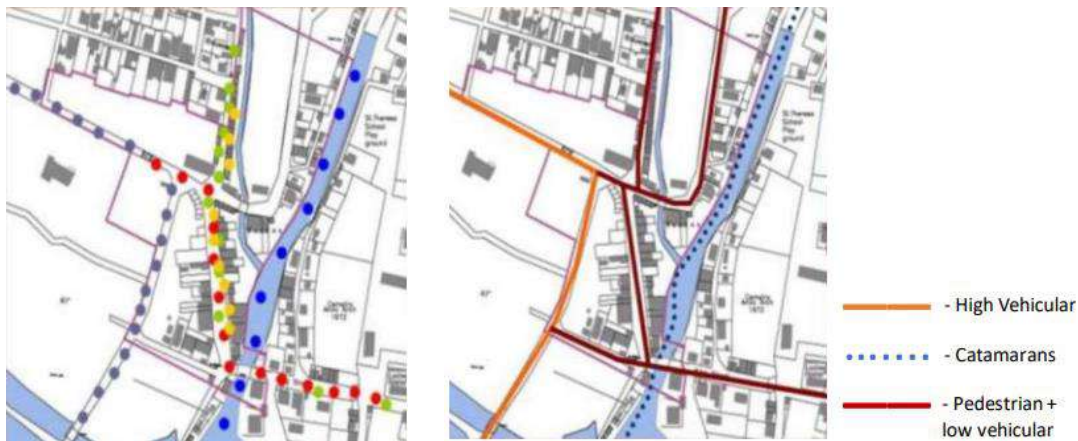


Fig 3.3 “ Activity analysis”

Activities

The following are the activities performed in the :

- Shopping – Daily, Weekly (Yellow dot)
- Walking – Daily (Green dot)
- Driving – Daily (Grey dot)
- Rowing – Daily (Blue dot)
- Processions – Annual (Red dot)

Daily timings:

Although this is a very busy place in the town there are only certain times of the day when it is very crowded

- Morning: vehicular activity
- Afternoon: low density pedestrian activity
- Evening: pedestrian and vehicular activity
- Night: vehicular activity and a very little pedestrian activity.

3.4 CHALLENGES AND CONSEQUENCES

The search has brought forth many issues, concerns, and ideas that serves as a launch pad for the next stage. But the following is seen to be a few challenges and constraints to be confronted with :

- The biggest challenge owing to the constraints of the town lacking any preconceived plan or vision for Trankebar, is to start conceiving one. Hence, there is an opportunity of complete unrestricted freedom, although it runs the risk of going away from the focus, due to the absence of any guidelines.
- The sheer scale of intervention poses a huge challenge for site planning both functionally and aesthetically.
- The concept of being rooted in context restricts the design decisions to finding solutions in and around the place, it has the constraint at every stage to be in conformity with its surroundings.

- The area of the site might pose as huge piece of land to plan for as the current population would not need a huge centre of this scale, the challenge lies in how it can be suitably used.
- Since resolving the biggest problem of the highway going right through the site and the town leads to some confusion, it will be a big challenge to solve.
- Problems might arise due to scale, as only few public buildings in the town were initially either a fort, church or big mansions, none meant for particular function such as an office or museum, which are meant to be spacious and the scale might be intimidating to the small Dalit huts that begin from along the banks of the Buckingham canal.

3.5 DIRECTIONS TO NEXT STAGE

The search has provided some main clues for what is it that can make sense on a new layer something the old layer lacks. Hence programme formulation and research as to how old and new need vital links that can be put in use. The design must follow:

1. The concept of creating an active node , it is in a way mandatory as there are many reasons why this town Centre where the king street culminates must be a little busier than the town itself. Morphologically it can be seen as a strategic nodal point that can over time form a landmark in itself for the town dwellers.
- 2.The town's character, as it is meant to be the flagpole demarcating the limits of the town, hence it must in someway always express the same feel as the inner town would.
- 3.The town Centre must be the central nervous system of the town.
- 4.Circulation issues must be carefully sorted out as the no. Of user groups to cater to, would in turn prove to be the key aspects to establish zoning.
- 5.Strong links/access must be maintained between the town Centre and the town apart from the King street, there must be many more means to make it a people's place, it is meant to be the democratic emblem of the town.
- 6.The design must also be able to exercise flexibility for the future.
- 7.Environmentally, methods and practices must be proposed and designed towards eco-friendliness, such as rainwater harvesting, sewage treatment, waste management, etc.,
- 8.The design must be evolved with local usage in mind such as plazas and squares that work wonders in cities, might not work out well in a quiet introverted town such as Trankebar.
- 9.Design must exhibit a sense of hierarchy, scale – while zoning in both horizontal and vertical dimension.
- 10.Finally over-all the scheme must areas as a well-knit entity, one that looks like natural extension rather than a foreign insertion.

4. CASE STUDIES

4.1 MARUTHAM VILLAGE RESORT

Criteria for choice: To understand the structure of a eco resort that is meant to project the rural character in an effective way.

Case Description:

- **Location:** 90 mins from Chennai International Airport & 8min drive from Mamallapuram, the International Tourist Town on the Bay of Bengal.
- **Area:** The resort is built on 2 acres of land, surrounded by agricultural land on all 4 sides.
- **Resort Capacity:** The venue comprises of 18 rooms with splendid interior in vernacular style, all of which are air-conditioned with breezy interiors open to bright natural lighting.




Fig 4.1 “Interior & Exterior views of Marutham village resort”

Planning strategy:

- The main idea behind the resort is to make city people experience a rural life. The outdoor of the resort has a beautiful view of farm on all four direction, which itself can give us a rural feel.
- The overall planning of the resort is that all the cottages are arranged in such a way that it forms streets of a village. Architectural spaces in common areas with influences borrowed from history, geography, mythology and popular cinema culture.

- The layout of the resort is reminiscent of a Tamil Village & instantly transports you to the bygone era of healthy village life amid paddy fields, farm animals and homegrown organic produce.
- There are a total of 18 rooms, where 2 single bedroom, 8 triple bedroom and 8 four bedroom cottages.
- The interiors are very carefully designed in a such a way to reflect the traditional tamil houses with courtyard and pitched roof. The courtyard itself means the heart of the house, which connects all spaces of the house. It makes the space more breathable allowing the light to penetrate inside the house, it becomes a relaxing space for some and plays area for the others.
- The commonly used building materials included baked bricks, sandstone, marble, wood, plaster and granite.

1 BEDROOM COTTAGE: 375 SqFt




Studio cottage

Max: 2 persons

Garden view Shower Balcony Air conditioning

3 BEDROOM COTTAGE: 950 SqFt




3 Bedroom cottage

Max: 4 persons

Garden view Shower Balcony Air conditioning

4 BEDROOM COTTAGE: 1000 SqFt



4 Bedroom cottage


Max: 4 persons

Garden view Shower Private bathroom Balcony Air conditioning

General

- Patio
- Seating area
- Fan
- Private entrance
- Outdoor furniture
- Child safety socket covers
- Telephone
- Alarm clock
- Laptop safe box
- Lockers
- Toilet for disabled

- Work desk
- Wardrobe
- Tiled/marble floor
- Soundproofed windows
- Mosquito net
- Books, DVDs or music for children
- Board games/puzzles
- Entire unit situated on ground floor
- Dustbin
- Pool towels
- Pool with a view



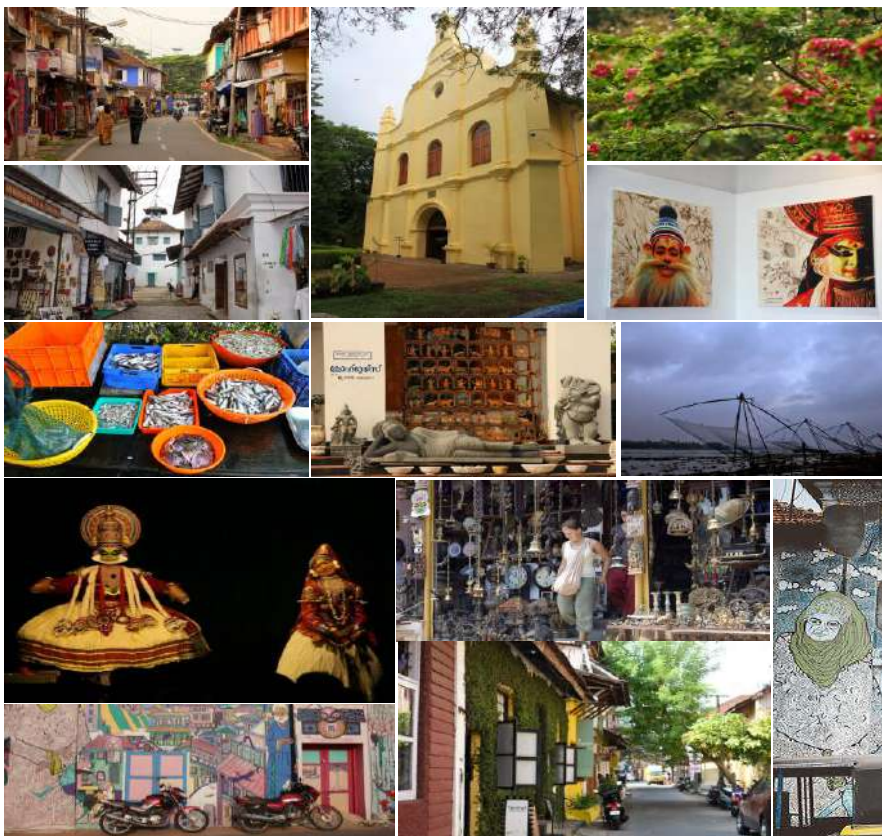
Learnings:

- The architect's beautifully combined with ingenious ways of recreating the feel of a small rural setup in a surreal ambience, that is drenched with images nostalgic of classic rural experience.
- The main motto to study this resort is that it could successfully evoke images and the feel of a rural village sophisticatedly, where often resort go vernacular the ambience had a charm but the design response was extremely modern, un-imitated. This is the most valuable lesson, apart
- from the planning of closely knit rooms with periodic courtyards to enrich the experience.
- The swimming pool was beautifully designed to replicate traditional theppakolams, which is a small water body in front of temples.

4.2 FORT KOCHI

Learnings:

- Fort Kochi is a **vibrant, historic** region by the Arabian Sea.
- It is one of those rare places in the world that has been ruled by three colonial powers—the **Portuguese, the Dutch and the British**, in that order. Most structures here were built in the **Dutch and the Portuguese styles**, and consolidating the city's status as a melting pot, there are also Chinese fishing nets, cathedrals, cemeteries and what were once Arab settlements.
- Along with celebrating the past, Fort Kochi is also about celebrating how the city's inhabitants shaped its growth, negotiated with local rulers, dealt with conflict, created space to accommodate and segregate
- In Fort Kochi, every door and window is an excellent photo opportunity. **Every door and window has a story to tell.** Pay heed to those stories and you will certainly be taken back in time, starting from the 14th century. Trader after trader came to this land seeking spices. And, slowly but steadily they **contributed to Fort Kochi's architectural wonders.**
- Over the past few years, the attention of this tiny region has turned entirely towards **fishing and tourism.**
- What makes it alive are its **people** who are the **main connectors between a glorious past and a future** of immense possibilities.



4.3 HERITAGE PARK, BELGAUM

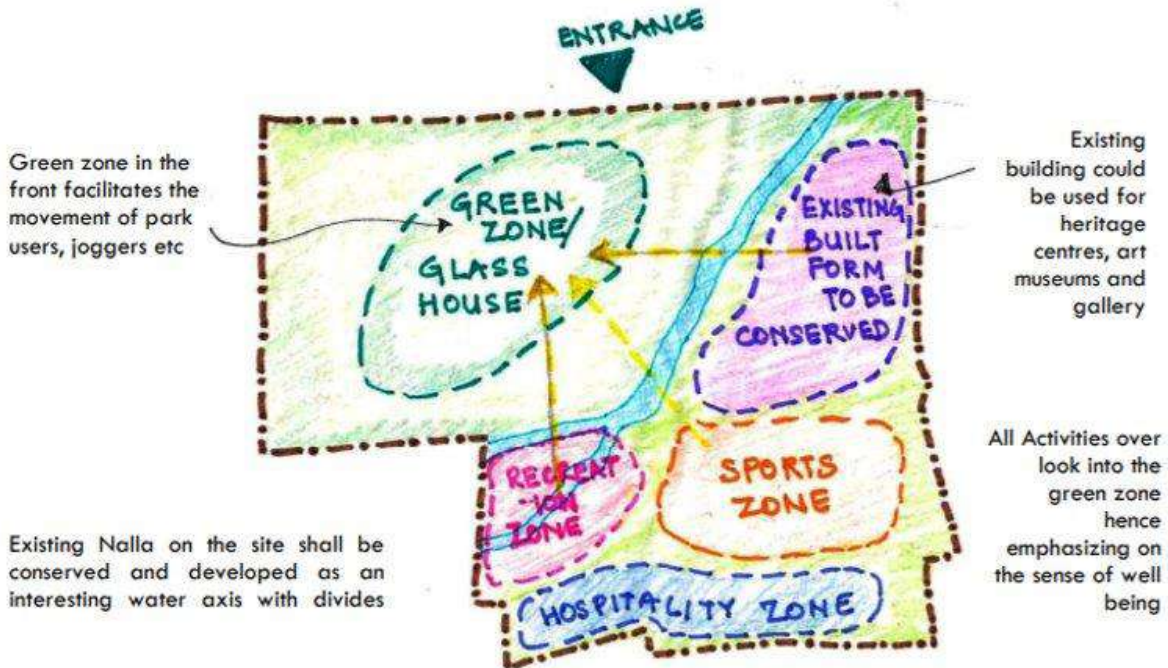
Criteria for choice: To understand the planning of a recreational place that is an integrated campus to promote heritage and tourism development.

Location: Belgaum is a town in northwest Karnataka, India. Belgaum is situated 502 km from Bangalore and is the Divisional Head quarter of North Karnataka.

Area: The Heritage park is built on 7 acres of land.

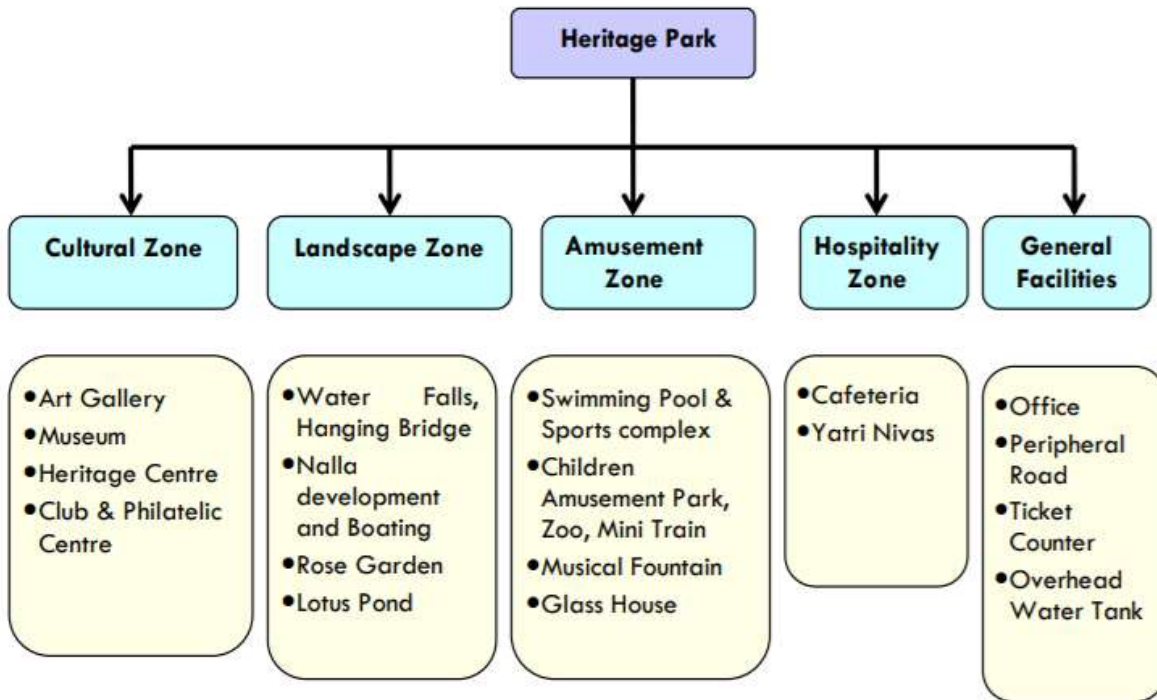
- Tangible heritage:**
1. Belgaum Fort
 2. Kamala Basti
 3. St. Mary's Church

Zoning & area statement:



S. NO.	PARTICULARS	AREA (SQM)
1	Art Gallery	250
2	Museum	250
3	Heritage Centre	300
4	Club and Philatelic Centre	875
5	Sports Complex with Swimming Pool	15,600
6	Glass House	465
7	Office	1,200
8	Cafeteria	465
9	Lotus Pond	10,000
10	Rose Garden	2,362

Table 4.3 "Area Statement"



Planning strategy:

- The proposed heritage park shall have integral elements to promote art and culture blended with amusement related activities.
- Conceptually, the Heritage Park works as a unified campus that showcases every aspect of the regional culture in a tangible, physical and visual manner, allowing people to experience the many facets of living heritage first hand.
- The main aim of the sustainable design process is to achieve an aesthetic response to the program, while minimizing the ecological footprint of the development and conserving the existing built form.
- The principle concept of the Heritage Park is one of sustainable development.

Learnings from Heritage Park:

- Conservation of the existing facilities and integrating the design proposal on top of the existing fabric, which in turn has a positive impact on heritage of the city.
- The open spaces & parks are important determinant in micro-climate of urban spaces, along with the vegetation and topography. These open spaces tend to absorb noise & air pollution and provide breathing space for the city.

4.4 SAIDAPET MARKET

Markets are a very integral part of the culture in many cities in India. Going to the market in the morning to buy vegetables, fruits and meat for the day is something of a ritual in many households. The experience of going to a market involves wading through a sea of people whilst estimating and judging the different stalls and their produce, finally ending with haggling with the shopkeeper for a reduced price or extra greens. This is a typical experience of a market goer on a daily basis.



Fig 4.4 “(i) Plan of Saidapet Market”

Through research, I found that the market going experience is marred by **several issues** facing the market area and its surroundings. The most common issues were faced **garbage disposal, parking inadequacy, irregular vehicular and pedestrian circulation around the market and improper segregation of various commodities within the market.**

FISH AND MEAT STALL

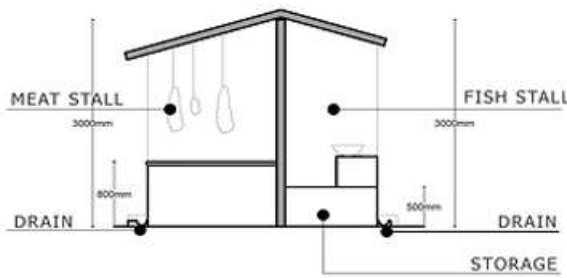


Fig 4.4 “(ii) Typical fish stall module”

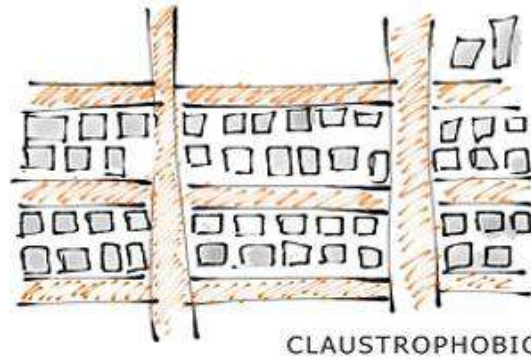


Fig 4.4 “(iii) Zoning & Orientation of Market”



Fig 4.4 “(iv) Circulation Map of Saidapet Market”



- From **fishes and meat, and from fruits and vegetables**, the bazaar sells it all, despite the fact that size and state of the roads make it almost impossible for vehicular traffic to move.
- **Lack of footpaths and congestion making it a challenging prospect to even walk.**
- **No system for waste disposal** exists even today.

5. THRUST AREA: PASSIVE DESIGN FOR HOT&HUMID CLIMATE

Passive design can be referred to a way of designing buildings that takes advantage of the prevailing climate and natural energy resources, such as daylight, wind and thermal buoyancy, to achieve a comfortable environment

while minimising energy use and reliance on mechanical systems. This paper reviews a selection of work on key issues which are inherent to passive design for thermal comfort in hot humid climates, namely the comfort zone, the minimisation of cooling needs and techniques for cooling and dehumidification. Directions for future research are also discussed. The review highlights the need for acquiring generic design and control principles, which will help maximise the potential of various passive design techniques for providing thermal comfort in hot humid climates, and which will also complement the knowledge already gained from case studies and fieldwork carried out in the areas. Furthermore, continuous research and development, both technical and commercial, are required to develop high-potential passive climate control techniques to become viable alternatives to mechanical solutions.

5.1 INTRODUCTION

Increasing concerns about global warming present the building industry with a challenge to cut its energy consumption. In countries such as the UK and the US, for example, the building sector consumes of order 40-50% of the total delivered energy. Of this, climate control systems, namely ventilation, cooling and heating can account for as much as 70% of the total energy use. However, this part of the energy consumption can be reduced significantly by employing passive environmental solutions instead of mechanical ones: for example, a well-designed naturally ventilated building can consume only a third of the energy consumed by an air-conditioned building, while arguably providing a comparable level of comfort. This is because passive design allows buildings to adapt more appropriately to their local climates and take better advantage of natural energy resources, such as wind and thermal buoyancy, to help condition their interior environments. Furthermore, passive, naturally ventilated buildings have potential to provide more pleasant and healthier environments for the occupants compared to their mechanically ventilated counterparts. Indeed, sick building syndrome is almost exclusively observed in the latter. However, achieving thermal comfort through passive means in hot humid climates is not always easy. Characterised by relatively high temperatures and high humidities, these climates usually require both cooling and dehumidification. These difficulties lead to many buildings relying completely on air-conditioning. Nevertheless, a range of passive design techniques may be employed to help minimise or avoid this reliance.

5.2 PASSIVE DESIGN STRATEGIES

The buildings are to be placed in such a way which can facilitate cross ventilation. Oblique winds between 30 and 120 degrees to the wall can provide cross-ventilation. Also, vegetation can help in contributing shade and deflection.

5.2.1 VENTILATION

Ventilation is one of the important factors to be considered while designing structures in the hot and humid climate. The flow of air helps in providing a direct physiological cooling effect. The buildings are to be placed in such a way which can facilitate cross ventilation. Oblique winds between 30 and 120 degrees to the wall can provide cross-ventilation. Also, vegetation can help in contributing shade and deflection. Furthermore, the attic spaces can also be used in ventilation as it helps in decreasing the solar heating through the roof.

5.2.2 WINDOWS

For increasing the cross-ventilation openings can be designed of larger sizes. But if the openings are not correctly shaded, it will result in the direct penetration of solar radiation into the interior of the structure. In case the windows are unshaded, the glass area should be limited to 15% of the area of the facade. Also, shading devices become necessary in such cases. Shading devices are critical for visual and thermal comfort and for minimizing mechanical cooling loads as well. The most effective way of shading can be external shading as it helps in cutting off direct sunlight during the summer season along with allowing sunlight in winter to enter the building. The orientation of the façade should be also considered while designing external shading devices as minimum or no shading is required on the north orientation. Also, external shades on southern orientation should be designed after studying the sun path.

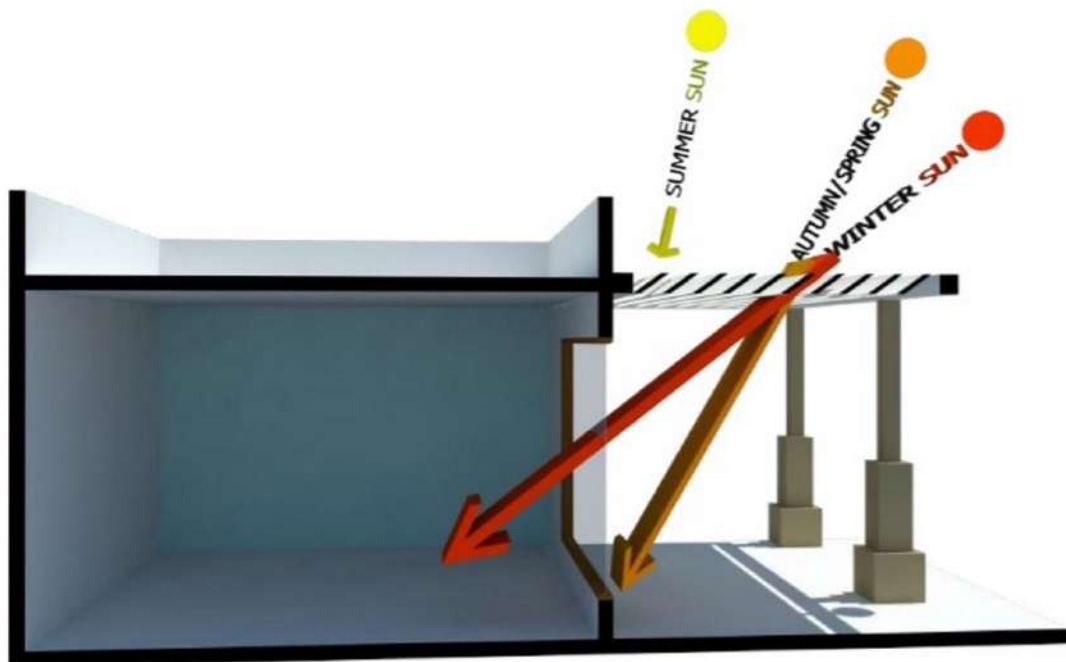


Fig 5.2.2 “Window placement”

5.2.3 LANDSCAPE

Micro-climate is essential to maintain while designing in the hot and humid climate as striking and heating of building surface can be considerably reduced by designing a proper landscape. It can also act as a buffer for restricting noise, traffic, sun, and heat. The temperature of micro-climate can be reduced around the structure and in the site through the evapotranspiration phenomenon as the shade can be created through landscaping. Additionally, deciduous trees help in providing shade during the summer season as well as provide sunlight during the winter season. Therefore, we can plant such trees on south-western as well as the west side of the structure. Furthermore, evergreen trees when planted on the northwest and north side of the structure can help in providing shade throughout the year.

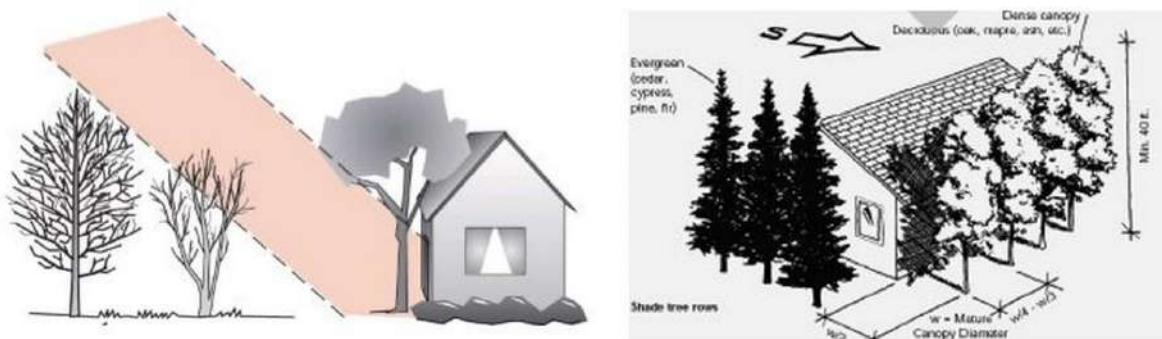


Fig 5.2.3 “Landscape & orientation”

5.2.4 BUILDING FORM

The form of the building can affect solar access, wind exposure, rate of heat loss or heat gain through the external envelope of the structure as well as airflow pattern around the structure, which will also affect the ventilation. The compactness of the structure can be measured with the help of the ratio of surface area to the volume (S/V). The requirement of artificial lighting also depends on the depth of the building. The lowest S/V ratio is believed to be of circular geometry. Thus, the circular form of the building becomes the most energy-efficient in a hot and humid climate.

5.2.5 ORIENTATION OF THE BUILDING

Solar passive design technique puts forth light upon the orientation of the building as it affects the solar radiation, daylight, and wind. In a hot and humid climate, the orientation of the buildings should be along the long axes in the east-west direction. This will eventually place the longest façade in north and south direction along with a short wall facing the east and west direction.

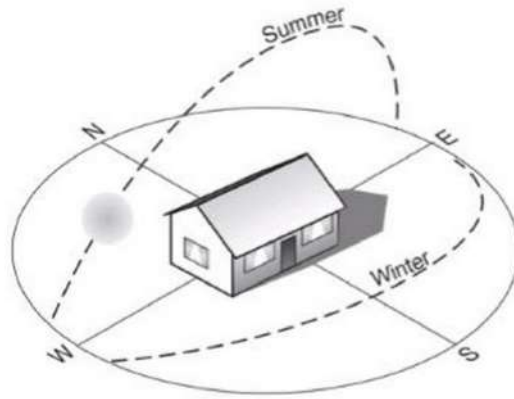


Fig 5.2.5 “Orientation & the building”

5.2.6 INNOVATIVE DAYLIGHTING SYSTEM

Light pipes are one of the innovative daylighting techniques which can be considered while designing the hot and humid climate. Light pipes help in transporting or distributing natural as well as artificial light. They also make it possible to transport daylight through thick roofs and attics. It is generally made of glass or plastic.

5.2.7 PLANNING OF COURTYARDS

The addition of courtyards at the strategic locations in the building helps in maintaining the microclimate of the structure as due to incident solar radiation in the open to sky enclosed space, the air gets warmer and moves upwards and the cool air from the ground level flows through the openings of the rooms surrounding the courtyard.

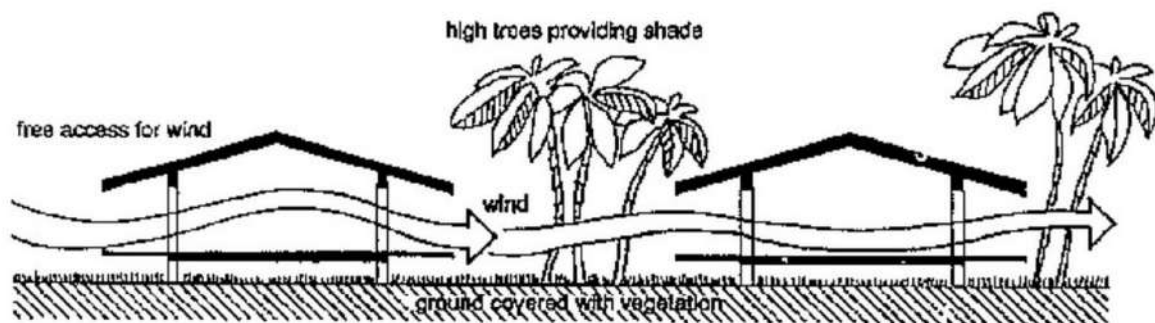


Fig 5.2.7 “Advantages of courtyards”

5.2.8 ROOM ARRANGEMENTS

The thermal load is related to the orientation of the structure and hence, room on the east side tends to be warm during the morning hours and cool down in the afternoon if it does not have much thermal mass. Whereas, the rooms on the western side are cooler in the morning and tend to heat up in the afternoon hours.

Rooms that tend to face north, as well as south, remain cool if provided with proper shading devices. Bedrooms can be designed on the east side of the building as this side remains cool in the evenings, whereas storage areas can be placed on the west side. Also, the kitchen should be placed on the west side as it is mostly used in the morning and afternoon hours. Furthermore, the main rooms can also be located on the east or west side. Rooms like the kitchen where heat occurs should be detached from the main building area but can be connected with the use of a common roof.

5.2.9 ROOF

The efficient solution for hot and humid climates can be using the double roof. The inner layer of the ceiling can be insulated and provided with a reflective upper surface. The air temperature in the inner surface should be a maximum of 4°C. Air that is discharged through the double roof should pass through the veranda and should not be allowed to enter the living zone.

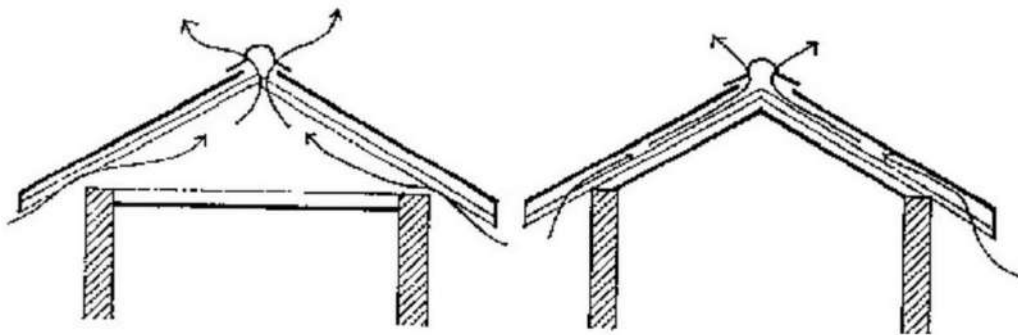


Fig 5.2.9 “Roof structure recommended for hot & humid climate”

5.2.10 GREEN WALLS

One of the solutions to work wonders in a hot and humid climate is the designing of green walls. It helps in providing protection against the solar radiant heat, reducing the glare, sound absorption, filtering the air, stabilization of the microclimate, humidity regulation effect. But the selection of plant species should be done with care, plants with aggressive root systems should be avoided.

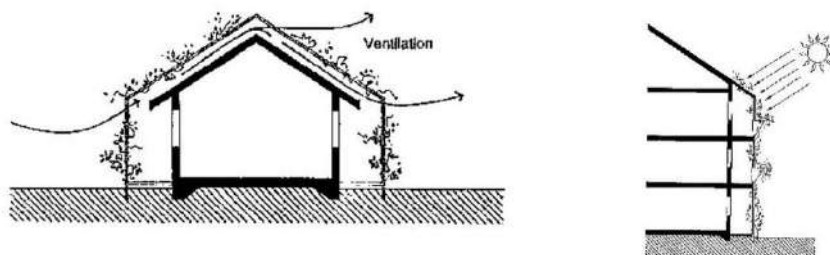


Fig 5.2.10 “Advantages of Green walls”

5.3 CASE STUDY – TRADITIONAL HOUSES IN KERALA

5.3.1 DESCRIPTIVE ANALYSIS

The tropical monsoon climate in the region and its subtropical location ensure that the average temperatures do not fall below 19°C and the maximum temperature is frequently above the 30°C mark. The diurnal temperature range is lower than the hot arid zone. The region is one of the first to be hit by south west monsoon during early June and the receding north east monsoon and experiences heavy rainfall amounting to more than 1700 mm annually. The humidity is always high often reaching a maximum of above 90%. There are strong winds all year round, especially in the monsoon season. The high humidity and temperature cause discomfort. Nights are usually too warm for comfort. Rain with strong wind tends to penetrate the building. Bright sky causes glare.

Unlike the hot and arid zone urban form, this zone's urban morphology features large open spaces with isolated houses. All houses are built in a compound surrounded by a garden with heavy vegetation. The sparse density of the cities lends to good air access. The surrounding vegetation ensures external shading and protects from the glare of the sun. The streets are oriented E-W to take advantage of the prevailing wind. The wide streets and large open spaces are a complete contrast to the narrow alleys of the hot and arid zone and show the climate sensitivity in the urban planning.

The traditional vernacular house in Kerala that falls in this zone is very distinct. Sitting in the midst of tall palm trees, the house features a central courtyard and deep verandahs both around the court as well as around the house. The longer axis of the house is aligned N-S to avoid the high heat gains from the west where the sun is low and harsh.

The house is built according to the traditional science of architecture (Vaastushastra), and is a quadrangular building known as nalukettu, so called as it has four blocks arranged around the courtyard. The large overhanging eaves of the external verandah protect the walls from the torrential rain and harsh sun, the high steeply pitched tiled roof drains the rainwater fast, the central court with a well provides evaporative cooling, the surrounding dense vegetation provides shade, the gable windows on the top of the roof facilitate stack effect, all lending to a characteristic architectural expression. The four blocks are all single bay to facilitate air movement; the upper storeys are often made in slats with spacing to take advantage of the breeze. The floor-to-floor height is about 6 m to facilitate stack effect. The high pitch ensures that the part of the roof is shaded at all times. The high roof contains a large insulated air space that keeps the lower living areas

cooler. If building more floors, the second floor is added first to the west wing, then to the south and the rest.

The courtyard is usually sunk so that cooler air settles down. The inner verandah is extensively used for all household chores. The external verandah may be enclosed with carved wooden panels that let in the wind. The verandahs towards the prevailing wind direction are kept open to benefit from the cool wind. The low eaves protect the thick laterite walls from solar radiation so that the sol-air temperature is lower.

The house has an efficient system of openings for ventilation. The gable windows to provide stack ventilation are most characteristic and efficient. There are usually more openings towards the direction of the prevailing winds. All openings are provided with wooden shutters.

5.3.2 MODEL SETUP

The house was simplified to two spaces for the model, the courtyard and the rooms surrounding it. All four walls of the court are shared by the room space. While the outer walls of the room interact with the environment, the internal partitions are modelled as one wall and connected on both sides to the room space. The courtyard is modelled with the same assumptions as the hot and arid model.

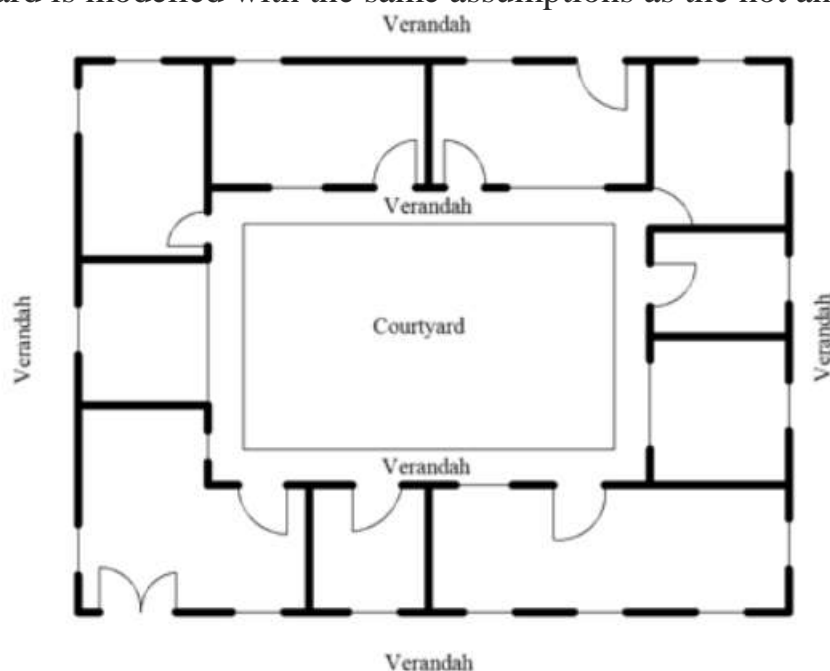


Fig 5.3.2 “Model house for analysis”

The house has a 20 m × 12 m wide courtyard and the surrounding structure totals 40 m × 32 m. The height varies from 7 m at the ridge to 5 m at the eaves. The

verandahs' are assumed as shaded. The walls are made of 500 mm thick laterite, the roof in clay tiles, and the floor of mud bricks. The windows in the houses do not have glass.

5.3.3 ANALYSIS

The simulation data are analysed and compared with reap results for the effect of the building envelope and layout in the traditional dwelling and the modern designed house. The model was run for the whole year, and an average day in the hottest month of the year was taken for thermal analysis.

The temperature and humidity results are used to calculate the Tropical Summer Index (TSI) developed in India by studies carried out in CBRI, Roorkee. It is defined as the temperature of calm air, at 50% relative humidity which imparts same thermal sensation as the given environment. The representative equation is where T_a is dry bulb (globe) temperature ($^{\circ}\text{C}$); T_w wet bulb temperature ($^{\circ}\text{C}$); v , air speed in m/s.

The thermal comfort usually lies between TSI values of 25°C and 30°C with maximum per cent of people being comfortable at 27.5°C .

The TSI was calculated using the DBT from HTB2 model, the WBT calculated using DBT and RH (from HTB2) using a psychrometric chart and the average wind speed calculated from WinAir, a wind simulation modelling tool. A study of the thermal performance of the materials and layout gave the following results. shows that there is a wider range of variations in the TSIs in various spaces in the traditional house, while in the modern house, the modelled space has a more constant TSI. The comfort range is exceeded in the modern house for a longer time and by a larger degree. The TSI for the courtyard is more extreme. But it is worth noting that the courtyard is a semi-enclosed space and the comfort in it depends on many more variables of shade and trees and evaporation, etc.

It is a common practice in the area of study, in the traditional houses, to wet the ground in the courtyard each morning, so that the temperatures remain low owing to evaporative cooling. The effect of such evaporative cooling has not been modelled in this case and hence it can be assumed that the actual temperatures will be lower than those found in this case.

In cases where the comfort range is exceeded by a minor amount, occupants can resort to certain adjustments in clothing or metabolic rate to restore comfort, but the larger this variation gets, the more difficult it is to achieve comfort. That is why in the modern houses, the use of mechanical cooling is imperative. On an average summer day, the traditional dwelling exceeds the comfort range for 40% of the time as against the modern's 65%.

In the hot and humid zone, the comfort TSI for the traditional house exhibits more variation than in the modern house. The inside is uncomfortable during the day, but the effect carries on in the modern house in the evening while the traditional house cools down faster owing to the variation in thermal mass in both constructions. The TSI for the rooms was calculated using this average wind speed of 0.5–1.5 m/s in the rooms and 1–2.5 m/s in the courtyard for the traditional house. It is evident that the house is uncomfortable during the afternoon, but reviewing the outdoor wind conditions during this period reveals that the wind speeds are much higher (8 m/s) than the average (3.5 m/s) and thus in effect the temperatures will be lower. A WinAir analysis with higher outdoor speeds of 8 m/s revealed indoor speeds of 4–5 m/s in the courtyard and 1–3 m/s in the rooms. The provision of rapid cooling of the structures works more efficiently to provide comfort in a hot and humid climate. The modern dwelling exceeds the comfort limit for 60% of the time while the traditional dwelling only exceeds it for 35% during an average hot day.

5.3.4 DISCUSSION

Typology	Modern	Traditional (hot-humid)
	No courtyard	Courtyard
Material usage	Low thermal mass walls, medium thermal mass roof	High thermal mass walls, low thermal mass roof
Fenestration/shading	High glazing ratio, low shading coefficient	High opening ratio, high shading coefficient
Natural ventilation strategies	N/A	Courtyard effect, stack ventilation
Thermal performance	+1–6°C; 60–65% of time	+1–6°C; 35% of time
Other strategies (not modelled)	Mechanical cooling	Evaporative cooling; landscaping/vegetation

Table 5.3.4 “Comparison between modern and traditional with & without courtyard”

Though the modelling analysis was limited to the effect of thermal mass, material properties and urban layout, and did not consider specifics of evaporative or ground-tempered cooling which is used in the regions as an aid to cooling; it

nevertheless gives an inkling to the effect of passive strategies in the traditional buildings when compared with the modern construction. It, thus, points out to certain lessons that are to be learnt from vernacular architecture and which can be incorporated in modern architecture to make it more efficient. A summary of features and results from the modelling analysis are presented above.

5.3.5 LESSONS LEARNT

5.3.5.1 ORIENTATION AND URBAN FORM

The orientation in traditional urban planning was designed to take advantage of the prevailing wind direction and to minimize the solar insolation in the building. There is no reason why the same principles cannot be followed in modern day planning, even when using grid layouts. The urban form in modern planning is dictated by the economic status and high rises are finding preference as against the traditional layouts. Yet, considering the benefits of orienting to reduce insolation and increase wind movement in planning should be considered by designers. Building depth should also be kept within the limit required to provide good ventilation and lighting in different spaces.

5.3.5.2 TYPOLOGY

The lack of space and the westernized design trend have steered designers away from adapting the courtyard in house design, along with the changes in lifestyles of people, such that they no longer require a semi-enclosed space to do household chores. The box-like design makes the modern house deeper than can be efficiently serviced by natural ventilation. The use of courtyard typology allowed for ventilation through well-shaded openings and a store for cooler air from the night ventilation. But similar effect, to a lesser degree, can be achieved by designing an atrium space with high-level ventilators and provision for night cooling.

5.3.5.3 EVAPORATIVE COOLING

In regions with scarcity of water, this technique was limited for its want of water features or the requirement of keeping gunny bags or earthen pots wet, but with the advent of fine-spray sprinklers, the strategy can be successfully adapted much more efficiently in modern design.

5.3.5.4 SHADING/LATTICEWORK WINDOWS

Jali windows make a distinct aesthetic expression but are a concern for safety and pest control along with being expensive in both time and money. They can be

designed to be used as the safety guards between the glass and pest screen shutters in a window, or more appropriately be used in high-level openings with pest screens. Alternatively, the use of louvers/blinds and tinted or heat-reflective windows instead of clear float glass windows will also help in increasing the efficiency of the windows. Shades must be designed to keep the solar insolation out while letting the light in, as such light shelves can be used for better performance of windows. Deep overhangs and verandahs are also losing importance in design but are an efficient way of shading windows as well as walls and reducing the sol-air temperature while providing a usable semi-enclosed space.

5.3.5.5 FENESTRATION DESIGN

Vernacular architecture features fenestration design variation in the different climate zones to either minimize solar gains or take advantage of the air movement, which is often ignored in the modern design and can be easily adapted to increase thermal comfort. The modern house has large glazed areas not well-shaded from the sun and oriented in all directions. The use of different types of openings for different purposes in a dwelling should be incorporated in design as per the climate requirement.

5.3.5.6 STACK EFFECT OPENINGS/WIND TOWERS

Modern design often ignores the principles of fenestration design for ventilation, focusing on providing large glazed areas for visual aesthetics. The traditional principles employed for increasing the wind movement in indoor spaces can be efficiently adapted to the current context, by providing high level trickle vents or atrium spaces with ventilators. The use of wind towers is discouraged also due to aesthetic concerns but a well-designed wind tower can add to the aesthetic expression and provide an efficient way to cool buildings. It can also be coupled with sprinklers to provide evaporative cooling, further enhancing the potential.

5.3.5.7 CARVED EXPOSED SURFACES

Traditional design took the benefit of carved wall surfaces to increase surface area for radiative loss and also to self-shade the wall. Some modern designs also use textured wall finishes or exposed brickwork in different courses to the same effect.

5.3.5.8 ROOF DESIGN

The thin concrete roof characteristic of the modern dwelling is the source of high solar gains and some traditional design principals can be successfully adapted to

reduce the solar gains. The use of double roofs is an efficient way of reducing heat gains and can easily be incorporated in modern design. The use of earthen pots for insulation in traditional houses can also be adapted in modern design to reduce heat gains. The use of high roofs to facilitate stack effect should be incorporated in design to increase air movement. In the warm humid region, the use of a low thermal mass roof that reciprocates the external conditions is useful for the fact that it cools down faster in the night restoring the dwelling to comfort conditions. Although it also heats up faster, it might be beneficial to explore the use of movable insulation to prevent heat gain in the day but promote heat loss in the night.

5.3.5.9 MATERIALS

This is perhaps the most difficult aspect to adapt, as most traditional construction materials are outdated and unsuitable to current standards. But as demonstrated in the analysis, they have a profound effect on the thermal performance of the building and there is ample scope of improvement in the current envelope design specifications. The modern brick-concrete construction does not provide the long thermal lag, and the rapid cooling in the hot and humid climate. In the hot and arid zone, the heavy thermal mass of the walls and the roofs of the traditional house provides long thermal lag ideal for a climate with high diurnal range, keeping the house comfortable both in the day and the night while in the hot and humid zone, the high thermal mass of the walls provides some thermal lag while the thin roof allows the house to cool rapidly in the evenings to maintain comfort conditions. Materials having similar thermal properties as the traditional stone or mud walls can be found or composite walls made to perform similarly. The use of cavity walls and insulation can be applied to the same effect.

5.3.6 CONCLUSION

It can be concluded that the traditional passive strategies can be effectively adapted to modern design conditions and benefit the comfort conditions in dwellings. As seen from the thermal modelling, only through the effects of materials, orientation and shading, the traditional dwelling are comfortable for 60–65% of the time as against the modern dwelling which is comfortable only for 35–40% of the time on an average hot day. Most of the design-based strategies are easy to adapt and the material-based strategies have alternative solutions that can be used to make the buildings more energy-efficient in the ways identified in this study. Further exploration is required to understand the other strategies apart from the thermal performance of materials, layout and shading; in order to fully comprehend the combined effect of these strategies. An exploration into finding different combination of these strategies in modern design might unravel a solution for a completely passive design.

6. DESIGN DEVELOPMENT AND PROPOSALS

6.1 CONCEPTUAL FRAMEWORK

6.1.1 INTRODUCTION

The town centre is seen as a mascot for the town, here the new revives the old. The town centre is not demonstrative of the contrast of old and new but, it is meant to be as an extended arm of the town that bridges the town to the outside. The town centre is an emblem of an Empowered trankebar. The town centre manifests many a metaphors for Trankebar, it's a multidimensional node. At the same time its unusual as it is a centre that is eccentric.

Although steps were there for structured process but the search revolved around a conceptual theme – “ Concept rooted in Context”. It was felt that in a heritage precinct such as Trankebar, where modernity has not yet seeped in and it still possesses a certain rustic character, the best guidelines and clues for designing could only be offered by the town, the CONTEXT. Hence, reference to contextuality was a constant reminder, that could check the design from going astray, by creating spaces and places that the town residents could identify with and restoring very little to adding new (foreign) visuals to an already diverse canvas of images and visuals. This was seen as the most appropriate manner in which insertions in Trankebar could be dealt with.

6.1.2 THE BASIS OF DESIGN

The central notion was a vision of “**Redefining the identity**” of Trankebar, while the vision had a practical and functional side of the extremely utilitarian town centre that has been proposed to affect the context in ways more than one – social, economical, cultural, educational etc., The **Con(cep)text** adopted a multi-pronged directive in order to guide the development of design translation in line with the central idea. Hence the Conceptual framework adopted would end up with a reality check with an aspect of the town and its characteristics – there has to be a strong link with the town in any aspect of the town centre - social, educational, historical, sentimental etc., This formed a strong backing for designing as follows:

1. The very first step of design reflected the conceptual application i.e., the town's vehicular access as discussed before, had strong connections to the restoration of traffic scene within the town. The town centre (eccentric) proves to be a good buffer in warding off highway traffic to the quiet town.
2. This would thus restore the respect the town must get as now with the town centre on the by-pass and with adequate signage passers-by would know that there exists a place to be explored, as compared to the current non-descript entry.

3. The Context/ contextuality reflected in macro organisations, with the surrounding scale offering enough number of clues to pickup from. So was the case with micro level strategies. Especially facilities like Guest house, Taluk office, Tourist centre, Market etc., have an “outsider” brand, however necessary they might be. With contextuality the same facilities were adapted to native surroundings the way such activities are performed traditionally, so that the function does not interfere with the rustic ambience.
4. The larger aspect of contextuality extends into proposing a scheme whereby the community of people who dwell in this town are able to manage their day to day business by relying on local labour for any form of work, this strengthens community ties, at the same time lends responsibility. Hence facilities like Guest houses, could very well be looked at as modest/lavish cottages nothing more, as the place is meant to be sojourn or a quiet away-from-city life, hence all guests must be offered is a well-managed clean little place minus the extravagant/wasteful lavish and experience hotel concept. The guest houses are being looked at houses offering to adopt guests and make them feel at home for their short stay. Ofcourse, it’s a community decision, such an ideal could only see the light of the day with the basic infrastructural problems settled to nil.
5. Contextuality as a concept works well in every aspect of designing. Designing as an act can be seen as either in its purest or inane, as there are evident constraints to be conformed to, that might in some cases lead to boredom, repetition and constant imitation leading to no designing.

Hence, however easy it might seem to adopt contextuality, it comes with the tag of “imitation” which is undeniable, for aesthetic, economical and fundamental reasons, after all the design is meant to be in Trankebar, and every place has its signature style that is good to preserve for people to appreciate and relish. Thus contextuality has affected the design in all its entirety, owing to the vicious cycle that, the intervention is meant for the town, and the intervention is meant to be in the town hence the town is inevitable.

6.1.3 EXTENT OF SUCCESS AND FAILURE IN THE TRANSLATION

The extent of success or failure in this thesis would depend upon many factors to begin with, although there is reality in the information we have gathered from the town and its condition, the design process has been made to suit a thesis semester, hence ignoring certain in-compatible complexities involved in reality in a project of this nature. Hence the design process might appear to be hypothetical in the absence of preconceived notion or proposal, Nevertheless, that comes in as a welcome challenge to exercise architectural explorations overlooking the volumes of work and inter-organizational interactions, and minor errors that seem

pitifalls. The loose ended subject had a challenge beginning with preparing a programme that is convincing or feasible within the purview of a student's thesis followed by extremely challenging act of determining the area of intervention with free-will. The choice of the subject could have failed if it wasn't for the strong ideological, conceptual and contextual drive that lent a launch pad for many options to be worked out for the thesis.

Although for a project of this scale, the extend of probable options derivable are unlimited in my case, that resulted in the final thesis design to be a little amorphous, as there was too much ambiguity (in terms of incoherence of scale of site v/s present population and conditions) to be extremely bold and invasive of the available resources, hence the failure lay in the aspect that the design per-se could not exhibit too much character barring the conceptual ideas, because, it required certain flexibility and lost out on the image or bold nature of a scheme i.e., an eloquent dense town centre packed with built facilities which would eventually make the town give up all public facilities within the fortified area and restore the residential colony-character. Maybe in the future events of a more successful tourism plan, the dense town centre would have done wonders but looking at the present conditions the design can be seen as a phasing plan. Among the many shortcomings, the scale –factor was most perplexing and it also made it an ambitious almost utopian scheme to plan for. Hence on the macro-level there have been too many complexities to settle before there could be free explorations into the micro-aspect of the town centre which would have been more interesting and handle able, and it's here the project needed little more time and thought.

- In spite of this, there are certain features to be highlighted in the project, as an overall scheme, however efficient or not, it did have the edge of progressiveness that is most-deserving for a town that must, like any other part of the country to be up-to-date.
- Features such as the Guest house, the shopping street seemed to fit in very well, as the retail street did prove to be a successful part of the overall scheme owing to the scale and grain. It possessed an impression of "belonging to the context".
- The plans were made to suit the present day needs, which most town-dwellers would wish for but from conservation point of view stress has been given to visualize stylization with a few modifiable options that could lend the edge of individuality at the same time continue to reflect the town's image.
- Environmentally, it is suggestive of being conservative towards restoring the greens along the river it could still beautify the scenery. It is also geologically a more sound ecological option to rescue the vulnerable site from floods or any form of tsunami back-flows.

To sum it up, the success of the project lies only in certain parts, but in totality it definitely has succeeded in being able to be expressed as an idea. Besides, offering valuable knowledge in learning the complexities one has to go through in order to prepare a well informed, flexible and workable plan for a large scale project.

6.2. PROPOSALS

1. CIVIC: TALUK HEADQUARTERS

- Office for various administration purposes
- Meeting hall
- Banking facility
- Terraced landscape

2. PUBLIC: TOURIST CENTRE

- Museum
- Town library
- Café
- Exhibition spaces
- Visitor's information centre

3. HOSPITALITY: GUEST HOUSE

- Reception and lobby
- VIP suites
- Deluxe rooms
- Dining area
- Event hall
- Banquet hall
- Ferry terminals for leisure boating

4. COMMERCIAL: MARKET

- Shopping street with retail stores
- Stock room
- Departmental store
- Fish auction space

5. RECREATIONAL

- Open plaza
- Open air theatre
- Sculptural zone

- Catamaran boating
- Riverside walkway and green park
- Ramped view deck
- Yoga & meditation corner
- Eateries & kiosks
- Heritage zone

6.3 PROGRAMME DESCRIPTION

The following section would describe each activity in broad terms for the qualitative standards under the heads: **WHY? WHAT? WHEN? WHO? WHERE?** This describes the necessity and requirements of the various activities in the programme.

6.3.1 TALUK HEADQUARTERS

WHY ?

Tarangambadi being the Taluk headquarter, holds importance in terms of administrative activities. Hence it is required to have a systematic and organized town headquarter/ town hall.

WHAT ?

- Office for various administration purposes
- Meeting hall
- Banking facility
- Terraced landscape

WHEN ?

Town hall would be used daily, morning to evening. Sometimes at night in case of social events

WHO ?

- It will be used by the residents and tourists.
- Nature of occupancy will be static and floating
- Footfall of the occupancy will be about 100-200 people per hour.
- Non-living occupancy will comprise mainly two wheelers and few cars.

6.3.2 MARKET

WHY ?

- Trankebar or the old fortified town is predominantly a residential and educational town, all the commercial needs of the town have been **ill-developed and disorganized**.
- The town also needs a platform to carry out the main occupation fishing, and **wholesale trade** apart from the retail shopping.
- The town also has Handicrafts goods that can find patrons in the tourist.
- Mainly because this is a tourist destination and people will actually buy in remembrance. The trade will boost eventually.
- Instead of a scattered pattern, a well-organized market area can increase the sales while looking it in a marketing point of view. All in one place.
-

WHEN ?

Activities are spread out from morning to night.

WHAT ?

- Shopping street with retail stores
- Stock room
- Departmental store
- Fish auction space

WHO ?

- It will be used by residents, tourists and people from neighbouring village as well
- Nature of occupancy will be largely floating and small amount of static
- Footfall of the occupancy will be about 200-300 persons per hour.
- Non living occupancy will comprise mainly freight vans and trucks, few tourist cars, taxis, autos, two wheelers, cycles.

6.3.3 GUEST HOUSE

WHY ?

- The site is located in a national highway, so there are high chances of people staying overnight.
- As of now, there are no accommodations or hotels or guest rooms that are built in town.

WHAT ?

- Reception and lobby
- VIP suites

- Deluxe rooms
- Dining area
- Event hall
- Banquet hall
- Ferry terminals for leisure boating

WHEN ?

Throughout the day, people will be checking in and checking out.

WHO ?

Tourists are the main target users. Nature of occupancy will be floating and static.

6.3.4 RECREATIONAL FACILITIES

WHY ?

Trankebar lacks well defined spaces for recreation and leisure apart from the sea-shore, hence for the community as well as for the additional tourist attraction facilities that can be developed.

WHAT ?

- Open plaza
- Open air theatre
- Sculptural zone
- Catamaran boating
- Riverside walkway and green park
- Ramped view deck
- Heritage zone

WHEN?

Activities are spread out from **Afternoon to Late evening.**

WHO?

- It will be used by residents and tourists
- Nature of occupancy will be largely floating
- Footfall of the occupancy will be about 100-200 person per hour
- Non-living occupancy will comprise mainly boats, catamarans, few tourist cars, two wheelers, cycles.

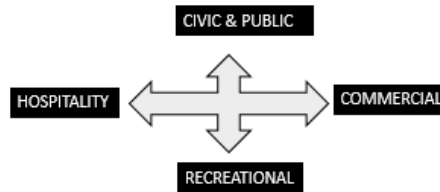
6.3.5 PROGRAMME RELATIONSHIP

The proposed town centre area is actually a low density area that has to be a continuity of the town's character. This suggests that most of the area shall be

opened to public as well as treated as outdoor spaces, that is also a requirement for the children and the elderly people in the town.

Macro components: The 4 major components are inter-related as shown

- Civic and public
- Commercial
- Recreational
- Hospitality

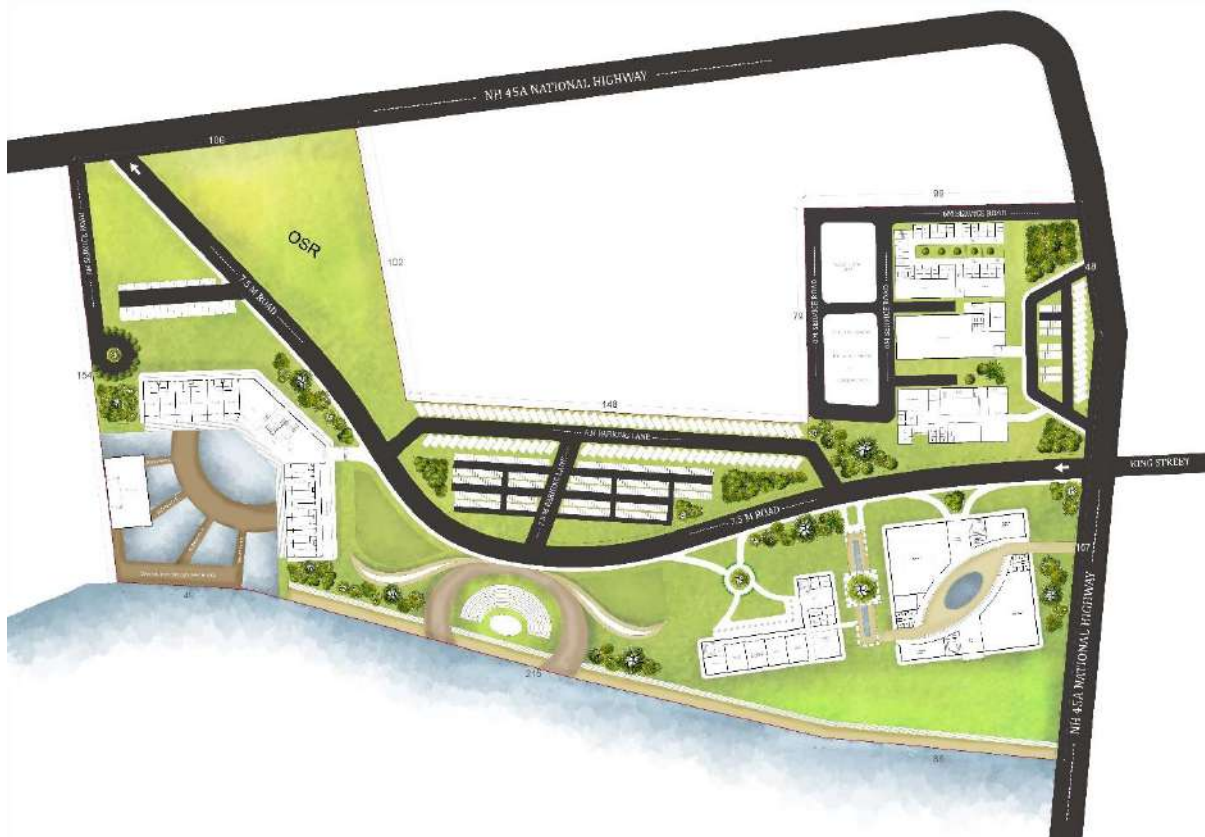


The town centre is intended to demonstrate a certain volumetric pattern that is exclusively possible only in the town centre for visual assessment, while the other buildings would follow the traditional heights, low roofs and an intimate scale. The programme thus can be seen as a combination of the monumental scale and the intimate scale.

- Monumental – Town hall
- Intimate – commercial establishments, recreation and guest house.

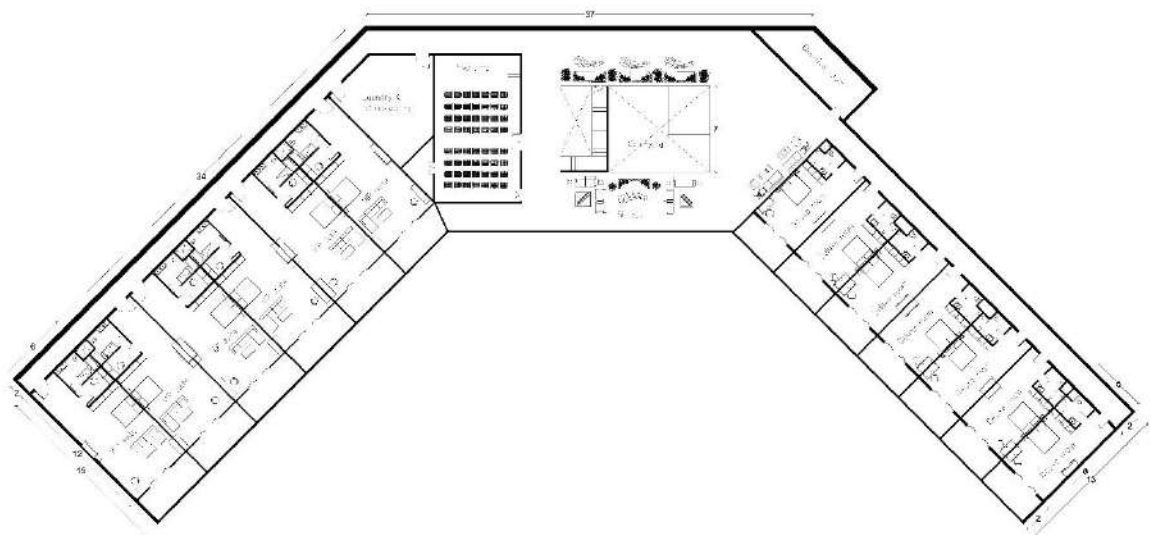
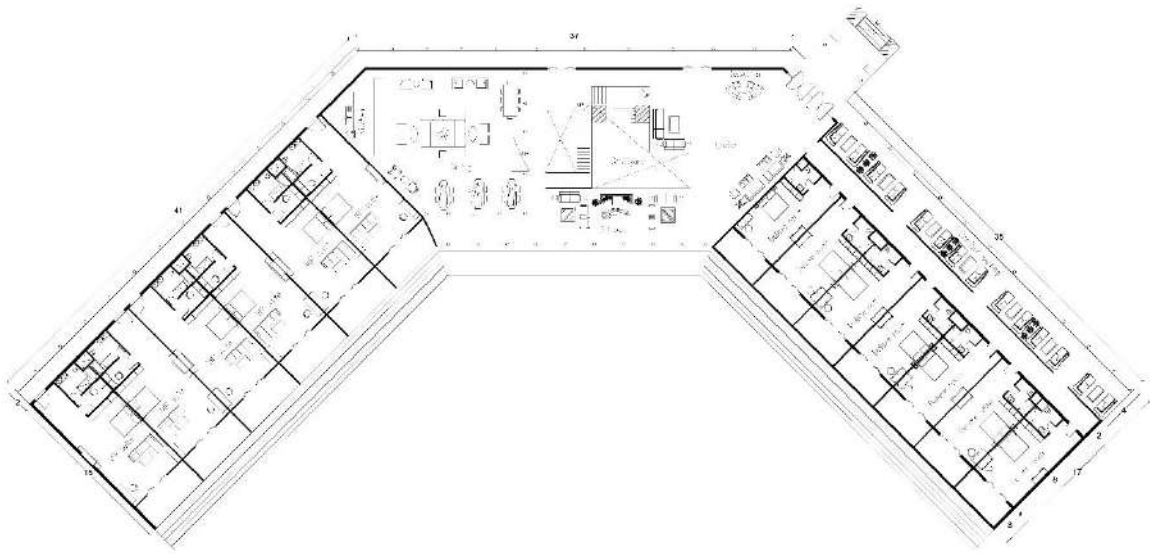
6.4 PROPOSALS

6.4.1 SITE PLAN



6.4.2 GUEST HOUSE

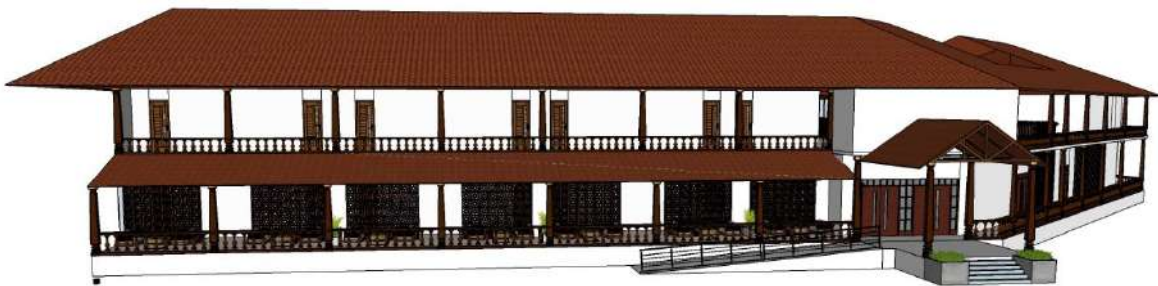
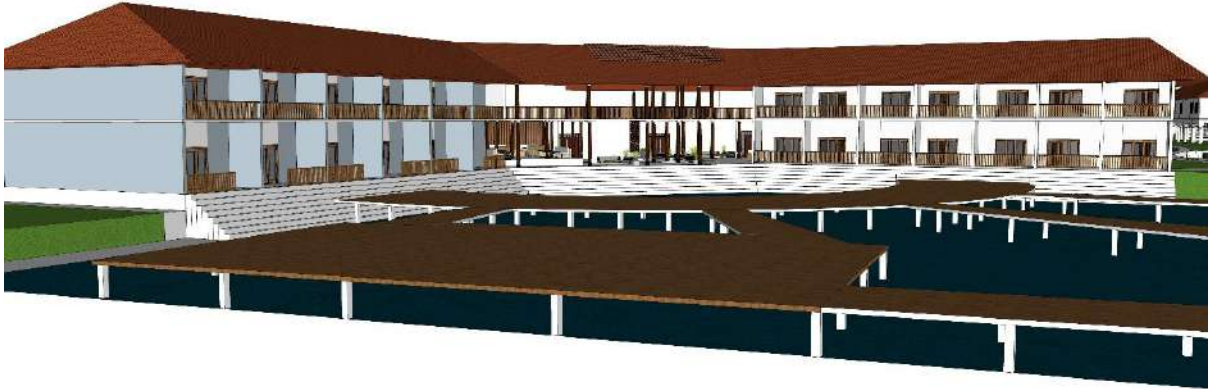
6.4.2.1 PLANS



6.4.2.2 ELEVATIONS

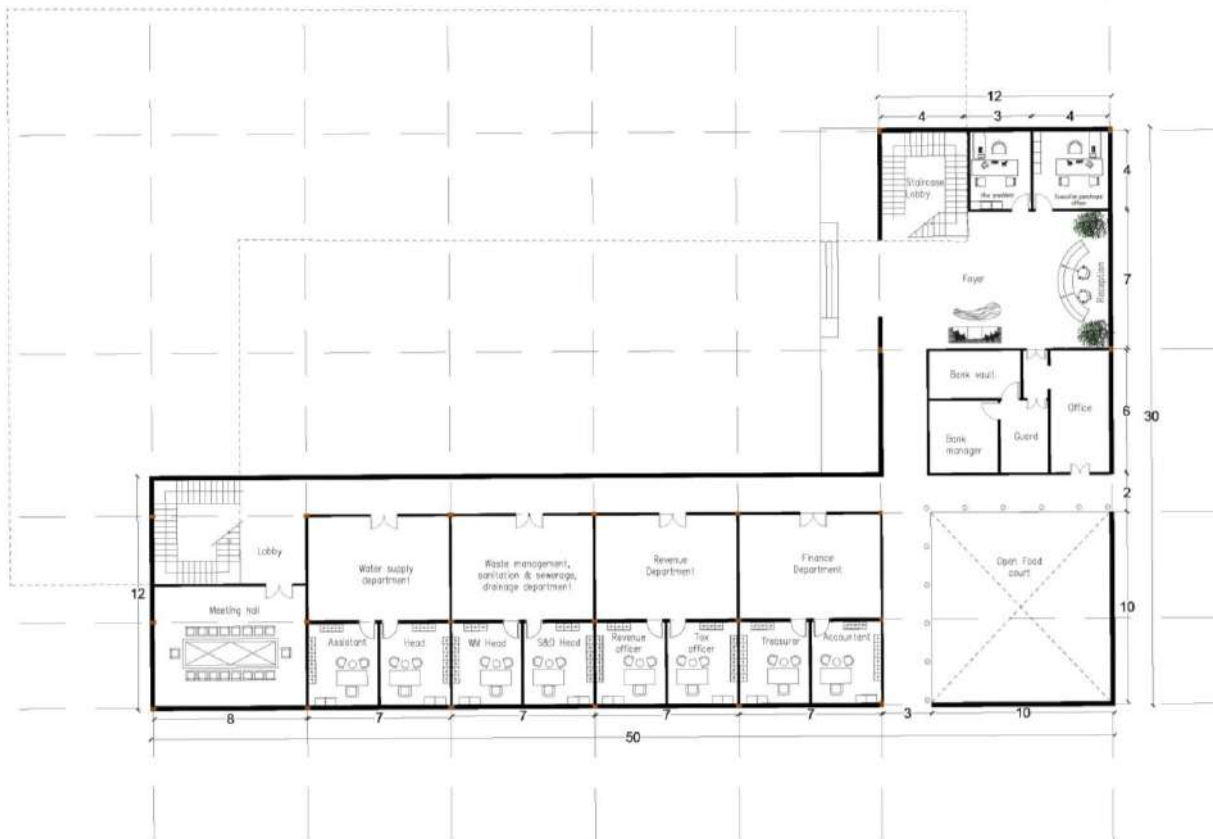


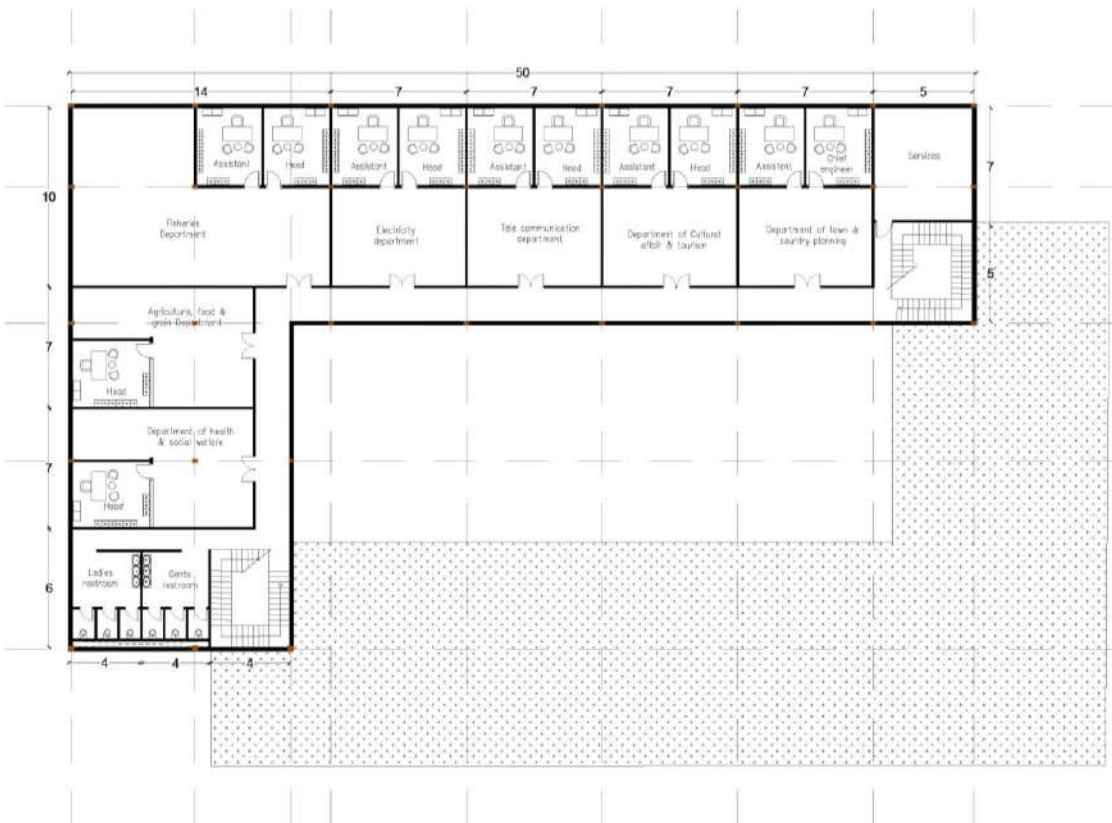
6.4.2.3 VIEWS



6.4.3 TALUK OFFICE

6.4.3.1 PLANS





6.4.3.2 ELEVATIONS



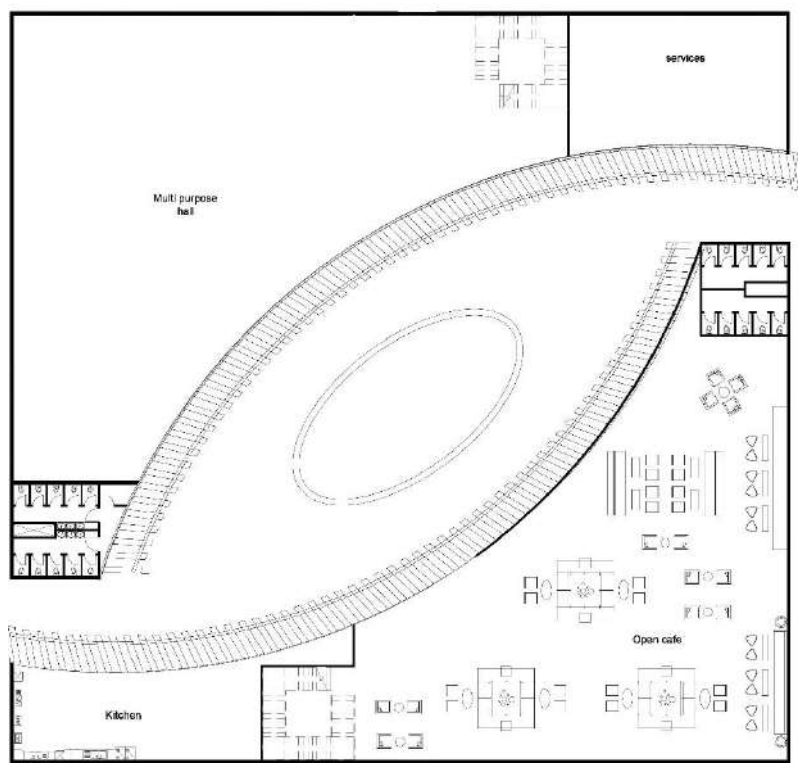
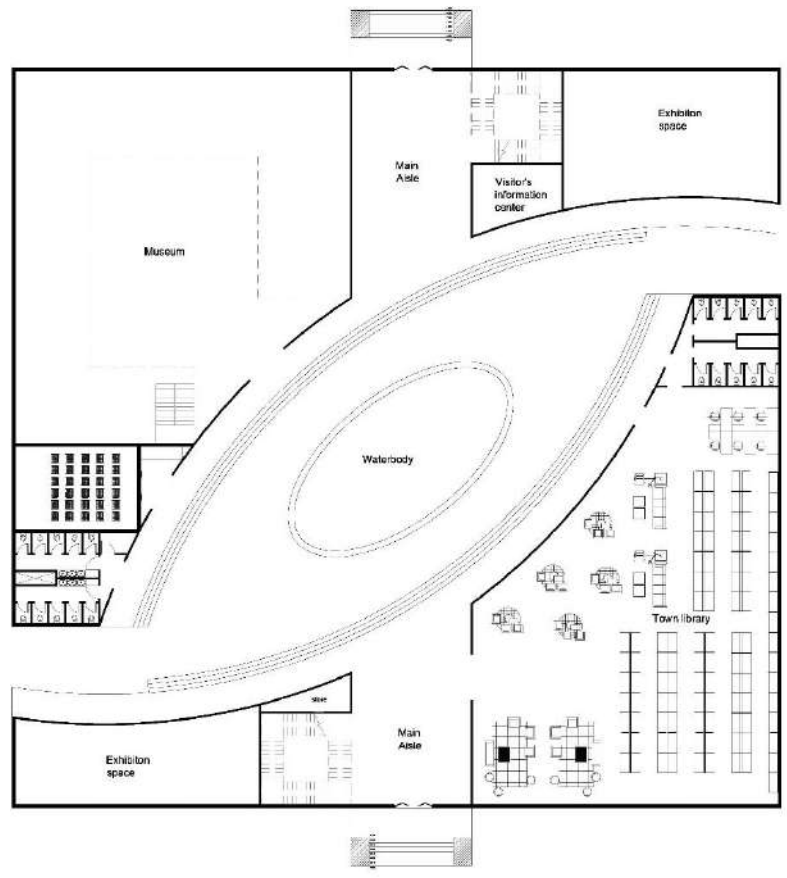


6.4.3.3 VIEW



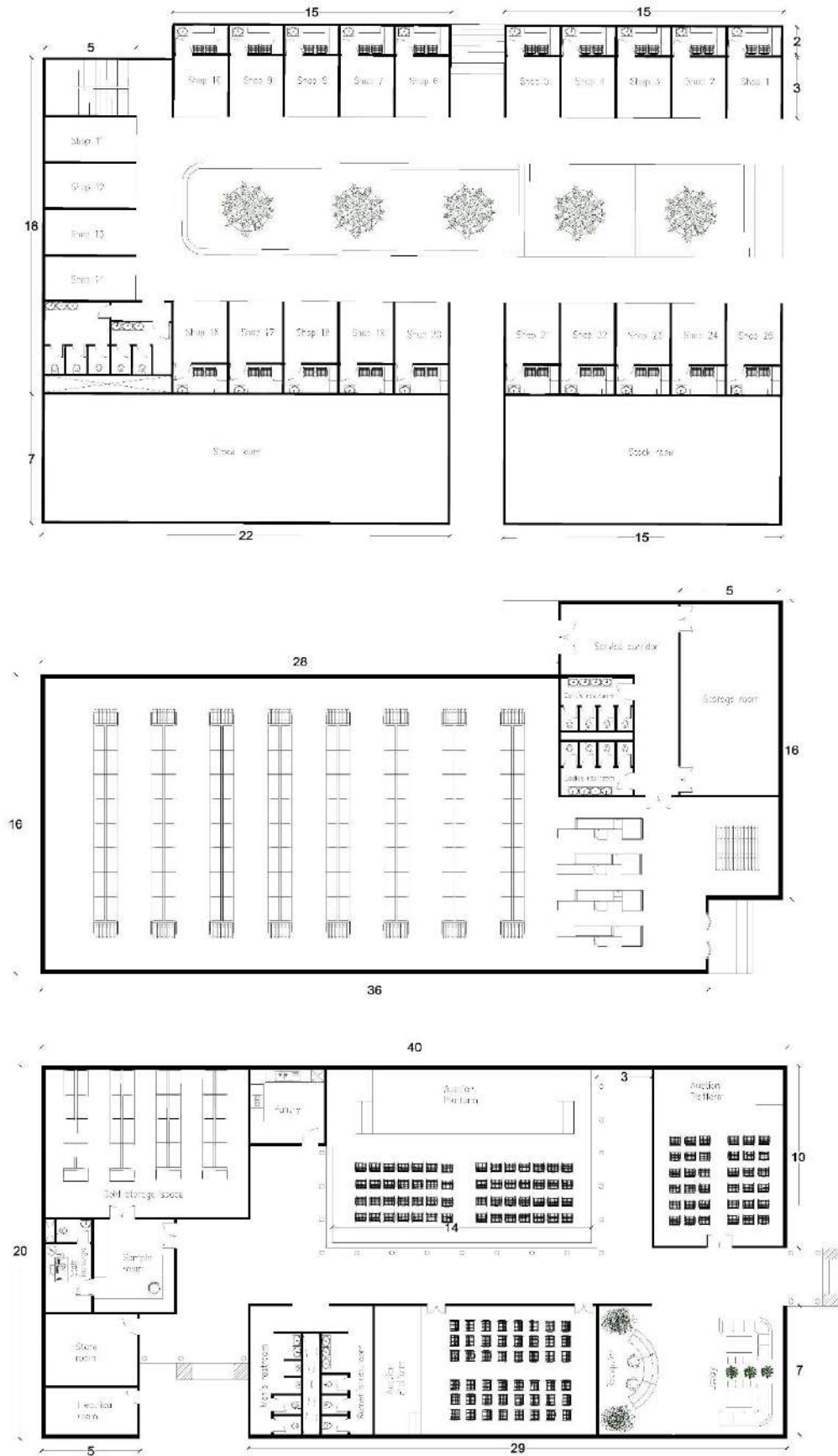
6.4.4 TOURIST CENTRE

6.4.4.1 PLAN



6.4.5 MARKET

6.4.5.1 PLAN



7. CONCLUSION

- The activities that have been proposed are all predominantly **public facilities**.
- The town hall is a civic facility while the rest are prominently commercial with a small amount of hospitality and recreational.
- There is also a major component of open public spaces that is part of the activity programme
- The **open spaces form vital connections** to relate the various public functions in the form of squares, pathways, courts, parks, etc.,
- While the **civic buildings** also assume more importance in terms of **size and form** the other facilities are more intimate in scale enabling the difference of **scales in the visual composition**.
- The **open spaces and commercial facilities offer flexibility**, that comes in use to tie up all other activities of the programme.
- The programme shall attempt to respond to the rich architectural heritage in order to **develop a new identity** for the town of Trankebar.
- The new hub/centre is symbolic and the node or interface between the old and the new, the town and its surroundings