A Study on Visibility Analysis of Urban Landmarks

The case of Gopuram of Padmanabha Swami Temple in Trivandrum

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***Abstract*—Urban experience is a sequential process and the cumulative effect of sequence of views is critical in it. Kinaesthetic experience of moving through space is an important part of visual dimension of urban environment. Urban landmarks are the primary elements of a city's image. Landmarks are very useful in orienting the observers in a city and providing memorable experience. Visibility and legibility of urban landmarks are important in orientation and increasing the potential depth and intensity of human experience in a city.**

Gopurams are the sacred and significant landmark structures which form the image and identity for the historic temple towns of south India. These sacred monuments have been built to be viewed and worshipped from far as well as near. The Gopurams, which once stood in the center of the settlement and dominated their surroundings, are now in danger of losing their visibility due to a variety of elements that obstruct the view. In this context the study focuses on the visibility analysis of Gopuram of Padmanabha Swami temple from a few selected transportation routes in the present CBD. For examining the sequential scenes of the landmark, photographic survey based scene capturing methodology was used. Viewscape Assessment Framework was used for analyzing the selected views. Quality of the view and the quality of place from which the view is available was taken into consideration in this framework. Each view was graded using modified View Assessment Framework. Major findings from the study reveals that the visibility of the Gopuram is strong in the selected routes and the view potential of selected points can be strengthened by reducing the visual pollution level and the grade can thus be improved. Proper guidelines is formed for protecting the view potential and improving the pedestrian legibility

Keywords— landmark, visibility, legibility, Kinaesthetic, Photographic survey, View Assessment Framework

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I. INTRODUCTION

A distinctive and legible environment which heightens the intensity of human experience can enhance the quality of an urban scenario. Urban experience is a sequential process. Kinaesthetic experience forms a very vital part of it. Studies conducted on the perceived quality of urban environment looks for ways of establishing harmonious relationship between people and world outside. Disorientation can affect this harmonious relationship adversely. Urban landmarks are one of the primary factors of image of city. Landmarks are very useful in orienting the observers in a city and providing a memorable experience. The Historic towns are the evidence of cultural and architectural evolution of a community. The preservation of character of historic towns is very important in maintaining the cultural and architectural identity and experience of a city. Views play an important part in shaping our appreciation and understanding of historic environment, in towns and cities [1]. Rapid urbanisation and unplanned formations without considering the aesthetic quality create visual chaos in historic cities. Although life is not totally impossible in the visual chaos of modern city, the same daily action could take a new meaning if carried out in a more vivid setting [2].

In Indian context uncontrolled urban development in the historic towns threatened to block the traditionally enjoyed views and due emphasis has not been placed in preservation of views of sacred monuments and landmarks. Each urban planning and renewal project should be focused on these characters. Both physical and social qualities need to be analysed in different study areas which include motion perception [3]. Due to intense infrastructure development, city dwellers perceive and interpret the city in motion along the transportation routes. So the visibility study of the landmarks can be done considering the motion along the transportation routes. The study focuses on the pedestrian legibility of the Padmanabha Swami Temple Gopuram in the present scenario and what kind of sequential view series this historical landmark has along the transportation and accessibility axes.

View assessment framework was used for determining the relative grade for the views, and guidelines were formed for improving the view potential and pedestrian legibility. In this study the area near to east entry gate was taken for the study because of its proximity to the transit nodes. Since the major view potential exists only in the axial roads, these roads were only selected for the study. Urban views were analysed as sequential photos by using traditional methods. Using more complicated visual assessment techniques can provide more extensive data and more detailed evaluation opportunity of visual images. The time constrains for the observation study limits the study to some extents. Since the view potential is only limited to the linear transportation routes, these routes are selected for the study.

II. LITRERATURE REVIEW

For a city experienced by a moving observer, the cumulative effect of sequence of views will be critical [4], [5]. Lynch defines 'imageability' of an object by a quality which has a strong evocative mental image in any given observer [2], [5]. Thus, perceiving an environment also means creating a visual hypothesis and building an organized mental image. Kinaesthetic Experience of moving through a space is an important part of visual dimension of urban environments. In kinaesthetic motion, there is an experience of self-movement and an experience of external world at the same time [3]. Visual aspects of the urban environment carry a prominent position for its inhabitants in visualization, conceptualization, and eventually perception of a city. Serial vision is a kind of sequential view analysis of the kinaesthetic experience in urban environments [3].

Urban landmarks are one of the important elements of image of the city and they are very useful in orienting the observers in a city and providing memorable experience [6]. Spatial knowledge is said to be necessary to build a complete mental representation of an environment and visual landmarks are the most remembered, thus the most descriptive elements of this representation [7]. An urban landmark greatly effects the navigability of an observer by giving proper sense of orientation.

Navigability is another important aspect of visual experience. Navigability means that the navigator can successfully move in the information space from his present location to a destination, even if the location of the destination is imprecisely known [6]. Three criteria determine the navigability of a space: first, whether the navigator can discover or infer his present location; second, whether a route to the destination can be found; and third, how well the navigator can accumulate way finding experience in the space [6].

Visual pollution can affect the visual experience adversely. It is an aesthetic issue and refers to the impacts of pollution that impairs one's ability to enjoy a vista or view. Visual pollution disturbs the visual areas of people by creating negative changes in the natural environment. Visual pollution is defined as the whole of irregular formations, which are mostly found in natural and built environments. Administrative negligence and excessive advertising cause Visual pollution in urban areas. Effects of exposure to visual pollution include distraction, eye fatigue, decrease in opinion diversity, and loss of identity [8] .

In recent years visual Perspectives of vehicle drivers, road traffic and pedestrians, and the role of landmarks in way finding and navigation are important topics of urban studies related with visual experience of the cities [3]. Study such as Visibility Analysis of Hagia Sophia [3] investigates the nature of landmark from various points of view such as the knowledge creating extensive spatial ability in way finding. Visual assessment study in urban analysis has also been widely recognized. Some of the prominent studies that focus on view protection Townscape, Buildings, and Landmarks are London View Management Framework [9], Viewscape Assessment Framework for Protecting the Views of Sacred Monuments: Comparative Study of Sreerangam and Thanjavur Religious Towns [1], Effect on Trabzon City Center Silhouette [8] etc.

The studies mentioned above developed methods which involve inventorying, analyzing, and developing recommendation for protection of views of landmarks, buildings, townscapes, thereby improving urban experience of a city . Visibility Analysis of Hagia Sophia [3] and Viewscape Assessment Framework for Protecting the Views of Sacred Monuments: Comparative Study of Sreerangam and Thanjavur Religious Towns [1] provided most useful information for this study. In overall, these studies provided with useful information that helped to guide this research towards identifying the important views and viewscape prevention.

In the Indian context, studies and research focusing on the visibility of historic landmarks and the preservation of their view were not given importance. But there is a need for such research to protect the views and to sustain the cultural as well as the architectural identity of a city. These landmarks are constantly threatened by surrounding urban development which obscures the traditionally enjoyed views. This study attempts to fill that gap by studying the pedestrian legibility of the Padmanabha Swami Temple Gopuram in the present scenario and what kind of sequential view series this historical landmark determines along the transportation and accessibility axes, assessing the view series using view assessment framework model.

III. METHODOLOGY

Present study examines the sequential scenes of a landmark from different approaching routes by extracting the silhouette of landmark and segmenting the visibly different regions of the scene. Photographic survey based scene capturing methodology is used to analyze the visibility. Ideal segmental division is used for the purpose of scene analysis, by separating different objects from the scene [10], [3].

Modified view assessment framework is used for analyzing views and the viewing place. It contains the following attributes for viewscape [1]: (a)Visibility of the monument, (b) Classification of view, based on distance, (c)Type of view, (d)Dominance in skyline, (e)Back ground and foreground, (f)obstruction type. In the case of the viewing place ,the attributes were (a)Type of viewing place, (b)Place characteristics of the view point, i.e., (i)Location, (ii)Assessment view point(AVP), (iii)Place elevation, (iv)Activities, (v)Land use, (vi)General Ambience, and (g)Potential Viewers.

The following is the modified view assessment framework with relative weightage criteria for analyzing the views of sacred monuments and for identifying the important views [1].

1. Visibility of the Gopuram: High (visibility of the structure is more than 90%, with no obstructions), Moderate (visibility range 70% - 90%, with few obstructions), Average (visibility range 50% -70%, with more obstructions), Poor (obstructed by permanent objects, partial visibility, visibility range less than 50%).
2. Classification of View: Immediate Views (within 500m from view amenity), Intermediate Views (between 500m to 1000m from view amenity) and, Distant Views (more than 1000m from view amenity).
3. Viewing Place: View from paths and streets, View from public parks & open grounds, View from semi-public places, sacred places, View from water bodies, sacred tanks, rivers, etc.
4. Types of view: Visual corridor, Panoramic, Serial views, Framed Views and, Street-end views.
5. Dominance in skyline: The impact of silhouette of the monument in the skyline (High, Marginal and Low)
6. Obstructions types: Buildings, Signage, Communication & Utility Lines, Vegetation, Hoardings, Temporary thatched roofs (pandal), etc. Background and Foreground of the View Plane.
7. Place characteristics of viewpoints: Enclosure, Activities, Land use, Place Elevation, General Ambience, etc.
8. Potential Viewers: Locals, Pilgrims, Tourist and Non-Religious Tourist
9. View Significance: Ranked A, B, C and D among the selected views based on viewscape attributes.

In the next stage guidelines are framed for improving the protecting the view potential and improving the pedestrian legibility.

IV. THE STUDY AREA

East Fort is the CBD of the city of Trivandrum, the capital of Kerala. It received its name because it is the eastern entrance to the fort, which was built by the Travancore Kings in the present area and this could be called as the heart of Trivandrum city. Padmanabha Swami temple is the major city landmark standing in this area. The growth of Trivandrum city begins with the shifting of capital from Padmanabhapuram to the Fort Area near temple. The Padmanabha Swami temple has been the nucleus of the city growth from 1758 to present. Earlier, the city growth had started considering the visibility of the temple tower. The area lies along M.G road stretch which caters for recent developments of the city especially in the commercial sector. It could be considered as the major diversion point to different parts of the city like kovalam, Aatakulangara etc. The presence of the major KSRTC terminal just outside the fort gate links it to rest of the areas of Trivandrum. The reasons for the selection of this region as the topic of research is the importance of Padmanabha Swami temple Gopuram as a city landmark and the need for researching how such an important urban landmark is perceived in motion and also because it has gained wide national and international attention in the recent past.

The trade and transportation route which connected Padmanabhapuram and Trivandrum in the past, later transformed into present Chalai market road. This route was the major approach way to the temple from Padmanabhapuram which was the capital of the ancient Travancore kingdom. The present study also examines the view potential in this route which is now at the center of CBD.

Fig 1. Google earth images of research area

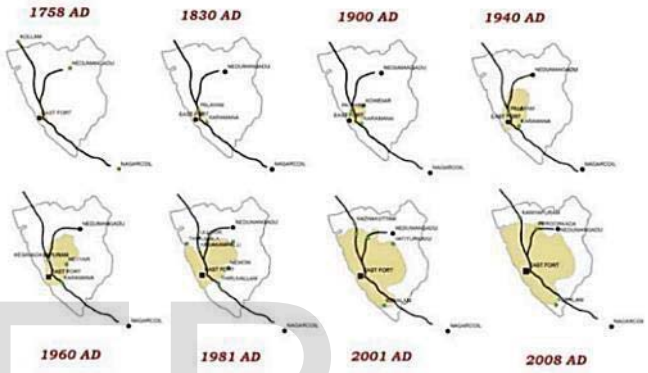


Fig 2. [11] Evolution of Trivandrum city from 1758 to 2008

Fig 3 . [12] Gopuram in 1840s

Fig 4. [13]

Chronology of events in the study area [14]

- 9th centuary-Temple was mentioned upanishad sadkopaa by nammaliar.
- 1560- Construction of the earlier gopuram of five stories.
- 1729- Reconstruction of temple by marthandavarma
- 1744-Reconstruction of fortwall.
- 1750-Thrippadidaanam.
- 1758-Shifting of capital from padmanabhapuram to trivandrum.
- 1831-construction of kuthiramalika
- 1886-Ananthavilasam palace and tamil settlements
- 1920-Extension of trivandrum city occurred.
- 1921-Chalai market grown in to a whole sale market.

A. Gopuram [15]

The base of the gopuram was constructed at the time of Raja Aditya Varma in 1568. Gopuram itself is almost 100 feets in height. On top of it, Gopuram has 7 finials. The extraordinary feature about this is that it has a base which spans more than required for its height. The Gopuram is made of brick and limestone. It has stairs up to 7th floor.

The top portion of gopuram was built in the shape a of boat. This was done according to the order of Karthika Thirunal Maharaja. The country was also called "vanchinadu",where "vanchi" means boat, hence "the country of boats". This is the reason why this shape has been given to the gopuram. Even now the shape of boat is very much evident in the silhouette. The temple gopuram represents the prosperity of the Travancore kingdom. Till 5th storey, the gopuram was constructed in the period of king Marthanda Varma. The remaining 2 storeys were finished during the period of Karthika Thirunal. At each step, the king was assisted by his devan Raja Kesavadasan. On the top of the gopuram, 7 golden finials were built. A very unusual speciality of the gopuram is its boat shaped shigaram.

The first storey of the gopuram has a small museaum in it. All the other storeys are unoccupied. A window like opening has been made at the middle of each storey where lamps are lit every evening. From far it gives a deep feeling of serenity and devinity. At the doors of all 7 storeys stand 2 dwarapalaks each. Each of the 7 pairs of dwarapalakas have unique expressions [15].

V. PROCEDURE

This paper examines what kind of sequential view series the Gopuram of Padmanabha Swami temple has, which is a historical landmark of Trivandrum. This was determined along the transportation and accessibility axes and where the most dominant visibility points and intervals in this series are. In this context, 3 different transportation axes demonstrating different perception levels along vertical and horizontal directions through Padmanabha Swami temple were determined as route for analysis.

1. Axis 1 - connecting Chalai Market -Gandhi Park-Fort Gateway-Temple.
2. Axis 2 - connecting Jos Alukkas-Padmatheertham-Ramachandran Street.
3. Axis 3 - Vasudeva Vilasam Road.

The following walking directions along the road axis were chosen to capture photos for visual analysis.

1. Axis 1 – A to A1
2. Axis 2 – B to B1
3. Axis 3 – C to C1

Then sequential view frames were captured along the determined routes. The shoots were initiated from the point where Temple Tower entered the view and was continued until it disappeared. Along the walking routes, a total of 105 photographs were taken on a partly cloudy day by using a Lumix Mega O.I.S digital camera. Since the shooting intervals were relatively short and some captures were nearly identical, the number of photos were reduced in order to achieve the best flow of the serial vision.

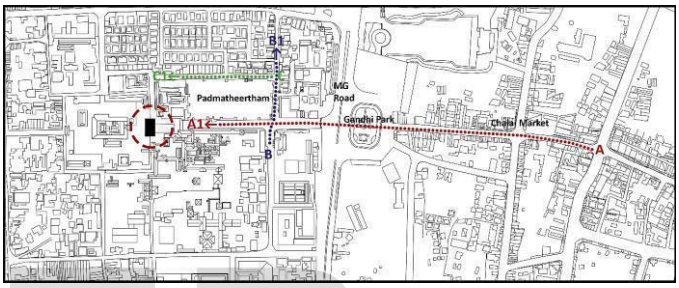


Fig 5-(source-author)

Color Photo | Black and White Photo | segmented view

Fig 6 - Extraction and Segmentation of Scenes (source-author)

In the next stage, sequential view analysis cards were prepared in order to define the visibility of Temple Tower in the obtained photo sequences. The sequential view frames in these cards were abstracted by applying the "distracting the outline silhouette "and "segmentation" [10], [3]. Many sets as shown in figure 6 were prepared.

In order to make the possible the correct interpretation of the constant differentiation, rhythm, visual unity and visibility of the tower, it is necessary to convert these series of photos into abstract expressions. Visual image set was constructed in a way to include a linear visual image produced with segmentation method, the photo taken, a map showing from where the photo was taken and the route of the movement.

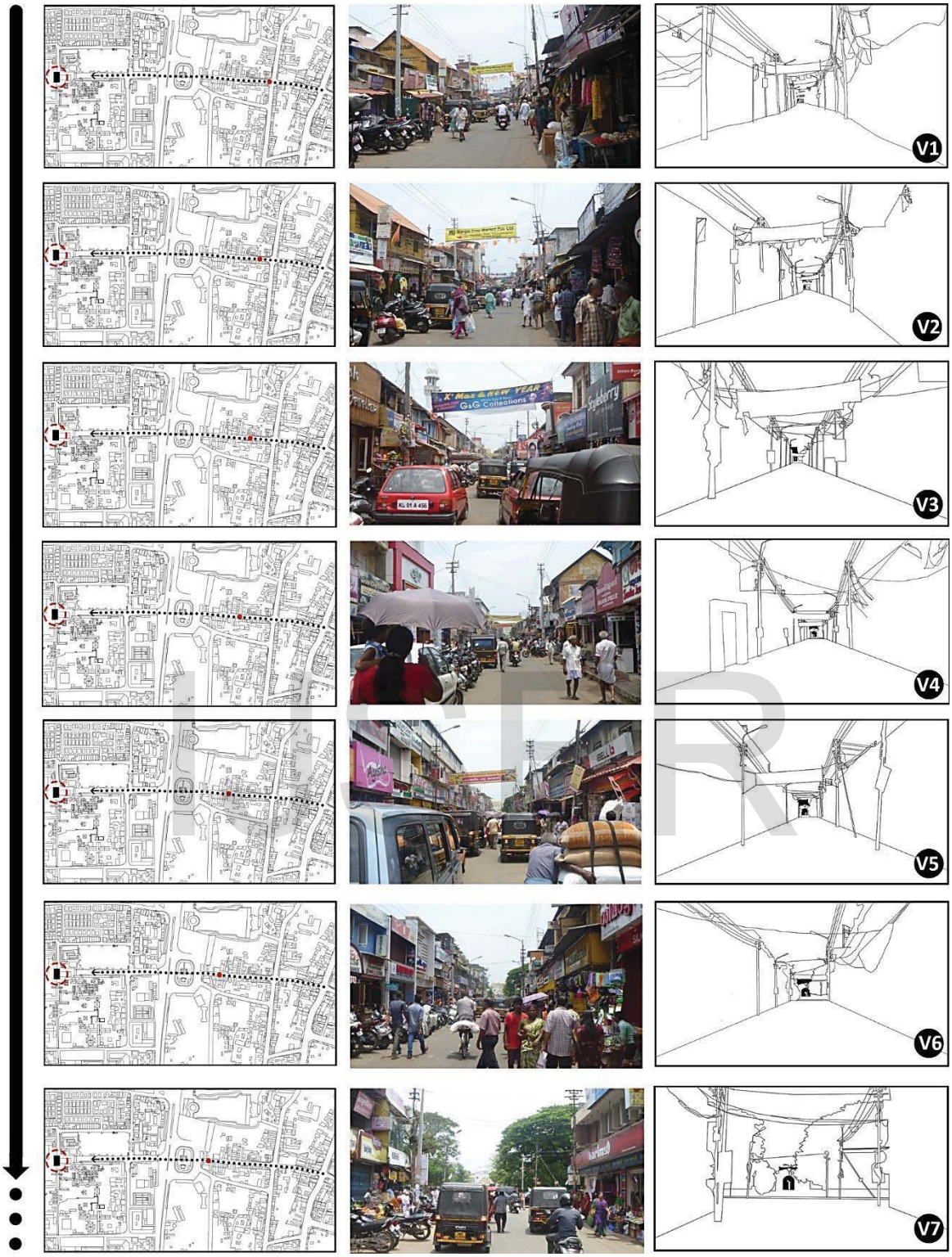


Fig 7. Group 1- A To A1 (Source-author)

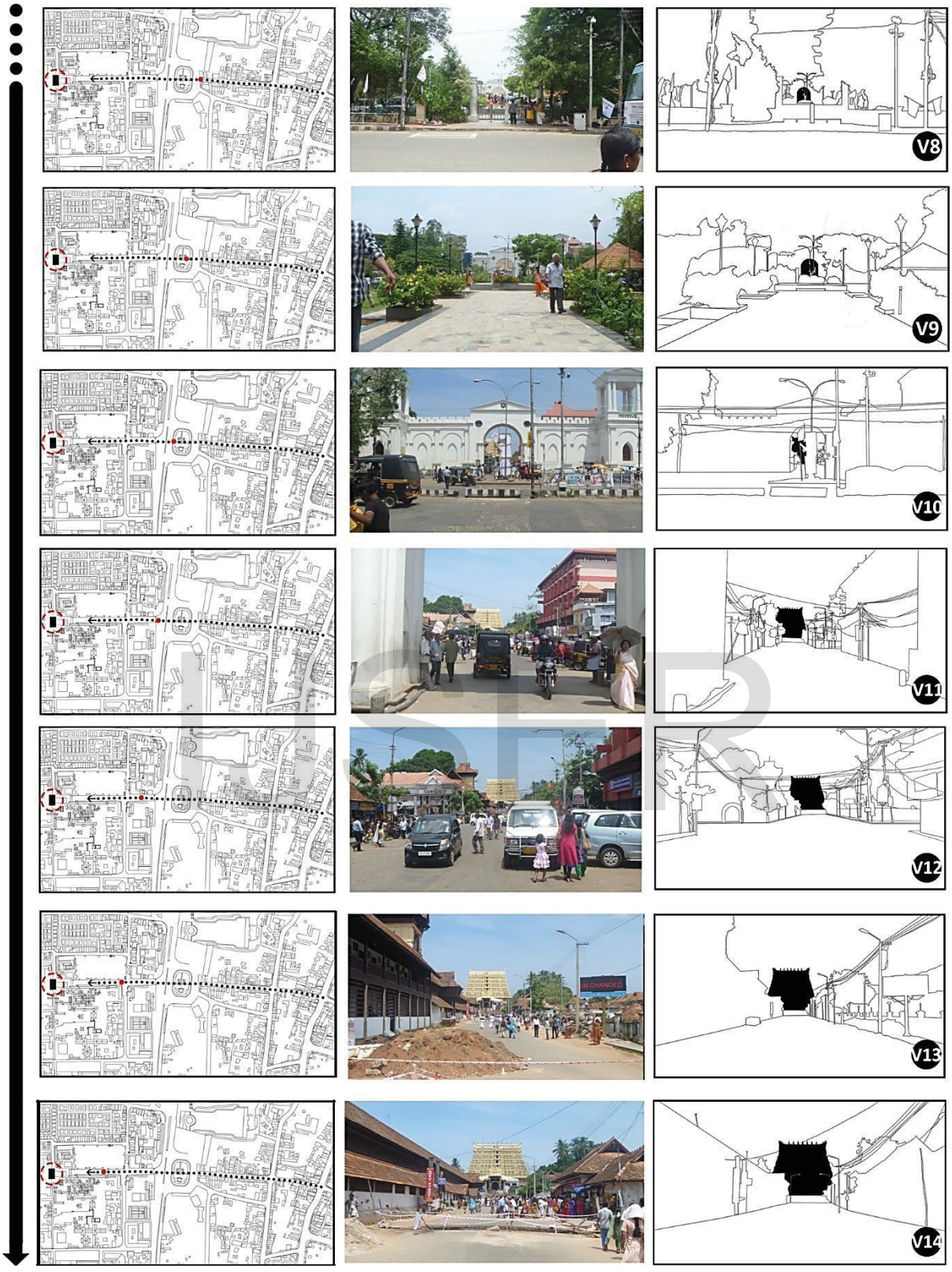


Fig 8. (Source-author)

Fig 9. Group 1- B To B1 (Source-author)

Fig 10. (Source-author)

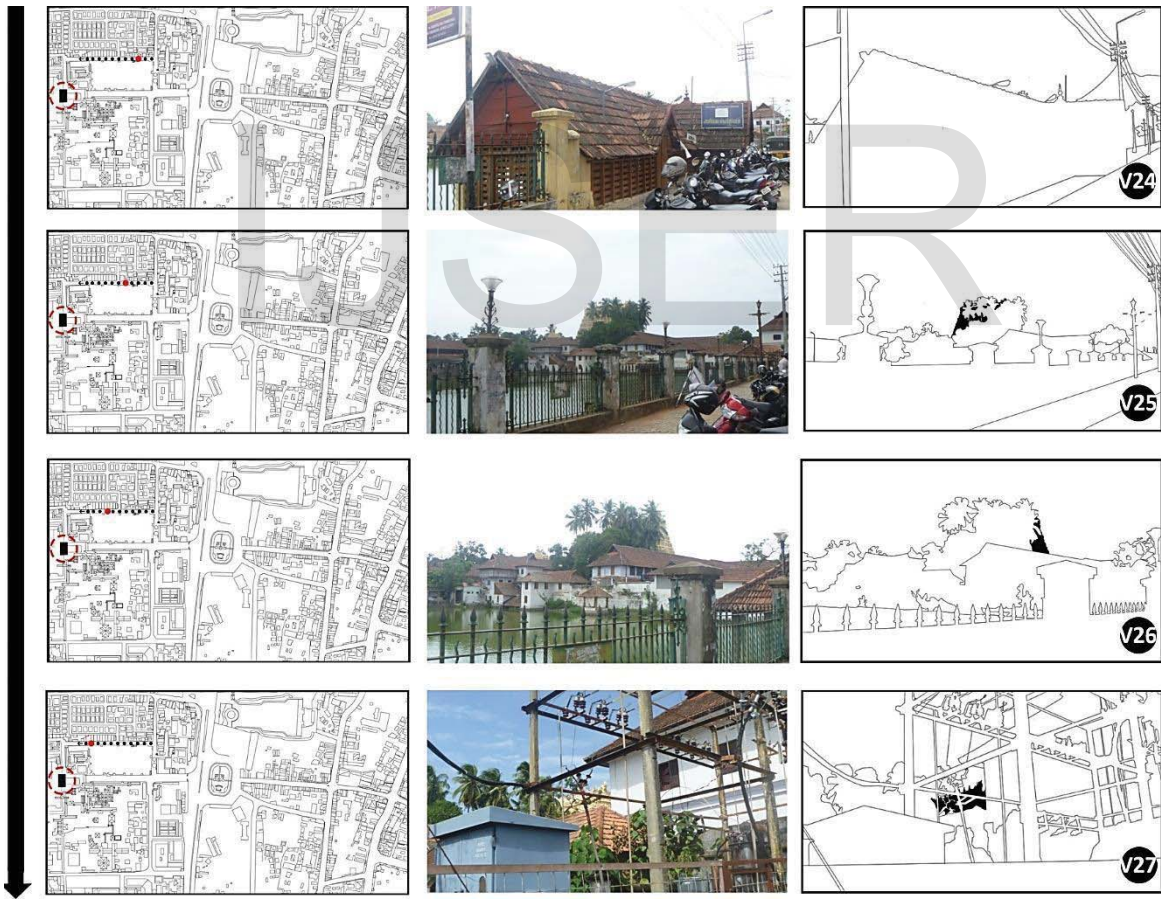


Fig 11. Group 1- C To C1 (Source-author)

VI. ANALYSIS AND INFERENCES

TABLE 1 VIEW ASSESSMENT FRAME WORK FOR STUDY AREA A TO A1 (SOURCE-AUTHOR)

View spots	Visibility of Gopuram	Classification of view	Type of view and dominance in skyline	Obstructions	Place characteristics	Potential viewers	significance
V1	Poor	Intermediate view	View :Street end Dominance: Low	Level: High Type: Moving vehicles, Hoarding, parking, Fort gate, Power lines, signages, vegetation	Location: Chalai market AVP: Market Road. Enclosure: High Activities: Commercial Place elevation: GL General Ambience: Poor	Locals	D
V2	Poor	Intermediate view	View :Street end Dominance: Low	Level: High Type: Moving vehicles, Hoarding, parking, Fort gate, Power lines, signages, vegetation	Location: Chalai market AVP: Market Road. Enclosure: High Activities: Commercial Place elevation: GL General Ambience: Poor	Locals	D
V3	Poor	Intermediate view	View: street end Dominance: Low	Level: High Type: Moving vehicles, Hoarding, parking, Fort gate, Power lines, signages, vegetation	Location: Chalai market AVP: Market Road. Enclosure: High Activities: Commercial Place elevation: GL General Ambience: Poor	Locals	D
V4	Poor	Intermediate view	View: street end Dominance: Low	Level: High Type: Moving vehicles, Hoarding, parking, Fort gate, Power lines, signages, Vegetation, Flux boards.	Location: Chalai market AVP: Market Road. Enclosure: High Activities: Commercial Place elevation: GL General Ambience: Poor	Locals	D
V5	Average	Immediate view	View: street end Dominance: Marginal	Level: High Type: Moving vehicles, hording, Fort gate, Powerlines, signages, vegetation	Location: Chalai market AVP: Market Road. Enclosure: High Activities: Commercial Place elevation: GL General Ambience: poor	Locals	C
V6	Average	Immediate view	View: street end Dominance: Marginal	Level: High Type: Moving vehicles, parking, Fort gate, Powerlines, signages, vegetation	Location: Chalai market AVP: Market Road. Enclosure: High Activities: Commercial Place elevation: GL General Ambience: poor	Locals	C
V7	Poor	Immediate view	View :Street end Dominance: Low	Level: High Type: Moving vehicles, Fort gate, Power lines, signages, vegetation	Location: Chalai market AVP: Market Road. Enclosure: High Activities: Commercial Place elevation: GL General Ambience: Average	Locals	C

View spots	Visibility of Gopuram	Classification of view	Type of view and dominance in skyline	Obstructions	Place characteristics	Potential viewers	significance
V8	Poor	Immediate view	View :Framed View Dominance: Low	Level: High Type: Fort gate, Street lights, signages, Moving vehicles	Location: Chalai market AVP: Infront of Chalai market. Enclosure: Minimum Activities: Recreational Place elevation: GL General Ambience: Average	Locals, Tourists, Pilgrims, Non-religious tourists.	C
V9	Poor	Immediate view	View :Framed View Dominance: Low	Level: High Type: Fort gate, Street lights, signages, Moving vehicles	location: Gandhi Park AVP: Pedestrian way Enclosure: Minimum Activities: Recreational Place elevation:0.90m General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists	C
V10	Average	Immediate view	View: Framed View Dominance: Low	Level: High Type: Hoarding, Moving vehicles, Fort gate, Powerlines, Signages ,Flux boards, Street lights	location: Gandhi Park AVP: End Point, Facing MG Road. Enclosure: Minimum Activities: Recreational Place elevation:0.30m General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists	B
V11	High	Immediate view	View: street end Dominance: High	Level: Medium Type: Moving vehicles, Powerlines, Vegetation, Buildings	Location: East fort AVP: Entry Way of fort. Enclosure: High Activities: Commercial Place elevation: GL General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists	A
V12	High	Immediate view	View: street end Dominance: High	Level: Medium Type: Moving vehicles, parking, Powerlines, signage, Street Lights, ,Buildings, Vegetation	Location: East fort AVP: Temple Approach way. Enclosure: High Activities: Commercial Place elevation: GL General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists	A
V13	High	Immediate view	View :Street end Dominance: High	Level: Less Type: Powerlines, Vegetation, Buildings, Street lights	Location: East fort AVP: Temple Approach way. Enclosure: High Activities: Religious Place elevation: GL General Ambience: Average	Locals, Tourists, Pilgrims, Non-religious tourists.	A
V14	High	Immediate view	View :Street end Dominance: High	Level: Less Type: Powerlines, Vegetation, Buildings, Street lights	Location: East fort AVP: Temple Approach way. Enclosure: High Activities: Religious Place elevation: GL General Ambience: Average	Locals, Tourists, Pilgrims, Non-religious tourists.	A

TABLE 2: VIEW ASSESSMENT FRAME WORK FOR STUDY AREA B TO B1 (SOURCE-AUTHOR)

View spots	Visibility of Gopuram	Classification of view	Type of view and dominance in skyline	Obstructions	Place characteristics	Potential viewers	significance
V15	Nil	Nil	Nil	Level: High Type: Buildings	Location: East fort AVP: Infront of jos alukkas. Enclosure: High Activities: Commercial Place elevation: GL General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists.	Nil
V16	Nil	Nil	Nil	Level: High Type: Buildings	Location: East fort AVP: Infront of jos alukkas. Enclosure: High Activities: Commercial Place elevation: GL General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists.	Nil
V17	Moderate	Immediate View	View : Street end Dominance: High	Level: Moderate Type: Buildings, Street lights, signages, Moving vehicles, Vegetation, Power Lines	Location: East fort AVP: Junction in the Approach Way of Temple. Enclosure: High Activities: Commercial Place elevation: GL General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists	B
V18	Average	Immediate view	View: Street end View Dominance: Marginal	Level: High Type: Temporary structure ,Martyrs post, Vegetation, Power Lines,Buildings, Moving Vehicle.	Location: East fort AVP-Road to Pazhavangadi Enclosure: Good Activities: Religious And Commercial Place elevation:GL General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists	B
V19	Average	Immediate View	View: Panoramic Dominance: Marginal	Level: High Type: Temporary structure Vegetation, moving Vehicle, Hording	Location: East fort AVP- Road to Pazhavangadi Enclosure: Nil Activities: Religious And Commercial Place elevation: GL General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists.	B
V20	Moderate	Immediate View	View: Panoramic Dominance: High	Level: Less Type: Vegetation, Buildings Moving vehicles	Location: East fort AVP- Road to Pazhavangadi Enclosure: Nil Activities: Religious And Commercial Place elevation: GL General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists	A
V21	Moderate	Immediate View	View: Panoramic Dominance: High	Level: Less Type: Vegetation, Buildings Moving vehicles, Mantapam	Location: East fort AVP- Road to Pazhavangadi Enclosure: Nil Activities: Religious And Commercial Place elevation: GL General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists	A

View spots	Visibility of Gopuram	Classification of view	Type of view and dominance in skyline	Obstructions	Place characteristics	Potential viewers	significance
V22	Moderate	Immediate view	View: Panoramic Dominance: High	Level: Less Type: Vegetation, Buildings Moving vehicles	Location: East fort AVP- Road to Pazhavangadi Enclosure: Nil Activities: Religious And Commercial Place elevation: GL General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists	A
V23	Poor	Immediate view	View: Panoramic Dominance: High	Level: High Type: Vegetation, Buildings Moving vehicles, Parking, communication Lines, Electric post	Location: East fort AVP-Road to Pazhavangadi Enclosure: Good Activities: Religious And Commercial Place elevation :GL General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists	B

TABLE 3 VIEW ASSESSMENT FRAME WORK FOR STUDY AREA C TO C1
(SOURCE-AUTHOR)

View spots	Visibility of Gopuram	Classification of view	Type of view and dominance in skyline	Obstructions	Place characteristics	Potential viewers	significance
V24	Nil	Nil	Nil	Level: High Type: Building	Location: East fort AVP-Vasudeva vilasam road Enclosure: Nil Activities: Religious Place elevation: GL General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists	Nil
V25	Poor	Immediate view	View: Panoramic Dominance: Low	Level: High Type: Building, Vegetation Moving Vehicles, Parking	Location: East fort AVP- Vasudeva vilasam road Enclosure: Nil Activities: Religious Place elevation: GL General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists.	C
V26	Poor	Immediate view	View: Panoramic Dominance: Low	Level: Less Type: Vegetation, Buildings Moving Vehicles, Parking	Location: East fort AVP- Vasudeva vilasam road Enclosure: Nil Activities: Religious Place elevation: GL General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists	C
V27	Poor	Immediate view	View: Panoramic Dominance: Low	Vegitation, Buildings, Transformer, Communication lines	Location: East fort AVP- Vasudeva vilasam road Enclosure: Nil Activities: Religious Place elevation: GL General Ambience: Good	Locals, Tourists, Pilgrims, Non-religious tourists	D

VII. FINDINGS FROM EXTRACTION OF SRGMENTAL SCENES AND NEW ASSESSMENT FRAMEWORK ANALYSIS AND INFERENCES

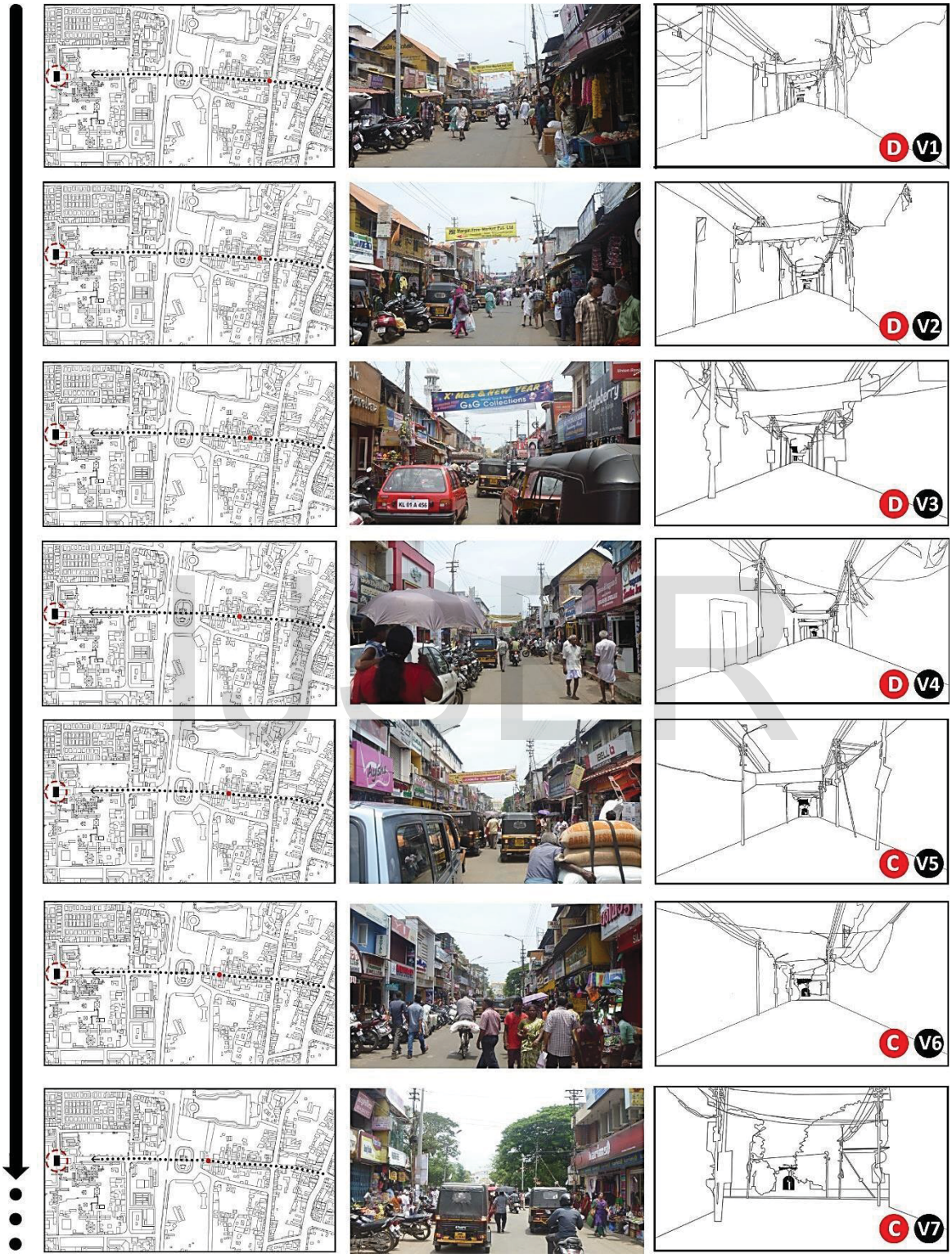
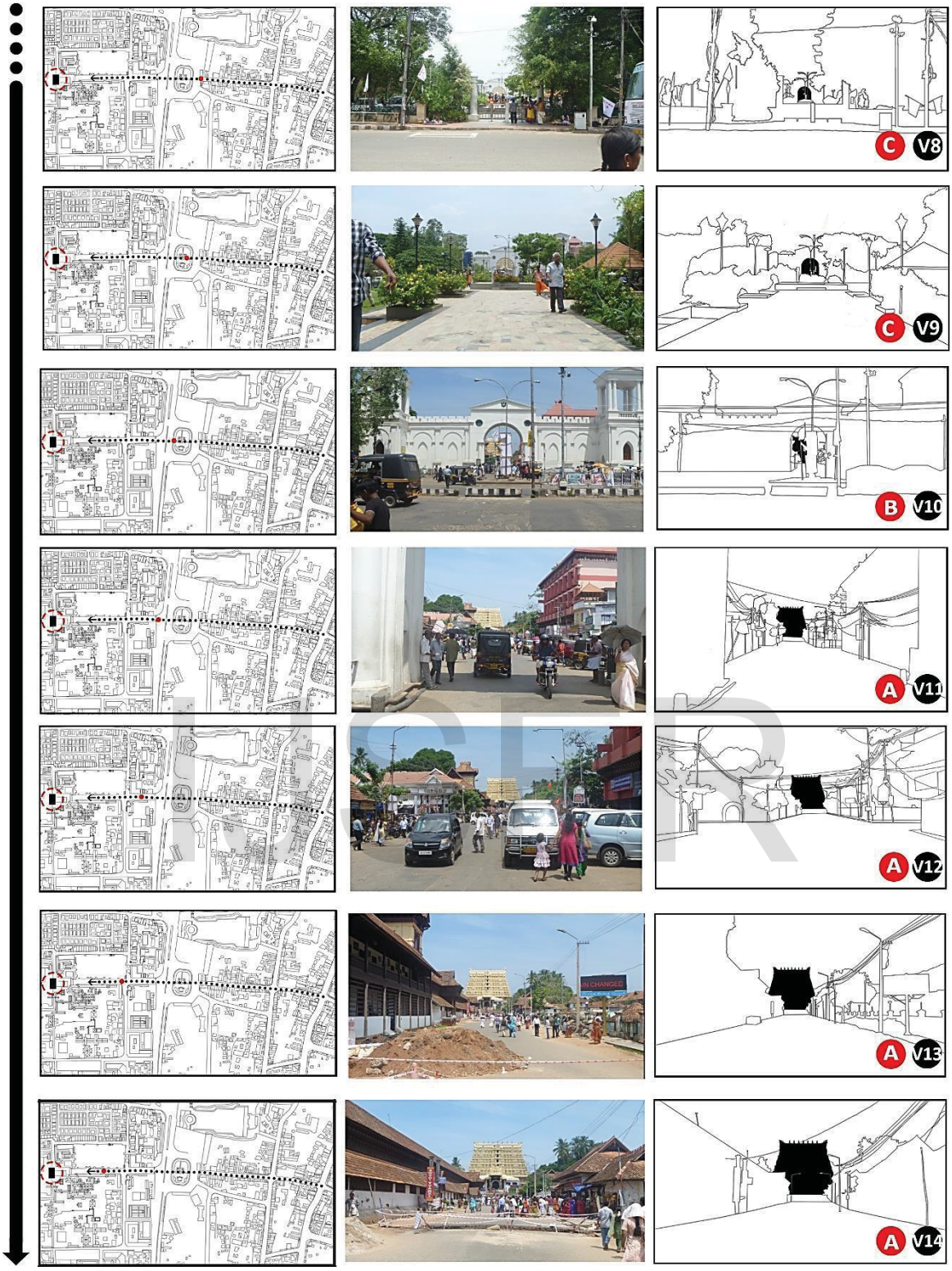


Fig 12 Group 1-A to A1. (Source-author)



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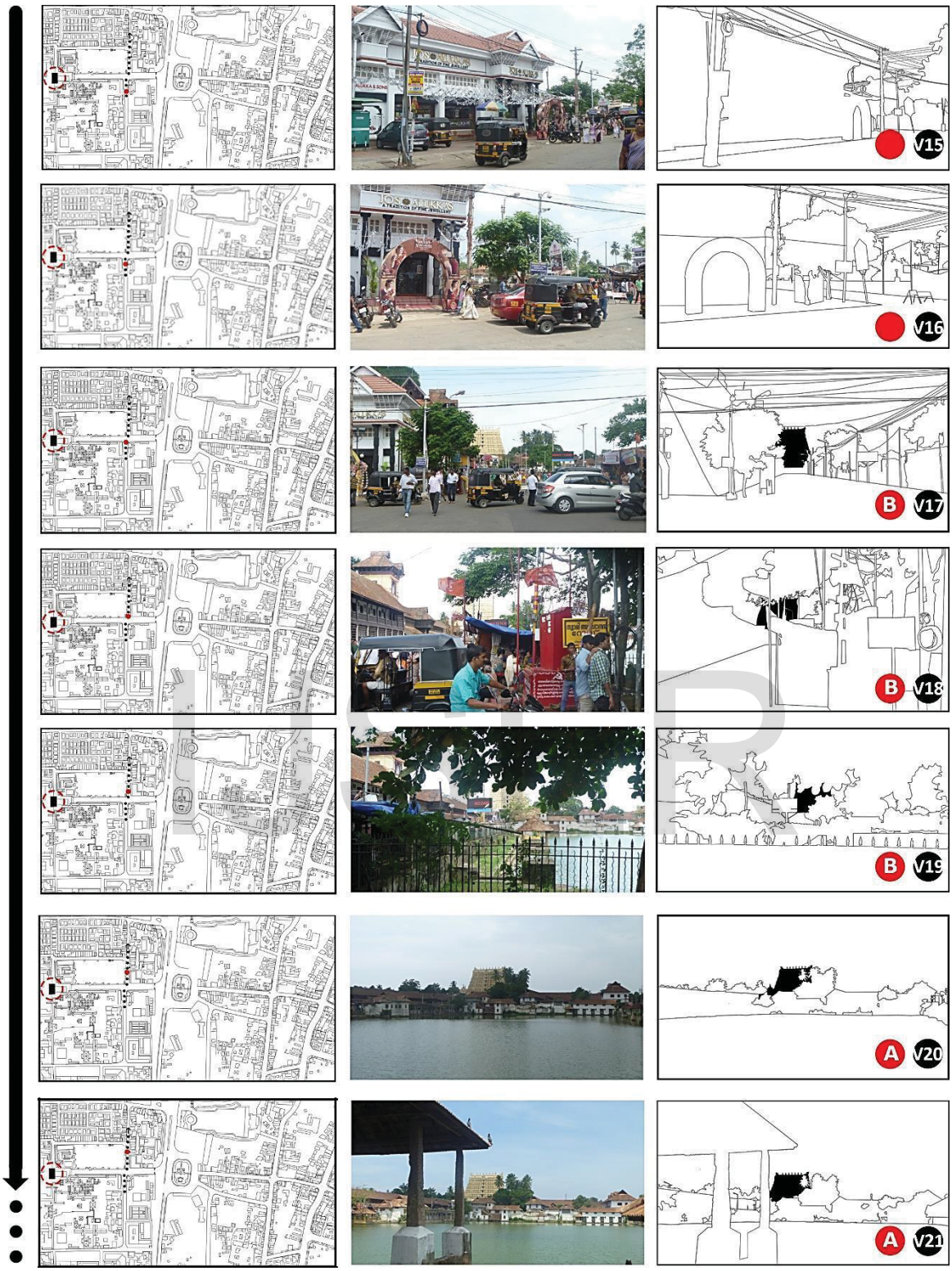

Fig 14. Group 1-B to B1 (Source-author)

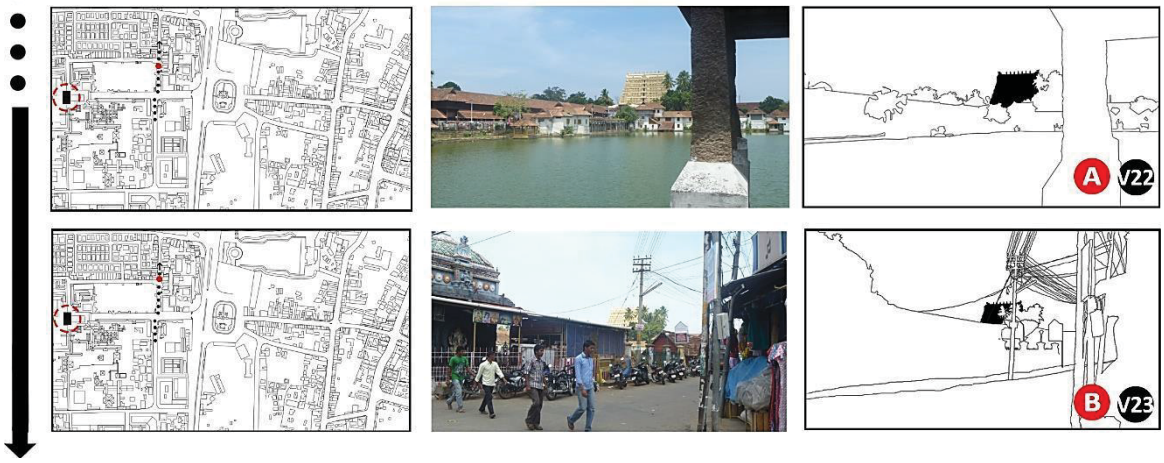

Fig 15 . (Source-author)

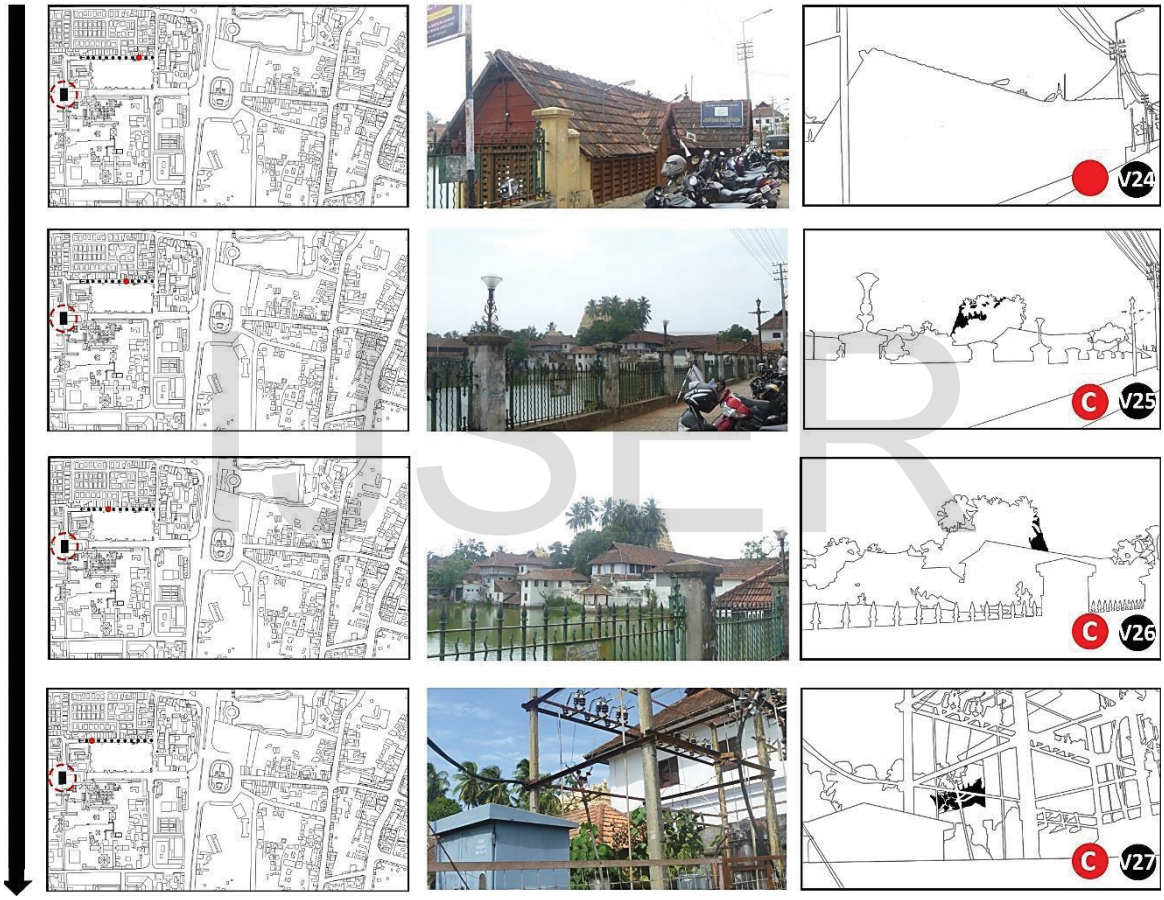

Fig 16. Group 1-C to C1 (Source-author)

Padmanabha Swami temple is located in city core of Trivandrum. With its connections to motorways, it is highly perceivable. Even now the visibility of the temple tower is strong in 3 selected axes. The major visual pollutions are caused by billboards, hoardings, excessive advertisements, electric posts and communication lines, vehicle parking, street lights, street installations, telephone towers, building height etc.

The selected points can be strengthened by reducing the visual pollution level and the grade can be improved. The pedestrian view legibility along the three axes can be enriched and the paths also can be made pedestrian friendly. Proper guidelines have to be formed for protecting the view potential and improving the pedestrian legibility.

VIII. GUIDELINES

Following guidelines are framed to strengthen the visibility of the Gopuram and to support the existing guidelines in the fort area.

- Bus parking at the East fort entry gate and the vehicular parking inside the fort wall in the selected 3 axes should not be permitted.
- The installation of hoardings, signage and advertisement boards should not affect the visibility of the Gopuram in any manner.
- Protect the skyline of the Gopuram and regulate billboards on the roofs of buildings or attached to walls of the same.
- Billboards should only be allowed to hang at roadside for a specific period of time & after that time, these should be removed to avoid unwanted burden of billboards.
- The signage and advertisement boards should be restricted to a standard size and placed at standard intervals.
- Installation of mobile towers, transformers electric posts, street lights, flag posts should not cause any impact on the skyline of gopuram.
- Tele communication lines and electricity wires should either be stretched by following a well-planned design so that these do not cause any problem to view Gopuram or undergrounding can be done.
- Confusing elements diverting the attention of pedestrian and negative effect on the visual experience shall not be permitted.

IX. CONCLUSION

The study on visibility and visual quality and perception in motion of Gopuram of Padmanabha Swami Temple, which is an important part of urban identity of Trivandrum with its effect on silhouette as well as its distinctive physical semantic quality creates a dimension of great importance at urban scale. Enriching the visual characteristics of the city by strengthening the points of visibility obtained through analysis and assessment of urban views is very important in terms of sustaining urban identity and quality. So analysis of a landmark in urban view in regard to perception in motion should be approached as an important field of study. Therefore the present urban design approaches should orient to strengthen the visual quality, the visibility of existing landmark, which is already a component of urban space, in the daily experience of its users and citizens at large.

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