ARCHITECTURAL RESTORATION IN HISTORICAL BUILDINGS - A CASE STUDY OF KANAK VRINDAVAN GHATI AND GALTA GHATI, JAIPUR

Thesis

submitted in partial fulfilment of the requirements for the degree of
Doctor of Philosophy under the supervision of
Dr. K.R. Chandhoke

By

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CERTIFICATE

This is to certify that the thesis entitled "**ARCHITECTURAL RESTORATION IN HISTORICAL BUILDINGS - A CASE STUDY OF KANAK VRINDAVAN GHATI AND GALTA GHATI, JAIPUR**" submitted by Mr. Rajiv Khanna ID No. 90PHXF803 for award of Ph.D. degree of the Institute embodies original work done by him under my supervision.

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LIST OF ABBREVIATIONS

AIA	:	American Institute of Architects
AIC	:	American Institute for Conservation
APT	:	Assocaition for Preservation Technology
ASCHB	:	Association for Studies in the Conservation of Historical Buildings
ASI	:	Archaeological Survey of India
BACRI	:	Birla Archaeological and Cultural Research Institute.
BISR	:	Birla Institute of Scientific Research, Jaipur
BITS	:	Birla Institute of Technology & Science
BTS	:	Birla Technical Service, New Delhi
HCT	:	Hindustan Charity Trust, Calcutta
ICCROM	:	International Centre for the Study of the Preservation and the Restoration of Cultural Property.
ICOMOS	:	International Council of Monuments and Sites.
INTACH	:	The Indian National Trust for Art and Cultural Heritage.
IOAAS	:	Institute of Advanced Architectural Studies (Formerly the York Institute of Architectural Studies)
UNESCO	:	United Nations Educational Scientific and Cultural Organisation.

LIST OF CONSERVATION AND RESTORATION PROJECTS UNDERTAKEN

BY

THE AUTHOR

Projects	Finance/Executing Agency	Period of execution
1. Conservation Master Plan - Jalmahal Complex	Govt. of Rajasthan	1982-84
2. Conservation Master Plan - Walled City Jaipur	Govt. of Rajasthan	1982-84
3. Kanak Vrindavan Temple Complex, Jaipur	Hindustan Charity Trust, Calcutta	1983-91
4. Kanak Vrindavan Valley, Jaipur	Birla Archaeological & Cultural Research Institute	1984-92
5. Bada Chowk, City Palace, Udaipur	Maharana Mewar Foundation	1987-92
6. Fathe Prakash Palace, Udaipur	Maharana Mewar Foundation	1991-93
7. Galta Temple Complex, Jaipur	Hindustan Charity Trust, Calcutta	1989-95
8. Kesar Kyari, Amber	Nagar Nigam Jaipur	1992-94
9. Parsuram Dwara, Jaipur	Avas Vikas Sansthan	1992-94
10. Bagore Ki Haveli, Udaipur	West Zone Cultural Centre, Udaipur, AVS	1993-ongoing
11. Mansagar lake Conservation	Nagar Nigam, Jaipur Deptt. of Tourism	1993-ongoing

12. Jalmahal Restoration	Nagar Nigam, Jaipur Development Authority	1993-ongoing
13. Mansagar Dam Restoration	Jan Mangal Trust, Jaipur	1994-96
14. Shree Govind Deoji's Temple, City Palace, Udaipur	Temple Trust, Jaipur	1993-ongoing
15. Conservation Tara Garh Fort, Ajmer	Ajmer Development Authority Ajmer	1986-ongoing
16. Revival of Mewar Complex	Rajasthan Tourism, Jaipur	1983-ongoing

The Author received the following awards for these works:

1. **Indira Gandhi Priyadarshini Award, 1991.**

2. **Maharana Sajjan Singh Award, 1992 – Mewar Foundation.**

3. **Heritage Award, 1996.**

CONTENTS

CHAPTER 1

INTRODUCTION

The cultural heritage of our country is very vast. The forts, palaces, architecturally rich temples with sculptures and paintings, created over the centuries are the symbols of our cultural identity and continuity. These monuments have remained a source of inspiration for the generations. Therefore, one of the major tasks before the present generation is to accept the challenge of preserving the cultural heritage for posterity.

Anand Coomaraswamy (1948) expressed his opinion about the cultural heritage as, "Each race contributes something essential to the worlds civilization in the course of its own self-expression and self realisation", while Percy Brown (1956) described the architectural development in these words, "In each of the major historic developments of architecture, there is one basic principle underlying its conception and one which is supremely distinctive" - "The refined perfection of proportion in Greek architecture; scientific construction of the Romans; passionate energy revealed in French-Gothic style; and the Italian Rennaissance reflects the scholarship of its time. In the same way the outstanding quality of the Indian Architecture has its spiritual content. It is evident that the fundamental purpose of the building art and technology was to represent the prevailing religious consciousness and aspirations of the people in concrete forms, "It is mind materialized in terms of rock, brick and stone" based on the principles of Vastu Sashtra.

Rajasthan, the land of Princes, comprised of many kingdoms and principalities, ruled over by various clans of Rajputs. Rajput rulers were great patrons of art and architecture and their rule saw the zenith of architecture in north India.

Amber, the ancient capital of Dhundhar, was a stronghold of Meena tribe, long before the Kachhawaha Rajputs rose to power. In AD 1017 a descendent of the Kachhawaha hero, Dholu Rai conquered the city of Amber and established his capital here. Later in the year AD1727, Maharaja Sawai Jai Singh II laid the foundation of a new capital Jaipur, in the south-west of Amber.

Number of architecturally important buildings developed in Amber and Jaipur during the last 1000 years but at the same time due to the negligence and other causes of decay, number of important buildings and sites got degenerated and turned into the ruins. These structures need careful study of their history, designs so that these could be conserved or restored.

According to Feilden (1982) conservation of historic buildings demands wise management of resources, sound judgement and clear sense of proportion and above all, it demands the desire and dedication to ensure that one cultural heritage is preserved.

The value of the historic buildings and the messages contained therein must be assessed and put in an a great order of priority before planning the conservation/ restoration work. The architect should also remember that the conservation and restoration work of historic buildings is multi-disciplinary and involves many skills/materials for the balances solution.

Review of the work of Archaeological Survey of India (ASI) for the last 40 years shows that ASI has done some conservation work of historical monuments in Rajasthan and have made important discoveries of sites and materials but they have done limited conservation work in Amber and Jaipur region, while the maintenance of the historic buildings of Amber and Jaipur has been done by the State Public Works Department (PWD).

In the year 1983 a Comprehensive Conservation Master Plan, based on the historical maps of Amber/Jaipur was prepared by a special committee constituted by the Government of Rajasthan. The Committee submitted a plan to the Government under the Coordination of M/s. Rajiv Khanna and Landscape Associates, Delhi. The Rajasthan Government approved the landscape and architectural conservation master plan in August 1984 and declared the area of the master plan as a conservation zone. The zone comprised of Forts, Palaces, Temples and other historical buildings and sites of importance within an area of 28 sq. kms. stretching between walled City/Jaipur and historical town Amber.

The first phase of the master plan started on 16th November 1984 with the objective of restoration of historical buildings and sites of Kanak Vrindavan temple complex with the budget of Rs. 13 crores. The Government of Rajasthan decided to launch the project with the public participation. The Governor of Rajasthan, approached Shri G.P. Birla, Chairman, Hindustan Charitable Trust, Calcutta for undertaking a part of restoration work in Kanak Vrindavan Ghati. The author of this thesis was the Chief Architect of the project.

After doing the preliminary study of this area, work on the thesis titled, "**Architectural Restoration in Historical Buildings - A Case Study of Kanak Vrindavan Ghati and Galta Ghati Jaipur**", was undertaken during 1990 to 1996.

The present study deals with the restoration and development of historic buildings and sites of **Kanak Vrindavan Ghati** located in the north-east of Jaipur, about five kilometers from Zorawar Singh Gate and **Galta Ghati**, situated about one kilometer from Suraj Pole gate in the east of Jaipur City as shown in the following map No. 1.

The detailed information of the present study has been described in the following eleven Chapters.

CHAPTERS:

1. INTRODUCTION
2. BASIC FUNDAMENTALS OF RESTORATION
   2.1 Study of International Charters
   2.2 Historical Study of: Amber/Jaipur Kanak Vrindavan Ghati
   Galta Ghati.
3. DOCUMENTATION OF SITES
4. CAUSES OF DECAY

CHAPTER 2

BASIC FUNDAMENTALS OF RESTORATION

2.1 STUDY OF INTERNATIONAL CHARTERS

Introduction

The international bodies like UNESCO, ICCROM and ICOMOS have proposed the basic principles guiding the preservation and restoration of ancient buildings and sites under different charters issued in the last 60 years. But our country has been following essentials of the principles of these charters from the beginning of the present century and thus, is ahead of time. In the year 1903, Sir John Marshall, Director General, Archaeological survey of India, in his work on the operation and future conduct of the Survey mapped out guidelines for arresting the process of decay in ancient monuments. He pointed out that hypothetical restorations were unwarranted and that every original component of the structure should be preserved. These principles and ideas were listed in a subsequent Government resolution in 1915, highlighting the deplorable harm that could have taken place to any ancient building by ill- conceived attempts at restoration. They were elaborated and published in a book entitled, *'Conservation Manual'* by Sir John Marshall in the year 1923. Later, Sir Bernard Fielden, Director Emeritus, ICCROM and Chairman ICOMOS, published the books *Conservation of Historic Buildings*; and *Guidelines for_Conservation - A Technical Manual* in the year 1989. Sir Bernard Fielden stated that, "We must remember, that decay is a law of nature and as conservators we can only delay matter so that future generations may benefit from our actions," but we should raise the public's consciousness of the value of their cultural heritage before it is lost forever.

The present thesis entitled : ARCHITECTURAL RESTORATION IN HISTORICAL BUILDINGS - A CASE STUDY OF KANAK VRINDAVAN GHATI AND GALTA GHATI, JAIPUR, is an attempt in the above direction.

Before restoration was initiated, the author desired it essential that the basic concepts and limitations of undertaking the task were clearly understood. Towards this end the following international charters were carefully studied.

2.1.1 VENICE CHARTER

International Charter for the Conservation and Restoration of Monuments and Sites

Imbued with a message from the past, the historic monuments of generations of people remain to the present day as living witnesses of their age-old traditions. People are becoming more and more conscious of the unity of human values and regard ancient monuments as a common heritage recognizing the common responsibility to safeguard them for future generations. What is also important to remember is that it is our duty to hand them over in the full richness of their authenticity.

It is essential that the principles guiding the preservation and restoration of ancient buildings should be agreed upon and laid down on an international basis, with each country being responsible for applying the play within the framework of its own culture and traditions.

By defining these basic principles for the first time, the Athens Charter of 1931 contributed towards the development of an extensive international movement which has assumed concrete form in national documents, in the work of ICOMOS and UNESCO and in the establishment of the International Centre for the Study of the Preservation and the Restoration of Cultural Property (ICCROM). Increasing awareness and critical study have been brought to bear on problems which have continually become more complex and varied. It is now time to examine the Charter afresh in order to make a thorough study of the principles involved and to enlarge its scope in a new document.

Article 1. The concept of an historic monument embraces not only the single architectural work but also the urban or rural setting in which is found the evidence of a particular civilization, a significant development or an historic event. This applies not only to great works of art but also

to more modest works of the past which have acquired cultural significance with the passing of time.

Article 2. The conservation and restoration of monuments must have recourse to all the sciences and techniques which can contribute to the study and safeguarding of architectural heritage.

Article 3. The intention in conserving and restoring monuments is to safeguard them no less as works of art than as historical evidence.

(A) CONSERVATION

Article 4. It is essential to the conservation of monuments that they be maintained on a permanent basis.

Article 5. The conservation of monuments is always facilitated by making use of them for some socially useful purpose. Such use is, therefore, desirable but it must not change the layout or decoration of the building. It is within these limits only that modification demanded by a change of function should be envisaged and may be permitted.

Article 6. The conservation of a monument implies preserving a setting which is not out of scale. Wherever the traditional setting exists, it must be kept. No new construction, demolition or modification which would alter the relations of mass and colour must be allowed.

Article 7. A monument is inseparable from the history to which it bears witness and from the setting in which it occurs. The moving of all or part of a monument cannot be allowed, except where the safeguarding of that monument demands it or where it is justified by national or international interests of paramount importance.

Article 8. Items of sculpture, painting or decoration which form an sole means of ensuring their preservation.

(B) RESTORATION

Article 9. The process of restoration is a highly specialized operation. Its aim is to preserve and reveal the aesthetic and historic value of the monument and is based on respect for original material and authentic documents. It must stop at the point where conjecture begins, and in this case moreover, any extra work which is indispensable must be distinct from the architectural composition and must bear a contemporary stamp. The restoration in any case must be preceded and followed by an archaeological and historical study of the monument.

Article 10. Where traditional techniques prove inadequate, the consolidation of a monument can be achieved by the use of any modern technique for conservation and construction, the efficacy of which has been shown by scientific data and prove by experience.

Article 11. The valid contributions of all periods to the building of a monument must be respected, since unity of style is not the aim of a restoration. When a building includes the superimposed work of different periods, the revealing of the underlying state can only be justified in exceptional circumstances and when what is removed is of little interest and the material which is brought to light is of great historical, archaeological, or aesthetic value, and its state of preservation good enough to justify the action. Evaluation of the importance of the elements involved and the decision as to what may be destroyed cannot rest solely on the individual in charge of the work.

Article 12. Replacements of missing parts must integrate harmoniously with the whole, but at the same time must be distinguishable from the original so that restoration does not falsify the artistic or historic evidence.

Article 13. Additions cannot be allowed except insofar as they do not detract from the interesting parts of the building its traditional setting, the balance of its composition and its relation with its surroundings.

(C) HISTORIC SITES

Article 14. The sites of monuments must be the object of special care in order to safeguard their integrity and ensure that they are cleared and presented in a seemly manner. The work of conservation and restoration carried out in such places should be inspired by the principles set forth in the foregoing Articles.

(D) EXCAVATIONS

Article 15. Excavations should be carried out in accordance with scientific standards and the recommendation defining international principles to be applied in the case of archaeological excavation adopted by UNESCO in 1956.

Ruins must be maintained and the necessary measures taken for the permanent conservation and protection of architectural features and of objects discovered. Furthermore, every care must be taken to facilitate the understanding of the monument and to reveal it without ever distorting its meaning.

All reconstruction work should, however, be ruled out *a priori*. Only anastylosis, that is to say, the reassembling of existing but dismembered parts, can be permitted. The material used for integration should always be recognizable and its use should be the least that will ensure the conservation of a monument and the reinstatement of its form.

(E) PUBLICATION

Article 16. In all works of preservation, restoration or excavation, there should always be precise documentation in the form of analytical and critical reports, illustrated with drawings and photographs.

Every stage of the work of clearing, consolidation, rearrangement and integration, as well as technical and formal features identified during the course of the work, should be included. This record should be placed in the archives of a public institution and made available to research workers. It is recommended that the report should be published.

2.1.2 THE BURRA CHARTER 1981

Charter for the conservation of places of cultural significance.

Preamble

Having regard to the International Charter for the Conservation and Restoration of Monuments and Sites (Venice 1966) and the Resolutions of Fifth General Assembly of ICOMOS (Moscow 1978), the following Charter has been adopted by Australia ICOMOS.

(A) DEFINITIONS

Article 1. For the purpose of this Charter:

1.1 **Place** means site, area, building or other works, group of buildings ~~of~~ or other works together with pertinent contents and surroundings. (Note: Place includes structures, ruins, archaeological sites and areas.)

1.2 **Cultural significance** means aesthetic, historic, scientific or social value for past, present or future generations.

1.3 **Fabric** means all the physical material of the **place.**

1.4 **Conservation** means all the processes of looking after a **place**, so it may, according to circumstance, include **preservation, restoration, reconstruction** and **adaptation** and will be commonly a combination of more than one of these.

1.5 **Maintenance** means the continuous protective care of the fabric, contents and setting of a place, and is to be distinguished from repair. Repair involves restoration or reconstruction and it should be treated accordingly.

1.6 **Preservation** means maintaining the fabric of a place in its existing state and retarding deterioration.

1.7 **Restoration** means returning the existing fabric of a **place** to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material.

1.8 **Reconstruction** means returning a place as closely as possible to a known earlier state and is distinguished by the introduction of materials (new or old into the fabric. This is not to be confused with either recreation or conjectural reconstruction which are outside the scope of this Charter.

1.9 **Adaptation** means modifying a place to suit proposed compatible uses.

1.10 **Compatible use** means a use which involves no change to the culturally significant fabric, changes which are substantially reversible, or changes which require a minimal impact.

(B) CONSERVATION PRINCIPLES

Article 2. The aim of conservation is to retain or recover the cultural significance of a place and must include provision for its security, its **maintenance** and its future. (Note: Conservation should not be undertaken unless adequate resources are available to ensure that the fabric is not left in a vulnerable state and that the cultural significance of the place is not impaired. However, it must be emphasised that the best conservation often involves the least work and can be inexpensive.)

Article 3. Conservation is based on respect for the existing **fabric** and should involve the least possible physical intervention. It should not distort the evidence provided by the **fabric.** (Note: The traces of additions, alterations and earlier treatments on the fabric of a place are evidence of its history and uses. Conservation action should tend to assist rather than to impede their interpretation.)

Article 4. Conservation should make use of all the disciplines which can contribute to the study and safeguarding of a place. Techniques employed should be traditional, but in some circumstances, they may be modern ones for which a firm scientific basis exists, and which have been supported by a body of experience.

Article 5. Conservation of a **place** should take into consideration all aspects of its **cultural significance** without unwarranted emphasis on any one at the expense of others.

Article 6. The conservation policy appropriate to a place must first be determined by an understanding of its cultural significance and its physical condition.

Article 7. The conservation policy will determine which uses are compatible.

Article 8. Conservation requires the maintenance of an appropriate visual setting, for example

- form, scale, colour, texture and materials, No new construction, demolition or modification which would adversely affect the settings should be allowed. Environmental intrusions which adversely affect appreciation or enjoyment of the place should be excluded. (Note: New construction work, including infill and additions, may be acceptable provided it does not reduce or obscure the cultural significance of the place, and it is in keeping with Article 8.)

Article 9. A building or work should remain in its historical location. The moving of all or part of a building or work is unacceptable unless this is the sole means of ensuring its survival. (Note: Some structures were designed to be readily removable or already have a history of previous moves, e.g. prefabricated dwellings and poppet- heads. Provided such a structure does not have a strong association with its present site, its removal may be considered.

Article 10. The removal of contents which form part of the cultural significance of the place is unacceptable unless it is the sole means of ensuring their security and preservation. Such contents must be returned should changed circumstances make this practical.

(C) CONSERVATION PROCESSES

(a) Preservation

Article 11. Preservation is appropriate where the existing state of the **fabric** itself constitutes evidence of specific **cultural significance**, or where insufficient evidence is available to other conservation processes to be carried out.

(Note: Preservation protects the fabric without obscuring the evidence of its construction and use.

The process should always be applied where the evidence of the fabric is of such significance that it must not be altered. This is an unusual case and likely to be appropriate for archaeological remains of national importance where insufficient investigation has been carried out to permit conservation policy decisions to be taken in accordane with Articles 23 to 25.

A new construction may be carried out in association with preservation when its purpose is the physical protection of the fabric and when it is consistent with Article 8.)

Article 12. Preservation is limited to the protection, **maintenance** and where necessary, the stabilization of the existing fabric, but without the distortion of its **cultural significance.** (Note: Stabilization is a process which helps keep fabric intact and in a fixed position. When carried out as part of preservation work, it does not introduce new materials into the fabric. However, when necessary for the survival of the fabric, stabilization may be effected as part of a reconstruction process and new materials introduced. For example, grouting or the insertion of a reinforcing rod in a masonry wall.)

(b) Restoration

Article 13. Restoration is appropriate only if there is sufficient evidence of an earlier state of the fabric and only if returning the fabric to that state recovers the cultural significance of the place. (Note: See explanatory note for Article 2.)

Article 14. Restoration should reveal a new culturally significant aspects of the place. It is based on respect for all the physical, documentary and other evidence and stops at the point where conjecture begins.

Article 15. Restoration is limited to the reassembling of displaced components or removal of accretions in accordance with Article 16.

Article 16. The contributions of all periods to the place must be respected. If a place includes the fabric of different periods, revealing the fabric of one period at the expense of another can only be justified when what is removed is of slight cultural significance and the fabric which is to be revealed is of much greater cultural significance.

(c) Reconstruction

Article 17. Reconstruction is appropriate where a place is incomplete through damage or alteration and where it is necessary for its survival, or where it recovers the cultural significance of the place as a whole.

Article 18. Reconstruction is limited to the completion of a depleted entity and should not constitute the majority of the fabric of a place.

Article 19. Reconstruction is limited to the reproduction of fabric the form of which is known from physical and/or documentary evidence. It should be identifiable on close inspection as being new work.

(d) Adaptation

Article 20. Adaptation is acceptable where the conservation of the place cannot otherwise be achieved, and where the adaptation does not substantially detract from its cultural significance.

Article 21. Adaptation must be limited to that which is essential to a use for the place determined in accordance with Articles 6 and 7.

Article 22. Fabric of cultural significance unavoidably removed in the process of adaptation must be kept safely to enable its future reinstatement.

(D) CONSERVATION PRACTICE

Article 23. Work on a place must be preceded by professionally prepared studies of the physical, documentary and other evidence, and the existing fabric recorded before any disturbance of the place.

Article 24. Study of a place by any disturbance of the fabric or by archaeological excavation should be undertaken where necessary to provide data essential for decisions on the conservation of the place and/or to secure evidence about to be lost or made inaccessible through necessary conservation or other unavoidable action. Investigation of a place for any other reason which requires physical disturbance and which adds substantially to a scientific body of knowledge may be permitted, provided that it is consistent with the conservation policy for the place.

Article 25. A written statement of conservation policy must be professionally prepared setting out the cultural significance, physical condition and proposed conservation process together with justification and supporting evidence, including photographs, drawings and all appropriate samples.

Article 26. The organisation and individuals responsible for policy decisions must be named and specific responsibility taken for each such decision.

Article 27. Appropriate professional direction and supervision must be maintained at all stages of the work, and a log kept of new evidence and additional decisions recorded as in Article 25.

Article 28. The records required by Articles 23, 25,26 and 27 should be placed in a permanent archive and made publicly available.

Article 29. The items referred to in Article 10 and Article 22 should be professionally catalogued and protected.

2.1.3 LAUSSANE CHARTER ARCHAEOLOGICAL HERITAGE

This doctrinal test will be presented for approval at the nest session of the Executive committee in November 1989.

Introduction

It is widely recognized that a knowledge and understanding of the origins and development of human societies is of fundamental importance to humanity in identifying its cultural and social roots. The archaeological heritage constitutes the basic record of past human activities. Its protection and proper management is, therefore, essential to enable archaeologists and other scholars to study and interpret it on behalf of, and for the benefit of present and future generations.

The protection of this heritage cannot be based upon the application of archaeological techniques alone. It requires a wider bases of professional and scientific knowledge and skills. Some elements of the archaeological heritage are components of architectural structures and in such cases must be protected in accordance with the criteria for the protection of such structures laid down in the 1966 Venice Charter on the Conservation and Restoration of Monuments and Sites. Other elements of the archaeological heritage constitute part of the living traditions of indigenous peoples, and protection and preservation of such sites and monuments the participation of local cultural groups is essential.

For these and other reasons the protection of archaeological heritage must be based upon effective collaboration between professionals from many disciplines. It also requires the cooperation of government authorities, academic researchers, private enterprise, and the general public. This Charter, therefore, lays down principles relating to the different aspects of archaeological heritage management. These include the responsibilities of public authorities and legislators, principles relating to the professional performance of the processes of inventarization, survey, excavation documentation, research, maintenance, conservation, preservation reconstruction, information, presentation, public access and use of the heritage, and the qualification of professionals involved in the protection of the archaeological heritage.

The Charter has been inspired by the success of the Venice Charter guidelines and a source of ideas for policies of governments as well as scholars and professionals.

The Charter has to reflect very basic principles and guidelines with global velocity. For this reason it cannot take into account the specific problems and possibilities of regions or countries. The charter should therefore be supplemented at regional and national levels by further principles and guidelines.

Article 1: Definition and Introduction

The archaeological heritage is that part of the material heritage in respect of which archaeological methods provide primary information. It comprises all vestiges of human existence and consists of braces relating to all magnificence of human activity, abandoned structures and remains of all kinds (including subterranean and underwater sites). together with all the portable cultural material associated with them.

Article 2: Integrated Protection Policies

The archaeological heritage is a fragile and non- renewable cultural resource. Landuse must, therefore, be controlled and developed in order to minimize the destruction of archaeological heritage.

Policies for the protection of archaeological heritage should constitute an integral component of policies relating to landuse, development, and planning as well as of cultural, environmental and educational policies. The creation of archaeological reserves should form part of such policies.

The protection of the archaeological heritage should be integrated into planning policies at international, regional and local levels.

Active participation of the general public must form part of policies for the protection of the archaeological heritage. This is essential where the heritage of indigenous people is involved. Participation must be based upon access to knowledge necessary for decision-making. The provision of information for the general public is therefore an important element in integrated protection.

Article 3: Legislation and Economy

The protection of the archaeological heritage should be considered as a moral obligation open all human beings; it is also a collective public responsibility. This obligation must be acknowledged through relevant legislation and the provision of adequate funds for the supporting programmes necessary for effective heritage management.

The archaeological heritage is common to all human society and it should, therefore, be the duty of every country to ensure that adequate funds are available for its protection.

Legislation should afford protection to the archaeological heritage that is appropriate to the needs, history, and traditions of each country and region, providing for *in situ* protection and research needs.

Legislation should be based on the concept of the archaeological heritage as the heritage of all humanity and of groups of peoples, and not restricted to any individual person or nation.

Legislation should forbid the destruction, degradation of alteration through changes of any archaeological site of monument or to their surroundings without the consent of the relevant archaeological authority.

Legislation should, in principle, require full archaeological investigation and documentation in cases where the destruction of the archaeological heritage is authorized.

Legislation should require, and make provision for, the proper maintenance and conservation of the archaeological heritage.

Adequate legal sanctions should be prescribed in respect of violations of archaeological heritage legislation.

If legislation affords protection only to those elements of the archaeological heritage which are registered in selective statutory inventory, provision should be made for the temporary protection of unprotected or newly discovered sites and monuments until an archaeological evaluation can be carried out.

Development projects constitute one of the greatest physical threats to archaeological heritage. A requirement for developers to ensure that archaeological heritage impact studies are carried out before development schemes are implemented, should, therefore, be embodied in appropriate legislation, with a stipulation that the costs of such studies are to be included in project costs. The principle should also be established in legislation that development schemes should be designed in such a way as to minimize their impact upon the archaeological heritage.

Article 4: Survey

He protection of the archaeological heritage must be based upon the fullest possible knowledge of its extent and nature. General survey of archaeological resources is, therefore, an essential working tool in developing strategies for the protection of the archaeological heritage. Consequently archaeological survey should be a basic obligation in the protection and management of the archaeological heritage.

At the same time, inventories constitute the primary resource data bases for scientific study and research. The compilation of inventories should, therefore, be regarded as a continuous, dynamic process. It follows that inventories should comprise information at various levels of significance and reliability, since even superficial knowledge can form the starting point for protectional measures.

Article 5: Investigation

Archaeological knowledge is based principally on the scientific investigation of the archaeological heritage. Such investigation embraces the whole range of methods from non destructive techniques through sampling to total excavation.

It must be an over-riding principle that the gathering of information about the archaeological heritage should not destroy any more archaeological evidence than is necessary for the protectional or scientific objectives of the investigation.

Non-destructive techniques such as aerial and ground survey and sampling should, therefore, be encouraged wherever possible, in preference to total excavation

As excavation always implies the necessity of making a selection of evidence to be documented and preserved at the cost of losing other information and possible even the total destruction of the monument, a decision to excavate should only be taken after thorough consideration.

Excavation should be carried out on sites and monuments threatened by development, landuse change, looking or natural deterioration.

In exceptional cases, unthreatened sites may be excavated to elucidate research problem or to interpret them more effectively for the purpose of presenting them to the public. In such cases excavation must be preceded by thorough scientific evaluation of the significance of the site. Excavation should be partial, leaving a portion undisturbed for future research.

A report conforming to an agreed standard should be made available to the scientific community and should be incorporated in the relevant inventory within a reasonable period after the conclusions of the excavation.

Excavation should be conducted in accordance with the principles embodied in the 1956 UNESCO Recommendations on International Principles Applicable to Archaeological Excavations and with agreed international and national professional standards.

Article 6: Maintenance and Conservation

The overall objective of archaeological heritage management should be the preservation of monument and sites *in situ*. Any transfer of elements of the heritage to new locations represents a violation of the principle of preserving the heritage in its original context. This principle stresses the need for proper maintenance conservation and management. It also asserts the principle that the archaeological heritage should not be exposed by excavation or left exposed after excavation if provision for its proper maintenance and management after excavation cannot be guaranteed.

Local commitment and participation should be actively sought and encouraged as a means of promoting the maintenance of the archaeological heritage. This principle is especially important when dealing with the heritage of indigenous people of local cultural groups. In come cases it may be appropriate to entrust responsibility for the protection and management of sites and monument to indigenous peoples themselves.

Owing to the inevitable limitation of available resources, active maintenance will have to be carried out on a selective basis. It should, therefore, be applied to a sample of the diversity of sites and monuments, based upon a scientific assessment of their symphonies and representative character, and not confined to the more notable and visually attractive monuments.

The relevant principle of the 1956 UNESCO Recommendations should be applied in respect of the maintenance and conservation of the archaeological heritage.

Article 7: Presentation, Information Reconstruction

The presentation of the archaeological heritage to the general public is an essential method of promoting an understanding of the origins and development of modern societies. At the same time it is the most important means of promoting an understanding of the need for its protection.

Presentation and information should be conceived as a popular interpretation of the current state of knowledge, and it must therefore be revised frequently . It should take account of the multi-faceted approaches to an understanding of the past.

2.1.4 FLORENCE CHARTER (MAY 21, 1981)

International Council on Monuments and Sites (ICOMOS)

The ICOMOS-IFLA International Committee for Historic Gardens, meeting in Florence on May 21, 1981 decided to draw up a Charter on the preservation of historic gardens which would bear the name of that town. The present Charter was drafted by the Committee and registered by ICOMOS on December 15, 1982 as an addendum to the Venice Charter covering the specific field concerned.

(a) Definitions and Objectives

Article 1. "An historic garden is an architectural and horticultural composition of interest to the public from the historical or artistic point of view". As such, it is to be considered as a monument.

Article 2. "The historic garden is an architectural composition whose constituents are primarily vegetal and therefore, living, which means that they are perishable and renewable." Thus, its appearance reflects the perpetual balance between the cycle of the seasons, the growth and decay of nature and the desire of the artist and craftsman to keep it permanently unchanged.

Article 3. As a monument, the historic garden must be preserved in accordance with the spirit of the Venice Charter. However, since it is a <u>living monument</u>, its preservation must be governed by specific rules which are the subject of the present charter.

Article 4. The architectural composition of the historic garden includes:

- Its plan and its topography.
- Its vegetation, including its species, proportions, colour schemes, spacing and respective heights.
- Its structural and decorative features.
- Its water, running or still, reflecting the sky.

Article 5. As the expression of the direct affinity between civilization and nature, and as a place of enjoyment suited to meditation or repose, the garden, thus, acquires the cosmic significance of an idealized image of the world, a "paradise" in the etymological sense of the term, and yet a testimony to a culture, a style, an age, and often to the originality of a creative artist.

Article 6. The term, "historic garden", is equally applicable to small gardens and to large parks, whether formal or "land-scale".

Article 7. Whether or not it is associated with a building in which case it is an inseparable complement - the historic garden cannot be isolated from its own particular environment, whether urban or rural, artificial or natural.

Article 8. An historic site is a specific landscape associated with a memorable act, as, for example, a major historic event; a well-known myth; an epic combat; or the subject of a famous picture.

Article 9. The preservation of historic gardens depends on their identification and listing. They require several kinds of action, namely maintenance, conservation and restoration. In certain cases, reconstruction may be recommended. The authenticity of an historic garden depends as much on the design and scale of its various parts as on its decorative features and on the choice of plant or inorganic materials adopted for each of its parts.

Maintenance, Conservation, Restoration, Reconstruction

Article 10. In any work of maintenance, conservation, restoration or reconstruction of an historic garden, or of any part of it, all its constituent features must be dealt with simultaneously. To isolate the various operations would damage the unity of the whole.

(b) Maintenance and Conservation

Article 11. Continuous maintenance of historic gardens is of paramount importance. Since the principal material is vegetal, the preservation of the garden in an unchanged condition requires both prompt replacements when required and a long term programme of periodic renewal (clear felling and replanting with mature specimens).

Article 12. Those species of trees, shrubs, plants and flowers to be replaced periodically must be selected with regard for established and recognised practice in each botanical and horticultural region, with the aim to determine the species initially grown and to preserve them.

Article 13. The permanent or movable architectural, sculptural or decorative features which form an integral part of the historic garden must be removed or displaced only insofar as this is essential for their conservation or restoration. The replacement or restoration of any such jeopardized features must be effected in accordance with the principles of the Venice Charter, and the date of any complete replacement must be indicated.

Article 14. The historic garden must be preserved in appropriate surroundings. Any alteration to the physical environment which will endanger the ecological equilibrium must be prohibited. These applications are applicable to all aspects of the infrastructure, whether internal or external (drainage works, irrigation systems, roads, car parks, fences, caretaking facilities, visitors' amenities, etc.).

(c) Restoration and Reconstruction

Article 15. No restoration work and, above all, no reconstruction work on an historic garden shall be undertaken without thorough prior research to ensure that such work is scientifically executed and will involve everything from excavation to the assembling of records relating to the garden in question and to similar gardens. Before any practical work starts, a project must be prepared on the basis of said research and must be submitted to a group of experts for joint examination and approval.

Article 16. Restoration work must respect the successive stages of evolution of the garden concerned. In principle, no one period should be given precedence over any other, except in exceptional cases where the degree of damage or destruction affecting certain parts of a garden may be such that it is decided to reconstruct it on the basis of the traces that survive or of unimpeachable documentary evidence. Such reconstruction work might be undertaken more particularly on the parts of the garden nearest to the building it contains in order to bring out their significance in the design.

Article 17. Where a garden has completely disappeared or there exists no more than conjectural evidence of its successive stages, the reconstruction could not be considered an historic garden.

(d) Use

Article 18. While any historic garden is designed to be seen and walked about in, access to it must be restricted to the extent demanded by its size and vulnerability, so that its physical fabric and cultural message may be preserved.

Article 19. By reason of its nature and purpose, an historic garden is a peaceful place conducive to human contacts, silence and awareness of nature. This conception of its everyday use must contrast with its role on those rare occasions when it accommodates a festivity. Thus, the conditions of such occasional use of an historic garden should be clearly defined, in order that any such festivity may itself serve to enhance the visual effect of the garden instead of perverting or damaging it.

Article 20. While historic gardens may be suitable for quiet games as a daily occurrence, separate areas appropriate for active and lively games and sports should also be laid out adjacent to the historic garden, so that the needs of the public may be satisfied in this respect without prejudice to the conservation of the gardens and landscapes.

Article 21. The work of maintenance and conservation, the timing of which is determined by season, and brief operations which serve to restore the garden's authenticity, must always take precedence over the requirements of public use. All arrangements for visits to historic gardens must be subjected to regulations that ensure the spirit of the place is preserved.

Article 22. If a garden is walled, its walls may not be removed without prior examination of all the possible consequences this is likely to lead to in its atmosphere and to affect its preservation.

(e) Legal and Administrative Protection

Article 23. It is the task of responsible authorities to adopt, on the advice of qualified experts, appropriate legal and administrative measures for the identification, listing and protection of historic gardens. The preservation of such gardens must be provided for within the framework of land-use plans and such provision must be duly mentioned in documents relating to regional and local planning. It is also the task of the responsible authorities to adopt, with the advice of qualified experts, the financial measures which will facilitate the maintenance, conservation and restoration, and, where necessary, the reconstruction of historic gardens.

Article 24. The historic garden is one of the features of the patrimony whose survival, by reason of its nature, requires intensive, continuous care by trained experts. Suitable provision should, therefore, be made for the training of such persons, whether historians, architects, landscape architects, gardeners or botanists. Care should be taken to ensure that there is regular propagation of the plant varieties necessary for maintenance or restoration.

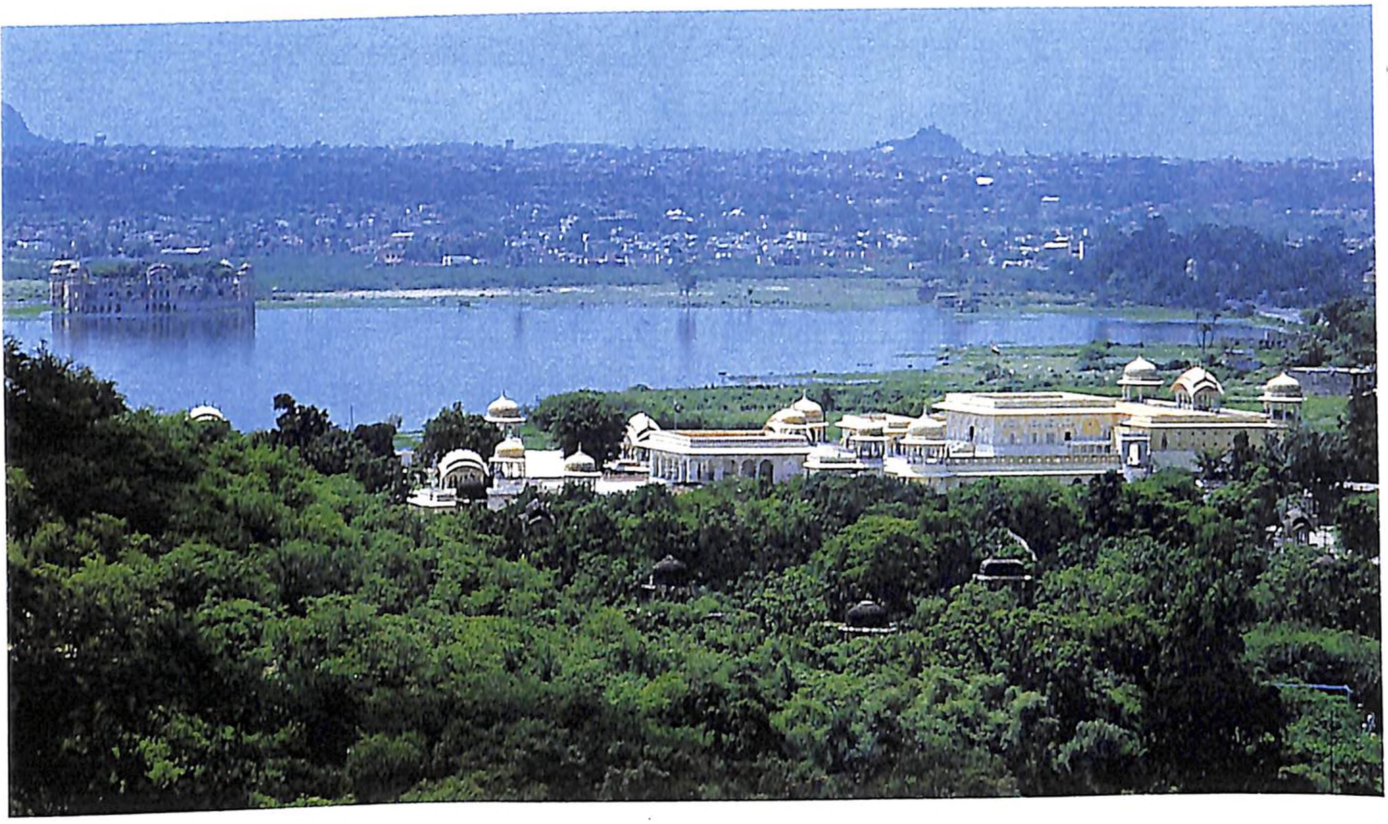
Article 25. Interest in historic gardens should be stimulated by every kind of activity capable of emphasizing their true value as part of the patrimony and making for improved knowledge and appreciation of them; promotion of scientific research; international exchange and circulation of information; publications, including works designed for the general public; the encouragement of public access under suitable control and use of the media to develop awareness of the need for due respect for nature and the historic heritage. The most outstanding of the historic gardens shall be proposed for inclusion in the World Heritage List.

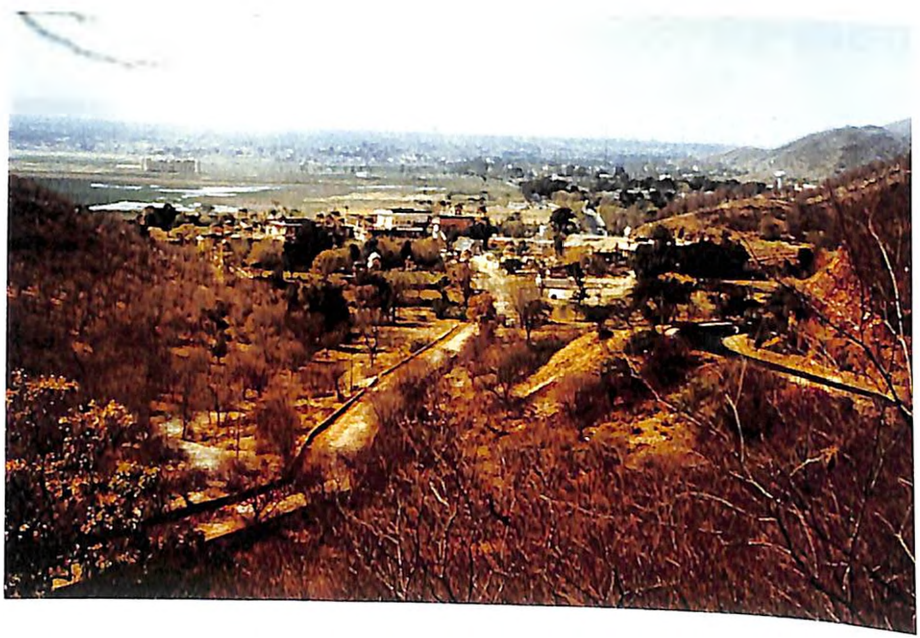
(f) Nota Bene

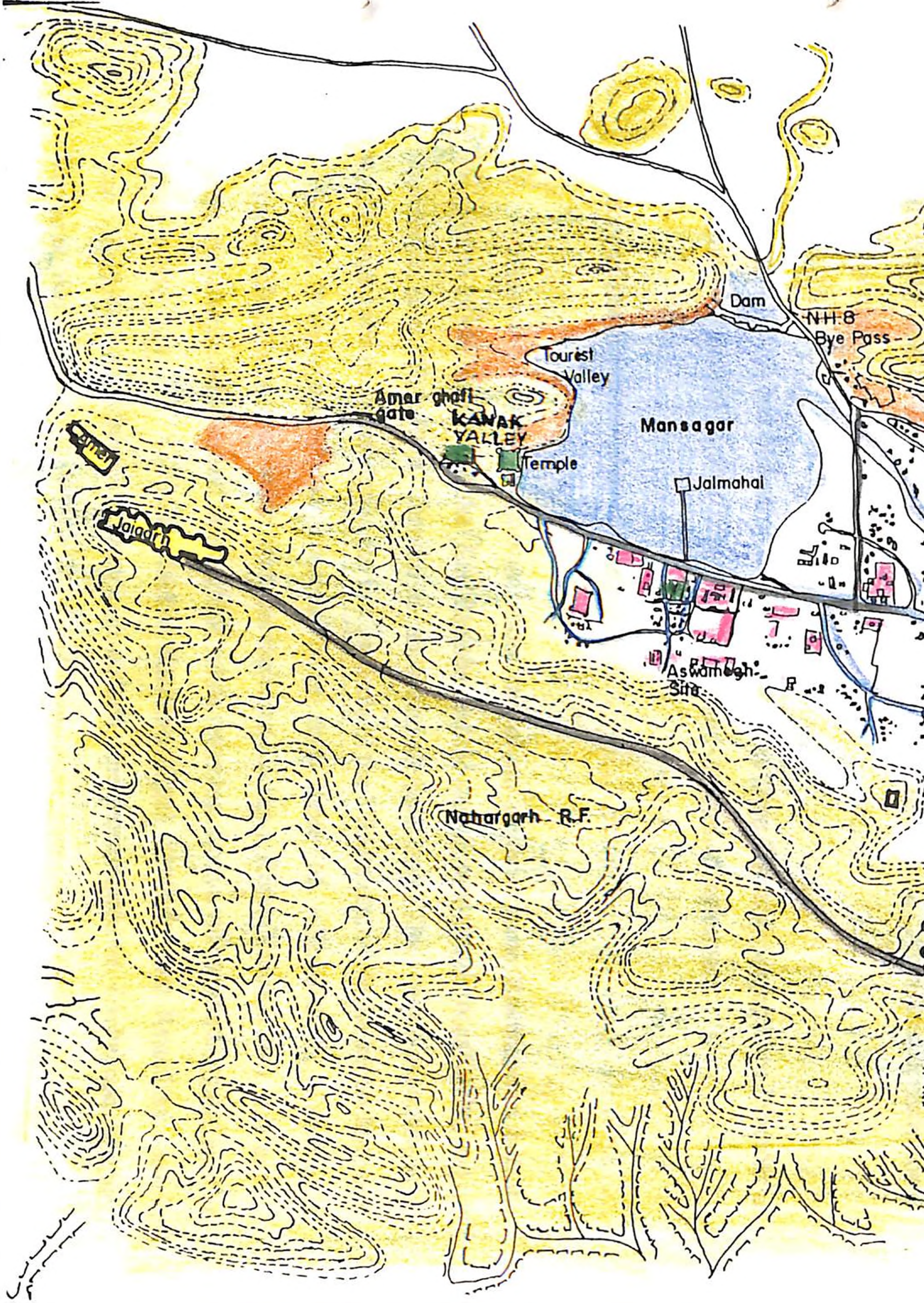
The above recommendations are applicable to all the historic gardens in the world.

Additional clauses applicable to specific types of gardens may be subsequently appended to the present Charter with brief descriptions of the said types.

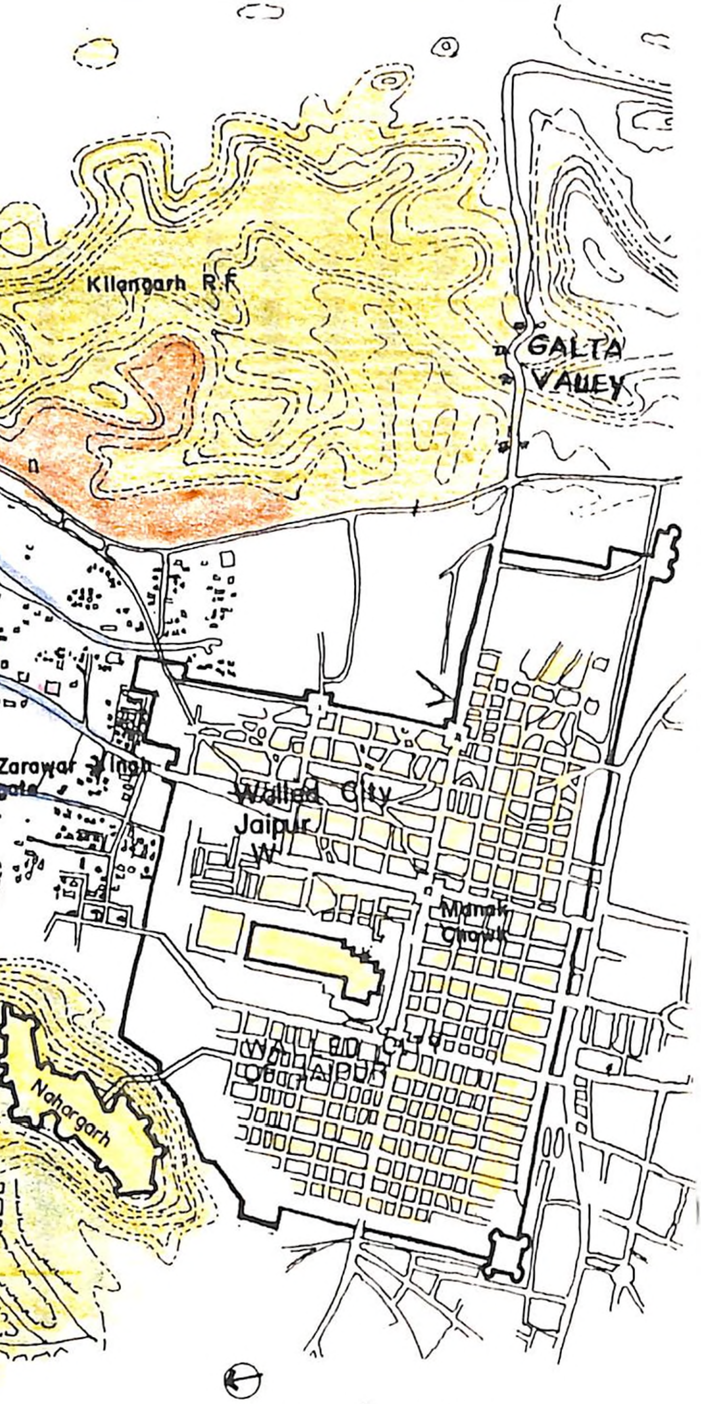
Kanak Vrindavan Valley Jaipur







Dam
N.H.8
Bye Pass
Tourist
Valley
Amar ghati
gate
KANAK
VALLEY
Mansagar
Amer
Temple
Jalmahal
Jaigarh
Aswamegh
Site
Nahargarh R.F.



SCALE:— 1" = 1/2 Mile

2.2 HISTORICAL STUDY

2.2.1 Amber and Jaipur

The territory of **Jaipur** lies between latitude 25°.40' N and 27°.40' N and between longitude 75°.8'E and 77°.20'E. It is bound in the north by the district of Churu (Rajasthan) and Hissar, Rewari, Mahendragarh (Haryana) in the west by Nagaur and Ajmer (Rajasthan), in the south by Bhilwara and Bundi (Rajasthan) and Gwalior (Madhya Pradesh) and in the east by Bharatpur and Dholpur (Rajasthan). The territory of Jaipur was about 150 miles in length and 140 miles in breadth with an area of about 14,500 square miles.

As present work deals with the restoration of a few historical buildings in Amber-Jaipur, it was felt necessary to study the history of the rulers of Amber and Jaipur so that a relationship of the origin, design and structure of the historical buildings included in the present study could be properly understood.

In AD 967, one branch of Kachawaha Rajputs from Gwalior migrated to Dhundar as this established state of Amber/Jaipur was called, and established supremacy.

History of the Kachhawahas of Dhundhar

There are number of theories about the origin of the name Kachhawaha but the protagonist of the theory, that the Kachhawaha derived their nomenclature from Kusha, son of Ayodhya's ruler Shri Ram Chandra is an acknowledged one. The word Kachhawa or Kachhawaha was prevalent during the first millenia of the Vikram era, while the earlier historical reference from contemporary sources, other than those of Sanskrit, is available in Futuh-us-sklatin by Isamis, which contains the word Kachawa Kotal (Kuntal - 24). It is stated therein that Sultan Muhummad bin Tughlak, while returning from a visit to the Dargah Sharif at Ajmer in the year AD 1323-28 attacked Kachawa Kotal. Similarly, two Rajasthani poetic works written in the fifteenth century also contain the word Kachawa. (Achaldasa Khichiri, Vachanik, AD 1423 Rao Jaitosi-ro-chand AD 1542.

The historical narrative of the Kachhawaha rulers of Amber, preceding that of Prithiraj (AD 1503-1527), is rarely corroborated by reliable sources of contemporary history. Historians are of the opinion that the Kachhawaha chronology, prior to Prithiraj, is quite confusing and does not stand the tests, wherever it contains casual references to historical personages or events, of serious and well- settled history.

The geneology of the Kachhawahas mentions **Isa Singh** the ruler of Narwar, who came into possession of Gwalior, as the first person from whom the line claims its direct descent. Isa Singh once consulted his priests to know how he could give perpetuity to his kingdom for posterity. He was advised to bequeath it to Jai Singh Tanwar, his maternal nephew, and native. His father having done this, Isa Singh's son, **Sodhadev** (AD 966-1006) had to shift to a village named Nindravali along with his family. Another version of this incident holds that Isa Singh ended his life by poisoning himself VS1023/AD966. In course of time, Sodhadev had a son named **Dulahadev** who on maturity, married the daughter of Silarasi Chauhan of Lalsot, a tract in the territory around Dausa. The town of Dausa was then under the joint occupation of Silarasi Chauhan and the Badgujars who had their main seat at Devati[140]. On a request for help from Sodhadeva, Silarasi invited his son-in-law, Dulahadev, to come prepared for a surprise attack on Dausa and occupy the territory. Thus advised, Dulahadev marched with his contingent in the guise of a horse-caravan and got hold of this stronghold of strategic importance by vanquishing the Badgujars. Gradually, he extended his sway over the mines of Bhadarej, Manchi, Khoh, Jhotwara, Getor, etc. and also subjugated the Badgujars of Devati. Manchi was supposed to be a formidable stronghold of the Shihara Minas which, on conquest was renamed as Ramgarh. A temple in honour of his family deity, to mark the victory was erected by Dulahadev in the midst of a valley near Manchi, which still stands testimony today. Finding himself rooted he sent for his father and family, and shifted his head-quarters to Khoh which was well guarded palace with strong ramparts and fortifications. It was while residing at Khoh Sodhadev breathed his last in VS1063/AD1006.

Dulahadev's son Kakildev (VS1036-AD1046) is credited with conquering Amber, the most important of Mina strongholds. The place, formerly known as 'Kalikhoh' or 'Ghata Rani' the area was renamed Amber by Kakildev in honour of the god Ambikeswar. Kakildev expired in VS1096/AD1039 and was succeeded by his eldest son **Hanuji**. The latter lived an eventless life which ended in VS1110/AD1053. His son **Janharadev** was an equally unaspiring person. On his death in VS1127/AD1070, his eldest son **Pajjun** ascended the *Gaddi*. His was an extraordinarily remarkable career. He had the privilege of a matrimonial alliance with Prithviraj, the great Chauhan, being married to his niece, the daughter of Kaka Kanh. The bard, Chand Bardai, has immorlalized his chivalry, loyalty and fearlessness. Pajjun met a heroic death in the battle of Kannauj. The eldest son **Malleus** was crowned in VS1151/AD1094 when he was still an infant. He is said to have conquered the Devras of Abu and restored many a king who was converted to Jainism at Girnar in Gujarat to their own faiths. He was succeeded by his son **Bijaldev** on his death in VS1203/AD.

We pass over the intervening princes and come to Kilhanadeva who ascended the *Gaddi* in VS1273/AD1216. The shrine of Ambikeshwara is also believed to have been built by him. No notable event of his reign is reported. He is supposed to have been killed by Jaitra Singh Chauhan, father of Hammir, as mentioned in the Balwan stone inscription. His presence at the court of Maharana Kumbha, as opined by Kaviraj Shyamaldas, however, is apparently erroneous. Out of his six sons **Kuntal**, the eldest, was enthroned in VS1333/AD1276.

Kuntal was a daring person. Other contemporary sources also bear witness to his valour. He is said to have died in an attack by Sultan Muhammad-bin-Tughalaq, while returning from a visit to the Dargah Sarif at Ajmer in AD1327-28. As the Kachhawaha genealogical tables mention VS1374/AD1317 at the year of his death, this difference of about ten years needs to be reconciled. The hostility of the imperial power towards the petty state of Amber may be inferred from a similar mention in the *Kanharade Prabandaha* which describes how Maladeva, younger brother of Kilanadeva, launched an attack on the imperial forces at Bahadurpur in Mewat, from his base at Amber. This event took place before AD1311-14 before the fall of Jalor. Gaur Thiraraj of Maroth is also said to have invaded Amber and subdued Kuntal. **Junasi**, the eldest of his sons, succeeded him and ruled peacefully for fortyeight years till his death in VS1423/AD1366. Three successive rulers of little importance, **Udai Karan, Nar Singh** and **Banbir** followed him one after the other, respectively, in the years VS1423/AD1366. VS1445/AD1388 and VS1485/AD1428 Udai Karan fathered Balo and Nar Singh, the progenitors of the Shekhawats and Narukas respectively, which are treated as the most important of the Kachhawaha branches.

Two more names **Uddharan** and **Chandrasen** intervene till we reach the well known Prithviraj. Uddharan succeeded his father Banbir VS1496/AD1439. He was married to the daughters of Maharana Kumbha of and Rawal Ranmal Rathor of two most outstanding personalities of their times. It was this matrimonial alliance which seems to have prompted Kumbha to rush to his son-in-law's help when some Muslim forces attacked Amber. The *Kyamkhan Raso*, though not a contemporary work, also contains a mention indicating the incident. Chandrasen, who succeeded his father Uddharan in VS1524/AD1467 is said to have successfully resisted the forces of the Sultan of Mundu, when the latter attacked the Bhankharot Kachhawahas who picked up a quarrel with a dealer of horses at Chatasu.

Twelve Kotaris

Prithviraj, the eldest of his sons, who has become a legendary figure in the annals of Kachhawaha history. There are many anecdotes relating his leanings towards the *'Nath'* cult, as also to his association with his favourate queen, Balabai from whom alone he had twelve out of his nineteen sons. Prithviraj is more known in Kachhawaha history for the creation of *twelve 'Kotaris'* by which he assigned fiefs to twelve of his sons. These *'Kotaris'* have wielded considerable sway in a later history by shaping the destiny of the State of Amber and Jaipur. Prithviraj breathed his last in VS1584/AD1527. Where upon his son **Puranmal** took over. Puranmal was killed while fighting against Mirza Hindal on the side of the Shekhawats at Sikhargadh. Historians differ on this issue. Munsi Devi Prasad is of the view that Puranmal was

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a favourite of Humayun and fought for him against Hindal, and was given the title of Raja by Humayun. Abul Fazl records his death in VS1593/AD1536 on the side of the Mughals when Mirza Hindal took military action to oust Sultan Mirza and Ulugh Mirza from Bilgram.

Puranamal's son Suja was an infant when his father died, and the right of succession, therefore, passed on to **Bhim**, When of age, Suja approached Mirza Sharfuddin, Governor of Ajmer, for help and attacked Amber, but could not achieve the desired result. Suja then begged Rao Maldev of Marwar for assistance he deputed a contingent of five thousand horses. Suja, however, lost his life to the evil designs of Lala Naruka who managed the Marwar contingent's retreat from Niwai in Rajasthan.

Bhim wielded considerable influence with Puranmal and fought along with him on the side of the Mughals, in the fateful battle. But could rule for a short period of two and half years only. It is alleged that he was murdered by his younger son Askaran. Bhim's eldest son, **Ratan Singh** succeeded him in VS1593/AD1536. He was murdered in his bed- chamber in the twelveth year of his reign, VS1604/AD1547.

No sooner had **Askaran** succeeded Ratan Singh he is said to have committed a blunder in sitting on the royal seat with his brother-in-law's son be side him. This turned out to be pretext enough for the nobles to demand expriation from him by way of a pilgrimage for a dip in the Ganges. This, it is said, was a crooked design planned by **Bharmal** and his supporters who lost no time in seating him on the *gaddi* immediately on Askaran's departure.

Askaran, when he realised of the trick played upon him, approached Emperor Islamshah, son of Sher Shah, for help Ashlam Shah asked Haji Khan, Governor at Ajmer, to proceed to Amber. Bharmal, however, appeased the Pathan by offering his daughter Kishanawati to him in marriage.

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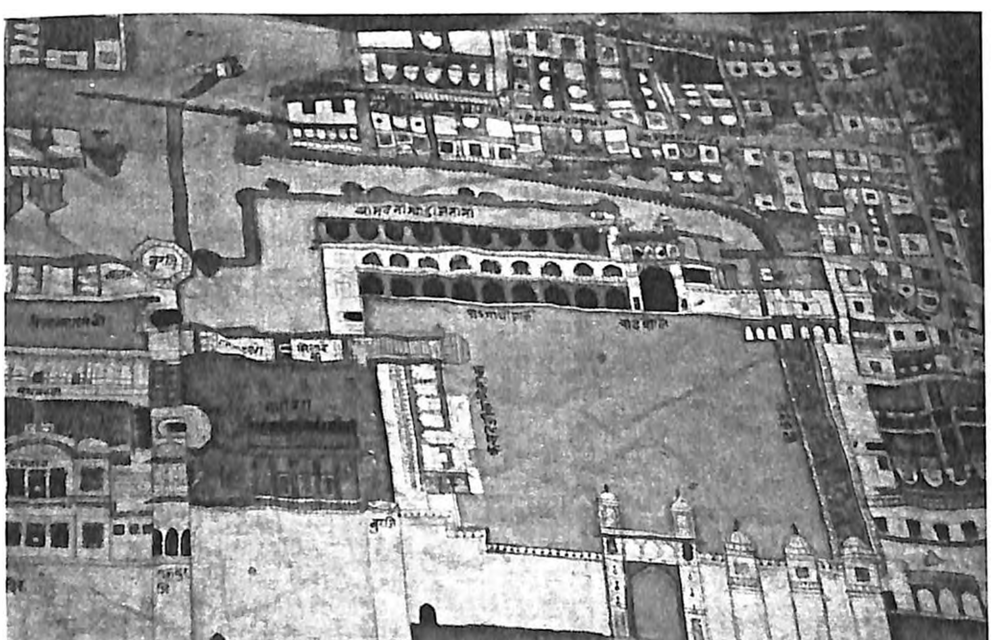

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The best strategy that Bharmal employed was to seek patronage from Akbar. The marriage of his daughter with the great Mughal further strengthened the relations. This resulted in bountiful favours to the Amber Kachhawahas from the Mughal Court. Bharmal took full advantage of this situation, and not only extended his sphere of influence over Mirza Sharafuddin of Mewat, who was source of continuous threat to him, but also managed to crush the Mina tribal chiefs as well as his own rebellious followers. Almost all of his sons, including his grandson Man Singh were enrolled in the Imperial services, which gave a sudden lift, financial as well as political, to the Amber house. He was made the first Rajput *Mansabdar* of the rank of 5000, and was deputed on various important missions and placed in highly responsible positions. Akbar left for Gujarat, Bharmal was put in the command of the city of Agra. He died in VS1630/AD1573 and was succeeded by his son **Bhagawandas** (Plate Va, 6).

Bhagawandas proved to be a trusted servant of Akbar, who reposed his confidence in him by appointing him as the Governor of Lahore, and also by using his inborn abilities on many crucial junctures. He was also deputed to Gujarat, Surat, Kabul, Kashmir and Sarnal on important missions and expeditions. His role was mainly of a peaceful nature. He tried to persuade Rana Pratap to accept subordination of the Mughals. The Emperor granted him the honour of a standard and a kettle drum, besides Raising his status to a *'mansab'* of five thousand. He adhered to his faith though he also gave away his daughter in marriage to Prince Salim, and caused a Masjid to be built at Lahore with his own money. He died at Lahore in VS1646/AD1589. **Man Singh** (Plate Vb,7) succeeded his father to the gaddi of Amber. he was the first Hindu *'mansabdar'* to be raised to the rank of 7000. Enrolled in the Mughal services at the age of twelve as early as AD1562. He served the mughals for fifty-two years with rare distinction. While he enjoyed the confidence of Akbar, he could not find favour with Jahangir who demoted him to the rank of 5000 and deputed to the Deccan with little power, where he died a sad death at Elichpur in VS1671/AD1614. He was a great builder of temples, forts, palaces and gardens. Shila Mata, the presiding Goddess of the Amber house, was brought by him from Bengal. A temple of Govind Deoji was built by him at Brindaban. The fort at Ramgarh and the first structure of the palatial complex at Amber are his creations (Plates Va,8a & Vb,8b).

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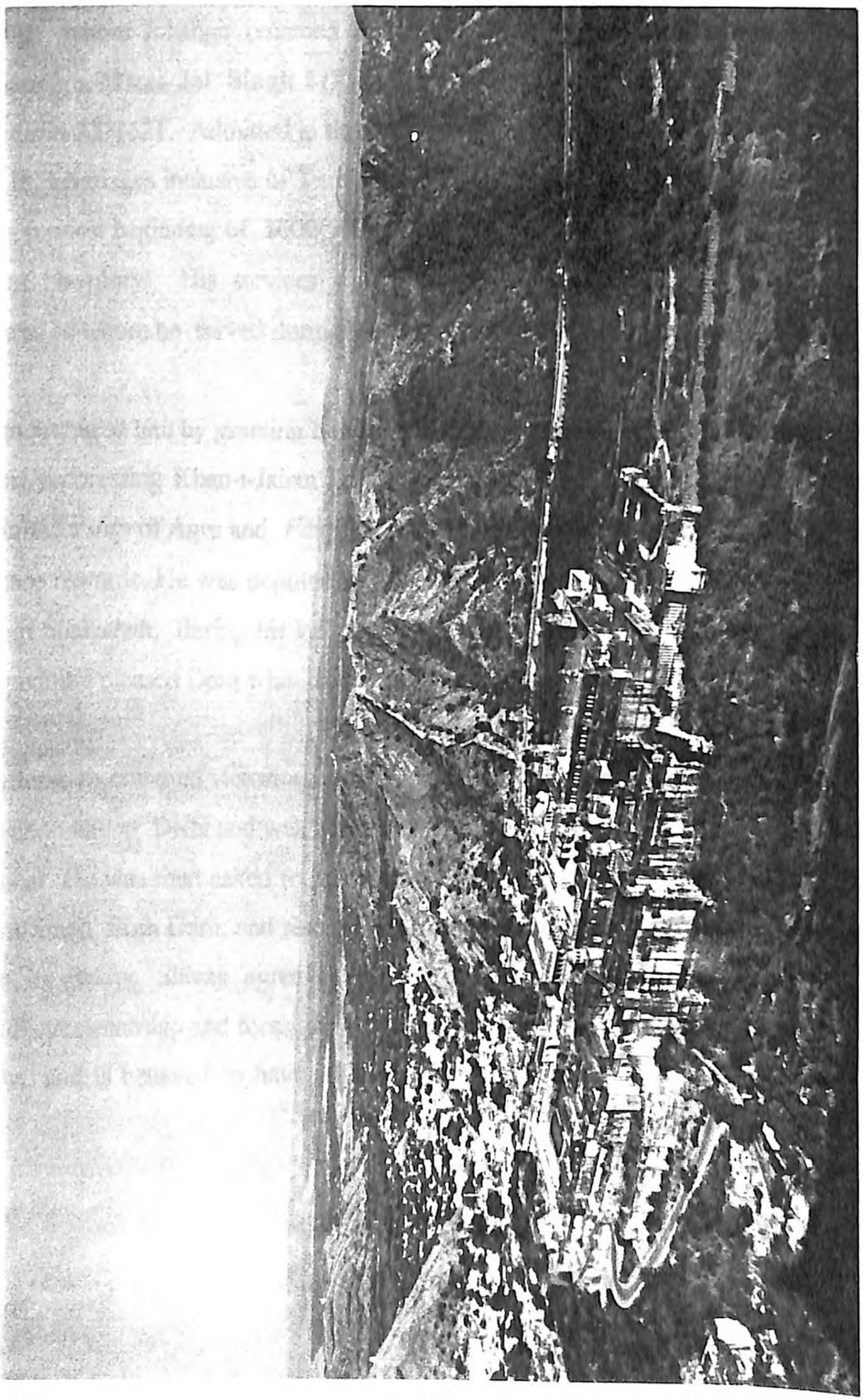

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Bhao Singh (plate VI,9) son of Man Singh was granted succession with the title of Mirza Raja by Jahangir in AD1614 though the real claimant was Maha Singh, son of Jagat Singh, the eldest son of Man Singh, who died of excessive drinking in his father's life time. Jahangir consoled Maha Singh by conferring upon him the title of Raja and also raising his rank and bestowing the territory of 'Gadh' in 'Inam.' He died at Balapur (Barar)[199] in V.S. 1694 A.D.

Bhao Singh, whom Jahangir renamed Bahdur Singh,left no issue, It was therefore, Maha Singh's minor son **Mirza Jai Singh I** (Plate VI, 10) who claimed succession which was granted by Jahangir in AD1621. Admitted in the imperial service at eleven years of age, he had a liberal training in languages inclusive of Turkish and Persian, along with other disciplines of education. With a modest beginning of 1000/500 in AD1621, he rose to the rank of 7000/7000 at the height of his glory. His services were appreciated by Jahangir, Shahjahan and Aurangzeb, all three of whom he served during his long career.

Shahjahan favoured him by granting honours and jagirs and by raising his rank when he was successful in suppressing Khan-i-Jahan Lodi at his orders. His conquests in the Deccan earned him the *Subedarship* of Agra and *Faujdari* of Mathura besides other favours by way of increments and case rewards. He was deputed in the campaigns of Kabul, Kandhar and Balkh. Under orders from Shahjahan, during his last days as Emperor, he set out to fight Shuja. His success in the expedition pleased Dara who showered many favours upon him.

When Aurangzeb emerged victorious in the first decisive war of succession at Dharmat, Jai Singh waited upon him at Delhi and was honoured with the charge of Delhi and grant of the pargana of Sambhar. He was then asked to pursue Dara. He also played a conspicuous role in alienating Jaswant Singh from Dara, and also, in return, managing Aurangzeb's favour for him. His achievement in making Shivaji agree to present himself at the Royal Court, was a marvellous feat of statesmanship and foresight. As a true Rajput he honoured his word given to the great Maratha, and is believed to have managed his escape through his son Ram Singh.

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Enraged at this incident Aurangzeb forebade Ram Singh's entry into the court. Expressing his displeasure at this incident, and also for Jai Singh's failure in the expedition against Bijapur, Aurangzeb recalled him from the Deccan. While on his way to Delhi, he died at Burhanpur in AD1667. It is alleged that Aurangzeb, being skeptical of his growing influence, poisoned him through his son Kirat Singh who accompanied him.

It was with some hesitation from Aurangzeb that succession was granted to Jai Singh's son, **Ram Singh**, (Plate VII, 11) with the title of Raja. To show his displeasure, however, Aurangzeb deputed him to Assam. Ram Singh's performance in Assam for a period of about nine years was appreciated and his *'mansab'* was increased to 5000. He was then directed to proceed to the Subah of Kabul. He died in distress at Kohat in AD1688 before he could reach Islamabad (Mathura) to take over as *Faujdar*, on transfer. His son Kishan Singh had died earlier at Parenda in the Deccan in VS1739/AD1682, leaving his son **Bishan Singh** (Plate VII, 12) or Vishnu Singh, grandson of Ram Singh, to be crowned in VS1746/AD1689 after his grandfather's death.

Bishan Singh accompanied his grandfather in the campaign to the frontier. Having granted a big *'Inam'* in cash with a robe, his success in the campaign was rewarded by the assignment of *'Zamindaris'* of Sinsini and Sonkh, with restoration of the *Pargana* of Malarana which had earlier been taken from him. But Aurangzeb was never really pleased with him and so he was again posted to Kabul. He died at Peshawar in AD1699 **Jai Singh II** (Plate VIII, 13) was hardly twelve year old when Aurangzeb granted him the hereditary *'gaddi'* of Amber in AD1700, with the title of Raja. The Emperor immediately called him to the Deccan, to be deputed under Prince Bedar Bakhata as a *'Mansabdar'* of 1500/1200 in AD1701. His show of valour during the siege of Khelna fort was rewarded by an increment of 500 '*Zat*' in his *'mansab'*.

Bedar Bakhata was so pleased with him that he recommended him for appointment as Deputy Subedar of Malwa under him. Acting on his policy of deep-rooted hatred for the Rajputs, Aurangzeb rejected the prince's recommendation at first, but granted the the same later on in AD1705 Jai Singh's II fortunes were thrown into the doldrums on Aurangzeb's death in 1707

PLATE VII

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A.D. Though special favoures sere shown to him by Azam, who increased his *mansab* to 7000, and granted the title of 'Mirza Raja', Jai Singh crossed over to the winning side in the battle of Jajau (Dholpur) when Azam's had become imminent. Bahadur Shah, who emerged victorious in the war of succession, deprived Jai Singh of his Watan Jagir of Amber and bestowed it on his brother, Bijai Singh. Jai Singh and Ajit Singh of Jodhpur, were asked to follow the Emperor in his march to the Deccan. Jai Singh was wise enough to take a bold step by defying the imperial order and returning with Ajit Singh to Mewar. Here he was married to the daughter of Maharana Amar Singh.

Jai Singh's Diwan Ramchand, with the help of Sanwaldas, deputed by the Maharana, was able to oust Saiyyed Hussain Khan Barah from Amber, and recapture it. The combined forces of Jodhpur and Jaipur also succeeded in occupying Sambhar which remained under the joint command of both the states. Meanwhile, Jai Singh was betrothed to the Rathor Princess, Suraj Kanwar of Jodhpur. After the death of Bahadur Shah in AD1712 Farrukhshiyar came in possession of the throne, and appointed Jai Singh as the Subedar of Malwa in AD1713. He dealt successfully with the Marathas and the Afghan rebel Dilerkhan.

He was sent by Emperor Farrukh-shiyar to supress the Jats headed by Churaman who, however, managed to save himself from a difficult situation through the connivance of Saiyyed Abdulla Khan the Wazir. During AD1719-20, Jai Singh had to face the wrath and opposition of the Saiyed brothers but after their fall, his position became secure and his rapid rise as a prominent figure on the political stage of India commenced. In AD1772, during Muhammand Shah's rule, he vanquished the Jats for which he was honoured by the Emperor by conferment of honoured titles. The famous Jat stronghold of Thun was raged to the ground and their headship was bestowed upon Badan Singh, who declared himself as a 'Thakur' and treated himself as a mere noble of Jai Singh, through his life.

In AD1730 he was appointed as Governor of Malwa, when the province was in a deplorable state of affairs, due to Maratha offensive raids. But neither his second governorship of Malwa nor the third (AD1733-34) could check the Maratha tide. Jai Singh took a leading

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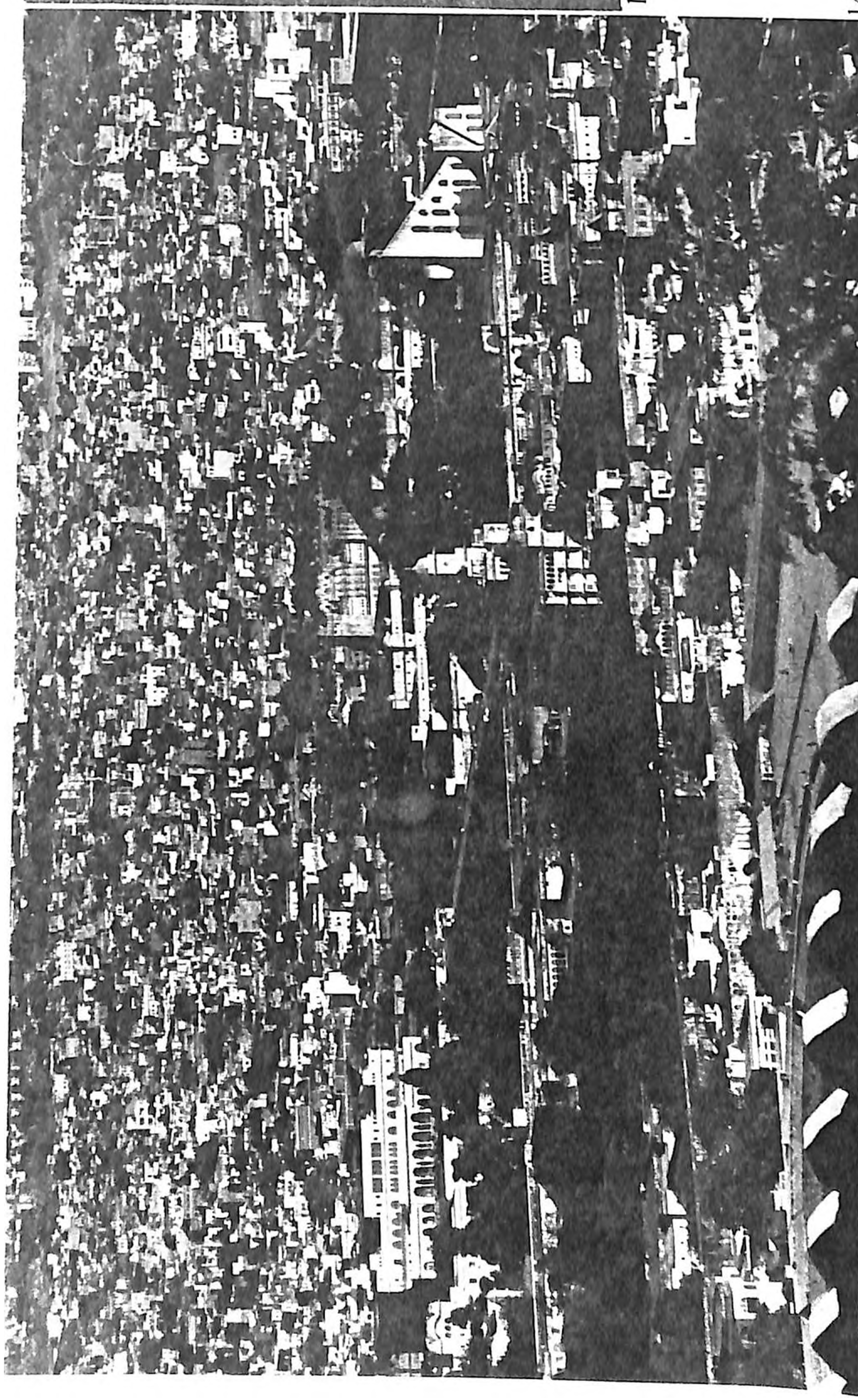

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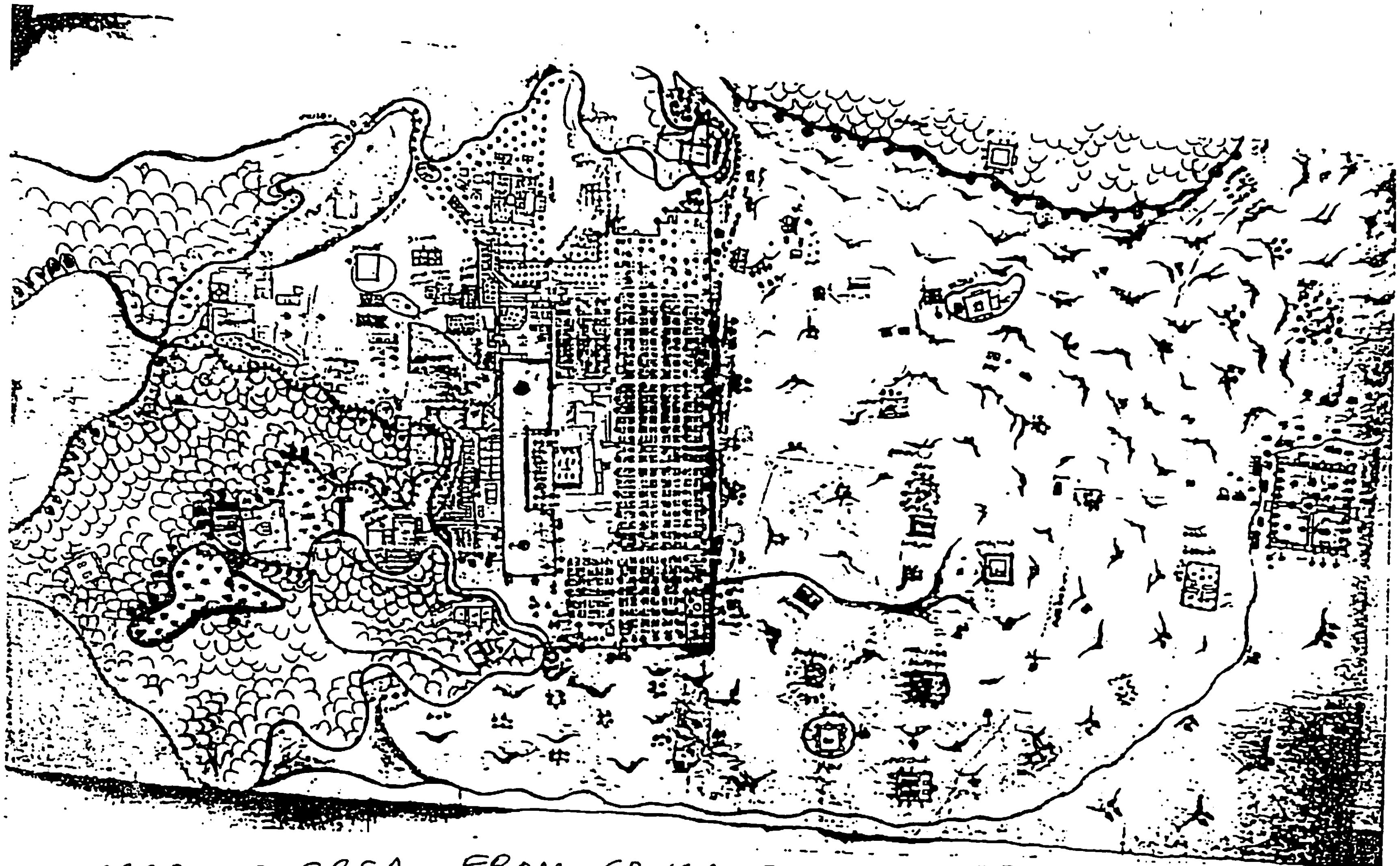
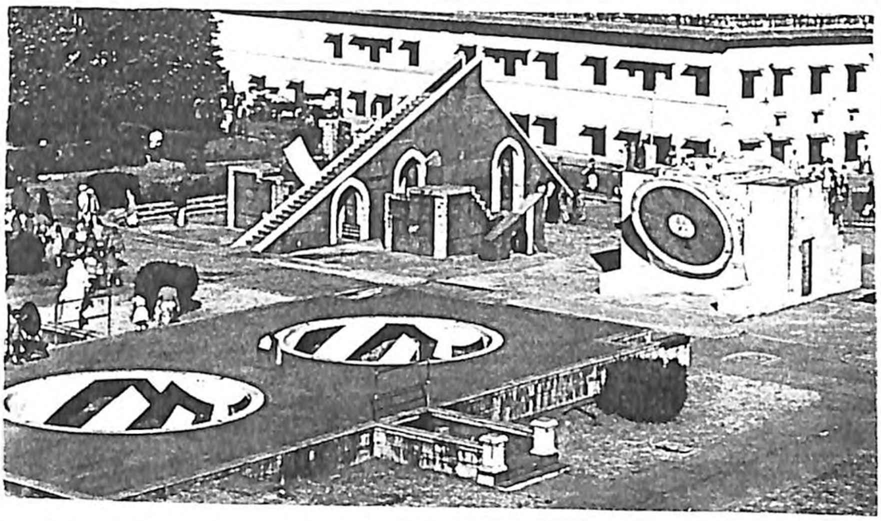


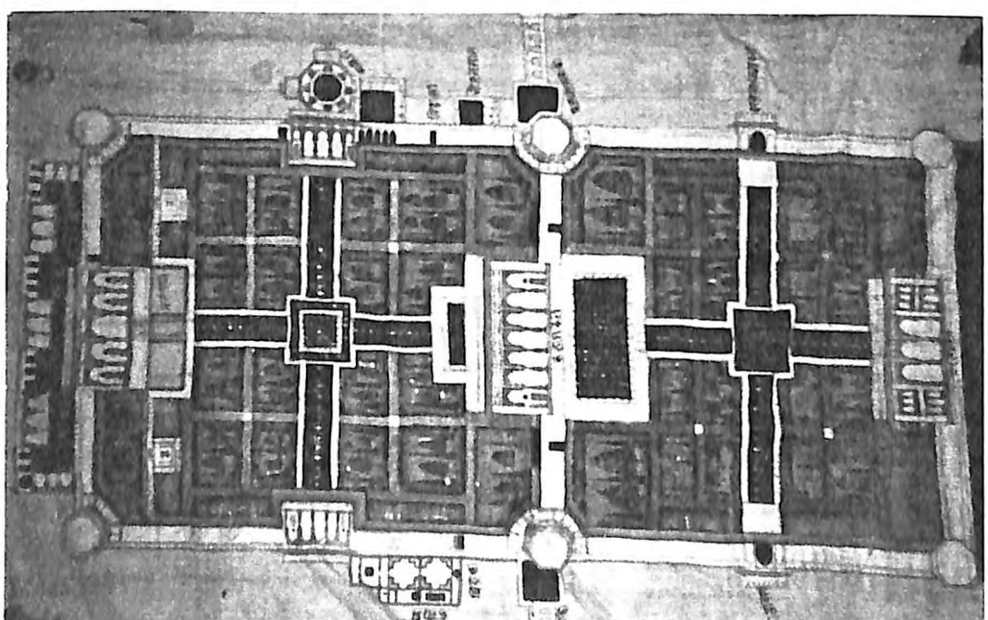
MAP OF AREA FROM SANGANER UPTO AMBER ~~G~~HATI (C. 18
(DATEABLE 1777-1803, REIGN OF MAHARAJA SAWAI PRATAP SINGH)
SHOWING MAN SAGAR AND A BUILDING CALLED JAL MAHAL SURROUN
BY WATER.

CIRCA (1777 - 1803)

HISTORICAL MAP NO. 2

HISTORICAL MAP NO. 3 (1725 A.D.)





part in Peshwa Baji Rao's negotiations with the Mughal government in AD1736 for a political solution of the Maratha problem but the intrigues of the Nizam and Saadat Khan came in the way. Jai Singh did not take any part in the muddled politics on the eve of Nadir Shah's invasion of 1740.

When Abhai Singh of Jodhpur invaded Bikaner in AD1742, Jai Singh used the occasion to humble the Rathor, on the request for help from Zorawar Singh of Bikaner. On hearing the news of Jai Singh's invasion of Jodhpur, Abhai Singh rushed back, but could save the state only on terms dictated by Jai Singh, which included payment of Rs. twenty lakhs among others, amounting to surrender. Bikaner also felt deeply indebted to him.

He is more known for his interest in astronomy, town planning and patronage to art, culture, literature, and religion. The modern city of **Jaipur** was founded by him in **AD1727** (Plate VIII, 14). The plan of the city was prepared by a Bengali Brahmin, **Vidyadhar Bhattacharya**, who had made a deep study of Indian architecture (Map No. 2). **Astronomical observatories** were erected by him at **Jaipur**, Ujjain, Delhi, Mathura and Varanasi (Plate IX, 16). Jal Mahal was also his creation (Map No. 3). As a warrior-statesman he laid much stress on the modernization of his personal army. From a bare one thousand soldiers at the beginning of his career, he expanded its strength to 30,000 horsemen and a still larger number of matchlockmen. His forts were well equipped with garrisons, He had to his credit the expanding and consolidating his territorial boundaries. The best diplomacy used by him in gaining control over vast territories was to secure '*Ijaras*' of Khalsa lands as also of those of Jagirs of various nobles. His clear foresight could anticipate the impending chaotic conditions of the falling empire which offered every chance to usurp the territories to make them a part of his state for ever. The vast tract of land known as Shekhawati was also gained in the like manner. As a devoted Hindu he performed Vajpey sacrifice in AD1711 and *Asvamedha* in *AD1734* and again in AD 1742.

Jai Singh had entered into an agreement with the Maharana on the occasion of his marriage with the Mewar princess, to appoint the son born out of that wedlock, as his heir-apparent. But, contrary to this, **Ishwari Singh** (Plate X, 18), ascended the throne in 1743 on Jai Singh's death. The Emperor applied the '*Tika*' of investiture with his own hand when he called on him in Delhi. Ishwari Singh had fought against the Marathas with the Nizam at Bhopal and displayed conspicuous bravery. He tried to normalize his relations with all other States, but Udaipur, Kota and Bundi were opposed to him. Maharana Jagat Singh was interested in placing his nephew, Madho Singh on the throne of Jaipur, and Maharao Umed Singh, son of late Budh Singh Hada, claimed his ancestral seat of Bundi, which was passed on to Dalel Singh by Jaipur. Over and above this combined strength, military help was also purchased by them from the Marathas. Ishwari Singh was able to thwart the combined opposition initially when a treaty was entered into at Jamoli (Jahazpur), which conferred territory worth five lakhs on Madho Singh. He also paid twenty lakhs to the Marathas as promised but the Maharana failed to keep his promise. A battle was again fought at Bagru (Jaipur) in AD1748 which ended in ceding five parganas to Madho Singh in evacuating Bundi for Umed Singh. Ishwari Singh, however, could not keep the promise of payment to the Marathas, which enraged the Holkar, who marched on Jaipur. The Kachhawaha king had no courage to face him, and the sane advice of his counsels failed to prevail upon him. He, therefore, took his life in desperation by poisoning himself. His was a reign of constant turmoil and worries.

On the sad demise of Ishwari Singh, Malharrao Holkar invited **Madho Singh** (Plate XI, 20) from Mewar and seated him on the throne. The show of strength, coupled with indecency by Holkar's soldiers, enraged the local populace, who killed a number of them and looted their belongings in a fury. This anti-Maratha wave reached the country-side also and people rose up in arms and murdered the Maratha soldiers wherever they could lay their hands upon them. Madho Singh could pacify the Holkar only with promises of payment of dues and compensation for loss.

Madho Singh had also his part to play in the strained relations between Ahmed Shah, the Mughal Emperor, and his Wazir, Safdar Jang, who had also enlisted the support of Surajmal Jat. His negotiations bore fruit in bringing about a settlement which pleased the

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Emperor, who rewarded him by conferring the Fort of Ranthambhore and the honour of 'Mahi Maratib' on him.

When Dattaji Sindhia attacked Marwar, Madho Singh deputed a large force to face him at Nagaur. Unfortunately, his army had to flee for life after heavy losses of men and material. It was during AD1756 that Raghunath and Holkar besieged Barawara and made a demand of fifty lakhs. Madho Singh managed a show of force which resulted in payment of Rs. six lakhs in AD1757. Next year, Jankuji Sindhia visited Jaipur and demanded thirty six lakhs which was promised by Madho Singh as usual. This hide and seek of promises and threats had become an everyday affair. In AD1759 Malharrao Holkar again laid siege to Barwara and gave a crushing defeat to the Rajputs.

Another notable event in the life of Madho Singh was the defeat of his forces at the hands of Kota at Bhatwara. The cause was the attempt of Jaipur to demand allegiance from seven Hada principalities, falling under the jurisdiction of Ranthambhor fort, now assigned to Madho Singh. Kota granted protection to them which resulted in the aforesaid battle.

The rising power of the aspiring Jawar Singh Jat, whose fore-fathers had always behaved as nobles of the Jaipur king, needed a strong blow once for all. This was done at Maonda (Jaipur) where the Jat army, on its return from Pushkar, was attacked by the Kachhawahas. Heavy losses were sustained on both the sides, but Jawahar Singh had to flee for his life. He was pursued to his own country and a severe defeat was inflicted upon him at Kama (Bharatpur) in AD1768. This was Madho Singh's last battle, as he died that every year.

Madho Singh left two minor sons behind him. The elder **Prithvi Singh** (Plate XI, 21) was only five years old when he ascended the throne. His mother, 'the Chundawat' from Devagadh (Mewar) acted as regent. But actual power was wielded by her father Rao Jaswantsinha. Khusaliram Bohra, Rajsinha Ghurchara, and Feroz, the elephant driver, were the ministers. As none of the Kachawaha nobility had any say in the affairs of the state, they tried

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their best to topple the administration. Pratap Singh Naruka stole the show and succeeded in carving out a separate principality for himself by wresting parts of land from Jaipur, Bharatpur and the imperial Mewat. He managed to bring the Mughal General Najafkhan on his side, to persuade the Emperor to grant him the territory of '*Macheri*' with the title of Rao Raja. The restlessness of Kachhawaha nobility found its way in the actions taken by Rao Pratap Singh in assassinating Feroz and squeezing out a sum of Rs. seven lakhs from him. He also imprisoned Bohra Khusaliram and outsted Jaswant Singh from Jaipur.

Prithvi Singh died prematurely in AD1778, leaving a widow of eleven years. The throne, therefore, passed on to his younger brother, **Pratap Singh** (Plate XII, 22), who was only fourteen years old, being born in AD1764. He ruled for 25 years and died at the age of 39 years in the year AD1803. He was a good poet and patron of arts, literature and culture. He has twenty-three books of poetry to his credit, besides his translation of 'Bhartrihari Shatakas'. The famous 'Hawamahal', alongwith other edifices of culture, and religious shrines were constructed during his reign.

His was a period of constant struggle and difficulties. The Marathas, Sindhia and Holkar, frequently raided his territory for exacting tribute which was demanded in lakhs, accumulating to over three crores. Though assisted by Jodhpur, he earned the credit of repulsing an attack of Sindhia at the battle-field of Tunga, he sustained a serious defeat at Patan, which resulted in the ravaging and plundering of his territory. George Thomas, an independent Irish aspirant, who occupied Fatehpur and wanted to retain it for himself, was driven away by his minister, Rodji, who chased him out of Jaipur territory with the help of 4000 troops of Bikaner.

During his last years, from 1791 to AD1801, Pratap Singh managed amicable relations with the Marathas and the European generals of the army. He also attempted to seek British protection but the East India Company was not in a mood to inferfere. The Nawab of Avadh sought refuge with him, but he was made over to the British on payment of Rs. 2 lakhs as expenses of his stay at Jaipur, and on promise of good treatment to the Nawab. It, however, goes to his credit that despite his continuous preoccupation with wars, and struggling with

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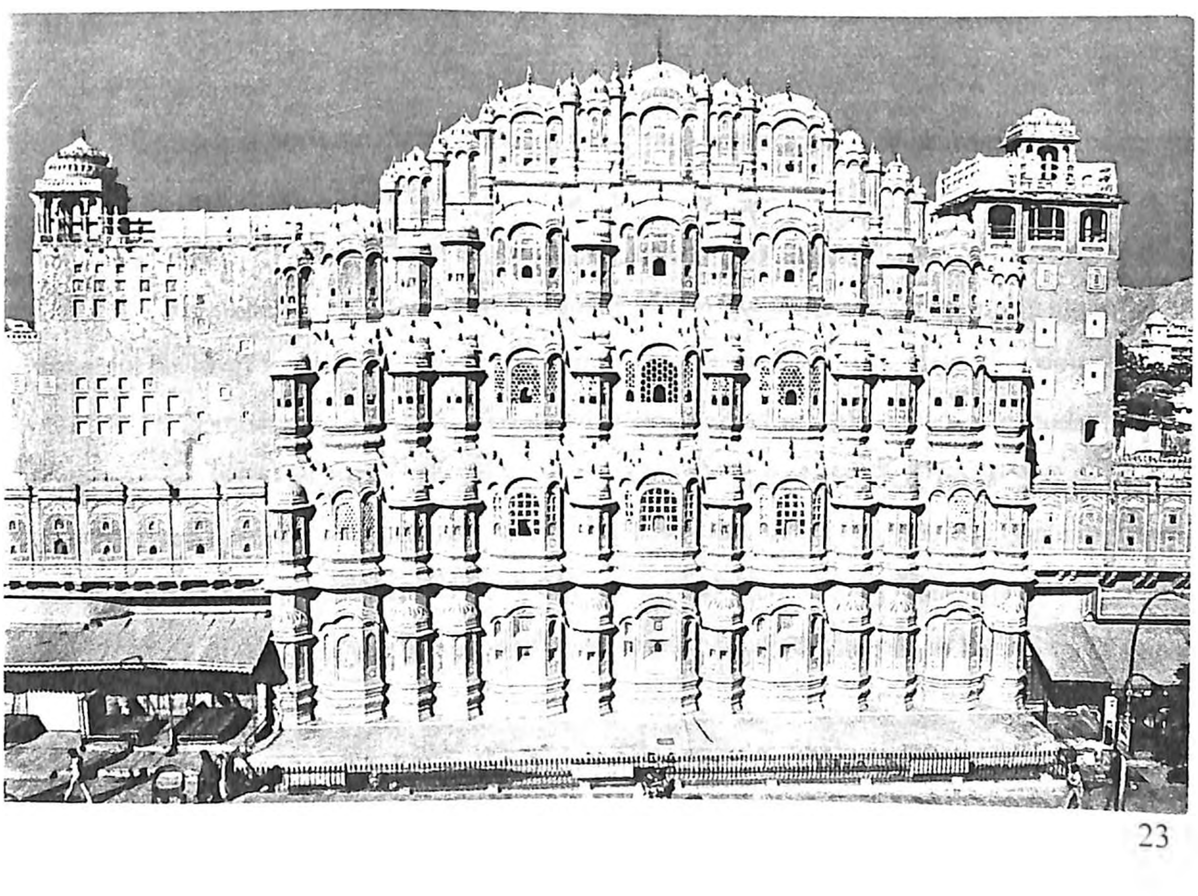

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financial difficulties, he found time to devote to learning, art and culture. His patronage to all these disciplines is still cherished by the local people.

Jagat Singh (Plate XIII, 24) was seventeen years old when he ascended the *'Gaddi'* in AD1803. He is more known in the history of Rajasthan for the famous case of Krishnakumari, the Mewar princess, whose hand was sought by him, and also by Man Singh of Marwar, who laid his claim being the successor of late Bhim Singh, with whom her initial engagement wasd to take place. This led to a struggle between Jaipur and Jodhpur which ended only with the poisoning of the poor princess, managed by the Maharana on advice of the Pindari chief, Amir Khan. After the death of the princess, both the kings could negotiate peace by matrimonial alliance between them. Jagat Singh was married to the daughter of Man Singh, while the latter was married to the sister of the former.

Jagat Singh is also blamed for his undue attachment to a concubine named Raskapur who wielded so much influence over him that the nobles were in a state of rebellion on this count. Contrary to the prevalent anecdotes of her confinement in Nahargarh fort, and her elopement with the Marathas, the state records mention that she committed sati on the king's death.

There had been a constant menace from the Marathas as well as from the Pindaris for a pretty long period, and the position continued to deteriorate from bad to worse, day by day. The demands of invaders which was found impossible to be fulfilled went on increasing due to financial stringencies and lack of able administration. Ministers were changed too often and none put his heart and soul in face of constant intrigues. A treaty was, therefore, signed with the East India Company in AD1818. The initial treaty, signed in AD1803 was repudiated by the Company in 1805 as the Directors of the Company had decided on a policy of non-intervention to avoid the displeasure of the Marathas. The terms of the treaty contained, among others, a provision for payment of Rs. 8 lakhs as annual tribute to the Company in perpetuity, in consideration of enjoying absolute rule of their territory and dependents by the Kings of Jaipur.

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In the very year of signing the treaty, Jagat Singh breathed his last, leaving no male issue to succeed him.

Mohan Singh of Narwar, a distant relation of Jaipur house, laid his claim to the *Gaddi*, and he was, therefore, adopted and seated on the throne with the help of Megha Singh of Diggi and Nazar Mohan Ram, two very influential persons in the administration. This arrangement was resisted by many nobles, and the situation would have taken a serious turn but for the timely birth of the posthumous son of Jagat Singh from his Bhatiyani queen. Mohan Singh had, therefore, to quit, and the infant **Jai Singh III** (Plate XIII, 25) was declared as the ruler in AD1819.

All powers of administration of the state were vested in the queen mother who acted as the regent. As she was a *'parda'* lady, her orders were communicated through her favourite maid-servant, Rupan, who was a clever and intriguing woman. Sir David Ochterlony, the British representative, was very helpful in setting matters right. He constituted a Regency Council under the Queeen Mother and put Rawal Bairisal of Samod at the helm of the affairs. Despite his sincerity and hard work, no significant success could be achieved. The main obstacle was Sanghi Jhuntharam and his party who connived with the Queen-Mother, through Rupan, and wanted to use the position to their own interests. The British representative sent him to exile only to have him recalled and posted as Diwan, and again to be shortly removed. It is alleged that he managed to have the minior king poisoned, as the poor boy died in mysterious circumstances in AD1835. He left a son named **Ram Singh II** (Plate XIV, 26), who was only Sixteen months old at the death of his father. There was an uprising against Jhuntharam and his partisans, which culminated in the misconceived action of injuring Major Alves, the British representative, and the murder of Mr. Blake. On a judicial enquiry, some of the miscreants were hanged and Jhuntharam was sentenced for life. Rawal Bairisal of Samod also found it impossible to control the situation: Jai Singh III died in AD1836.

When **Ram Singh II** was declared ruler in 1835, Rawal Bairisal was there to manage the administration. But, on the latter's death, a Council of Nobles was formed to conduct the administration. The State was running in deficit, and it was deemed necessary to curtail the expenditure, which was done by Major Thorsely. This move was opposed by the Queen-Mother and certain nobles. Major John Ludlow, who was resident from AD1844 to AD1847 had the credit of introducing some social reforms which included the abolition of the customs of *sati*, infanticide, and extravagent expenses, as that of *tyag* (compulsory payments to Charans and Bhats, etc.).

Ram Singh had a thorough education in language, literature, arts and state-crafts, before he began to attend the meeting of the State Council, even as a minor of sixteen years. He got full powers in AD1854 in his twentieth year. Pt. Shivadin, Faiz Ali Khan and Fateh Singh Champawat were his prime ministers in succession. He was nominated to the Legislative Council of the Viceroy for his outstanding abilities. His help to the British in the upheaval of AD1857 was highly appreciated and rewarded by the assignment of the Pargana of Kotkasim. During the famine of AD1868-69, he spared no pains in providing genuine relief. The city of Jaipur was enriched by him by erecting buildings like Albert Hall Museum, laying of the **Ram Niwas Garden**, and providing for amenities and facilities, such as the Water works, Mayo Hospital, Maharaja College, Sanskrit College, School of Arts, Public Library, Ram Prakash Theatre, Girls School, Public Works Department, etc. His forty-five years' reign is still cherished by the oepole of the State. When he was on his death bed in AD1880 he nominated Qayam Singh of Isarda as his successor.

The growth of the early Kachhawaha nobility, their territorial principlities and geographical distribution of the Estates:

The growth of nobility under the Kachhawahas may be described under the following broad categories; (a) Chiefs already occupying allodial estates, as independent or subordinate rulers, before they were forced into allegiance by the Kachhawahas, (b) near blood-relations of

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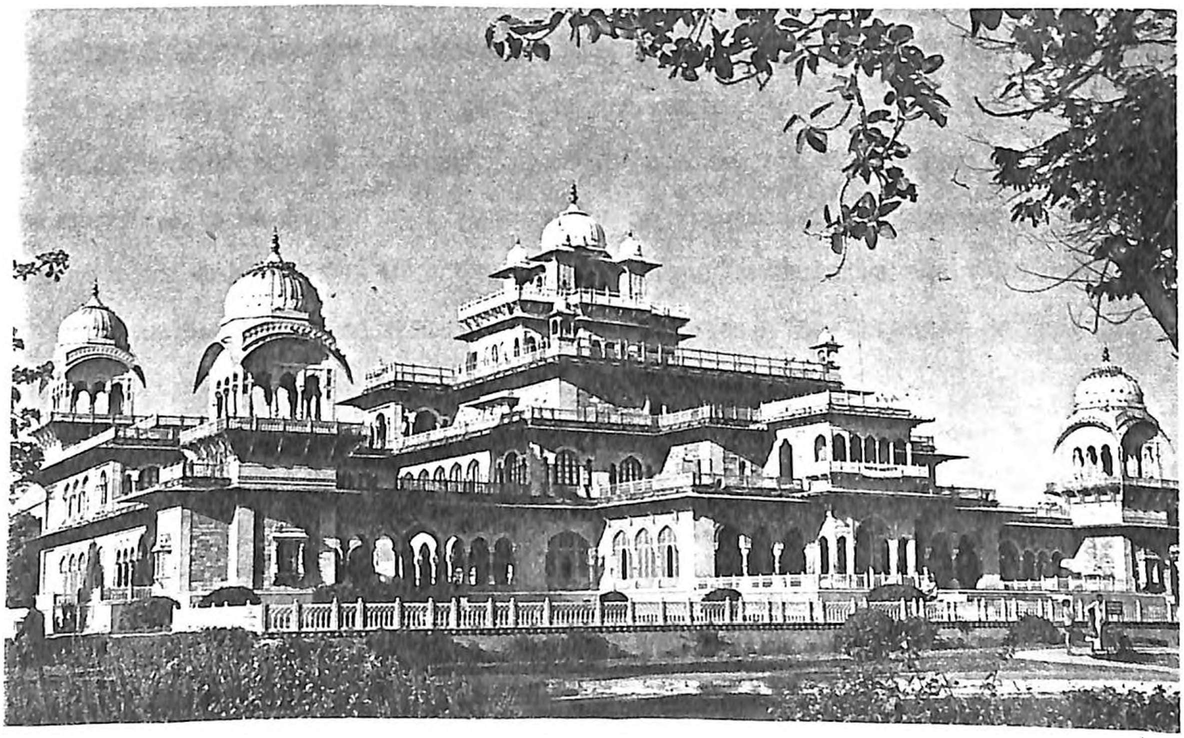

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the ruling family who were offered sustenance grants from time to time, (c) relations by matrimonial and other alliances who were granted fiefs as a gesture of goodwill, (d) nobles of other States who sought patronage or refuge, or were admitted into the personal service of the ruling house or that of the state, (e) hereditary and faithful employees who were granted token fiefs, as a mark of honour, in addition to their cash remuneration, (f) *Majis*, Maharanis and other laides of the seraglio who were granted life-time jagirs, (g) *Jagirs* gifted in appreciation of services, (h) religious and charitable endowmenets to temples, priests, bards, etc. They were called *Jagirdars, Sardars, Bhai-Beta, Bhomia, Parsangi, Ganayat, Inami, Udaki, Tankhadar, Rojindar*, etc. according to the particular category to which they belonged. For the purpose of our present study, we are concerned with such of the nobles only who hailed from the Kachhawaha tribe, irrespective of the gradations, such as, *Tazim, Khas Chauki, Imtiazi, Mamalaguzar, subaguzar, Istamarar, Chakotidar*, etc. The branches or individuals who migrated to other territories, and settled in an independent or subordinate position, have also been excluded from the scope of this study.

The first major attempt as is currently believed by the historians, was made by Prithviraj (AD1502-1527), in creating twelve principalities, known as Bara Kotari, with marked chunks of territories, for twelve out of his nineteen sons. This event may be taken as a dividing line in the historical growth of the Kachhawaha nobility, thus, separating the lesser known pre-Prithviraj period from the comparatively better known post-Prithviraj period, upto Sawai Jai Singh. The only sources of our information for the pre-Prithviraj period is the genealogical account preserved in the form of Vanshavali manuscripts Pedigrees maintained by the family bards also provide some such details. There is no option but to rely on these assorted accounts to enable us to have an idea of the formation of principalities. By scanning these details in chronological order, we find thirty three branches of the Kachhawahas, who were either known from the territories occupied by them, or carried the names of their respective progenitors.

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Table 1

Chronology of Rulers of Amber/Jaipur and Their eriod of Rule

Name of the Ruler	Ruled upto the period VS/AD	No. of Years of rule	Important event/s during the regime
Isa Singh	1023	966	Ruler of Narwar - of Gwalior
Sodhadev	1023-1063	966-1006	Village Nindrowali
Dulahadev	1063-1093	1006-1036	Won Manchi, Khoh, Jhotwara, Getor of and nounced Macchi as Ranegarh.
Kakildev	1093-1096	1036-1039	Won Kalikhoh or Ghatarani and renamed Amber in the mirror of god-ambikeswar.
Itanugi	1096-1110	1040-1053	
Janharadev	1110-1127	1053-1070	
Pajjun	1127-1257	1070-1095	Crowned. Conquered the Devras of Abu.
Malesi	1157-1203	1095-1147	
Baijaldev	1203-1236	1147-1180	
Rajdev	1236-1273	1180-1216	
Kilhanadev	1273-1333	1216-1276	Ascended the Gaddi and shrine of Ambhikeshwara killed by Jaipra Singh Chauhan father of Hamuir.
Kuntal	1333-1374	1276-1318	enthroned
Junasi	1374-1423	1318-1367	ruled for 48 years.
Udaikaranji	1423-1445	1367-1389	

Narsinghji	1445-1485	1389-1429
Banveerji	1485-1496	1429-1439
Uddaranaji	1496-1524	1439-1467
Chandrasen ji	1524-1559	1467-1503
Prithviraj ji	1559-1584	1503-1527
Puranmal ji	1584-1590	1527-1534
Bhim ji	1590-1593	1534-1537
Ratan ji	1594-1605	1537-1548
Ashkaran ji	1605-1608	1548-1551
Bharmal ji	1608-1630	1551-1573
Bhagawat Singh ji	1630-1646	1573-1589
Man Singh ji I	1646-1671	1589-1614
Bhausingh Mahasingh	1671-1678	1614-1622
Mirza Jai Singh ji I	1678-1724	1622-1667
Ram Singh ji I	1724-1746	1667-1689
Vishnu Singh ji	1746-1756	1689-1700
Sawai Jai Singh II	1756-1800	1700-1743
Ishwar Singh ji	1800-1807	1743-1750
Madhav Singh ji I	1807-1824	1750-1768
Prithvi Singh ji	1824-1835	1768-1779
Pratap Singh ji	1835-1860	1779-1803
Jagat Singh ji	1860-1875	1803-1817
Jai Singh ji III	1875-1892	1819-1835
Ram Singh ji II	1892-1937	1835-1880
Madho Singh ji	1937-1979	1880-1922
Sawai Man Singh II	1979-1990	1922-1949
Bhawani Singh	1990-present	1949-present

Table -2

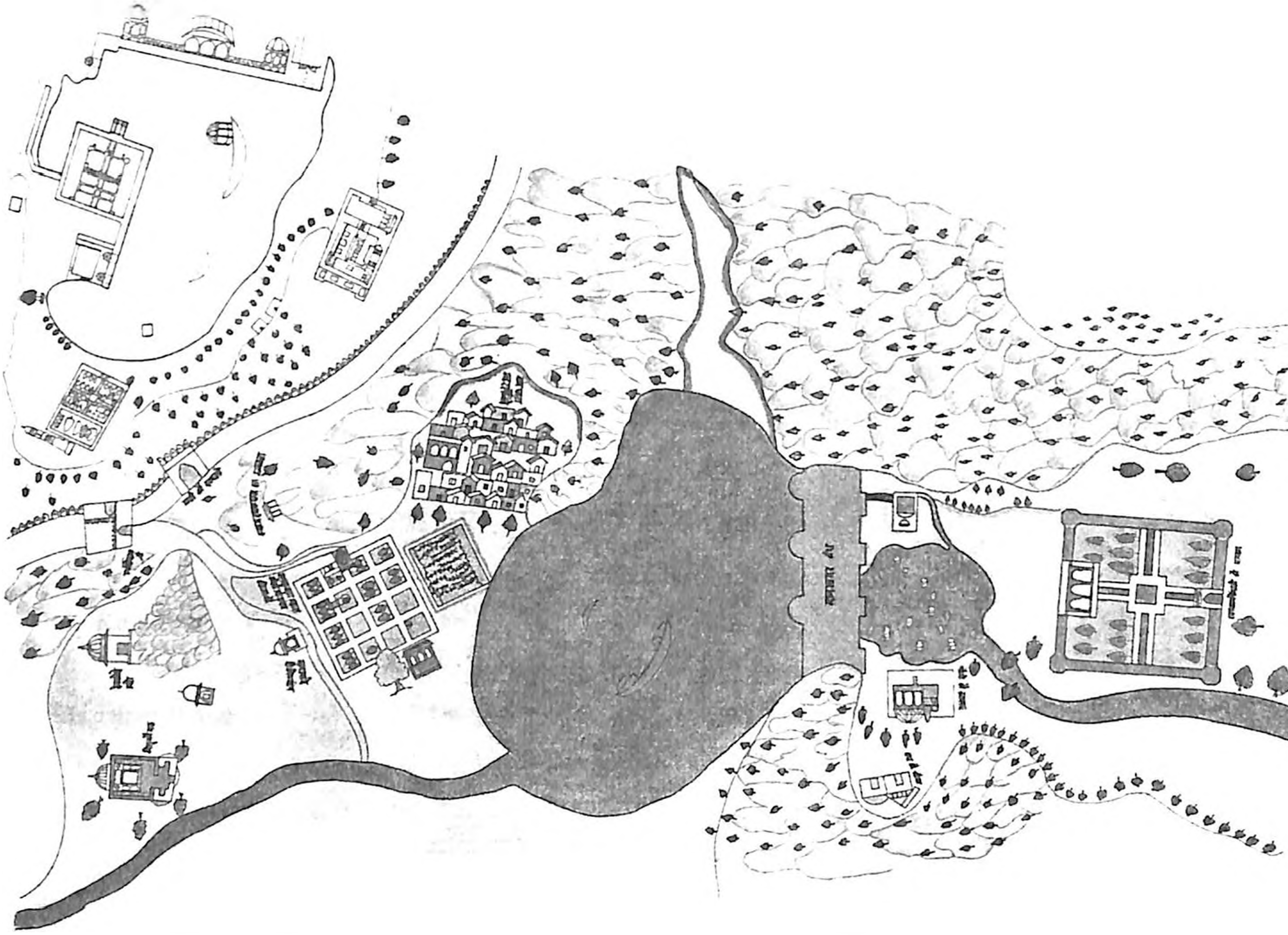
LIST OF IMPORTANT HISTORICAL TEMPLES AND BUILDINGS ETC. CONSTRUCTED BY THE MAHARAJAS AND MAHARANIS OF JAIPUR

S.NO.	Historic buildings	location	by whom constructed	construction year (AD)
1.	Temple of Shri Jamwa Mataji	Jamwa Ramgarh	Maharaja Duleh Rajji	1007-37
2.	Old Palaces below hill	Amber	Maharaja Raj Deoji	1180-1217
3.	Ten Pillared Palace	Vishram Ghat,Mathura	Maharaja Ratan Singhji	1537-1548
4.	Jama Masjid	Amber	Maharaja Bhar Malji	1569
5.	**Old Amber Palace on the hill**	Amber	**Maharaja Man Singhji I**	**1590-1615**
6.	Shri Shilla Deviji's Temple	Amber	-do-	1604,1942
7.	Jagat Shiromaniji's Temple	Amber	Shri Kankawatiji, Maharani of Maharaja Man Singhji I, built this temple in commemoration of her beloved son Maharaj Kumar Jagat Singhji	1601
8.	Man Mandir	Pushkar	Maharaja Man Singhji	1590-1614
9.	Man Mandir	Benaras	-do-	1590-1614
10.	**Govind Dev Temple**	**Brindaban**	-do-	**1592**
11.	Canotaph of Maharaja Man Singhji	Ellichpur (Berar)	Maharaja Bhao Singhji	1615-1622
12.	Dewan Khana and Ganesh Pole	Amber Palace	Mirza Raja Jai Singhji	1639
13.	**Govind Deoji's Temple**	**Kanak Vrindavan**	**Sawai Jai Singhji**	**1707-1714**

14. **Jai Niwas Garden**	**Jaipur**	**Maharaja Sawai Jai Singhji**	**1726**
15. **Observatories**	**Jaipur,Delhi Banaras,Ujjain Muttra**	**-do-**	**1724-34**
16. Shri Sitaramjis Temple	Vishram Ghat Mathura	-do-	1732
17. Shri Surajji's Temple	On Galta Hills	Rao Kripal under the patronage of Maharaja Sawai Jai Singhji	1734
18. Sudarshangarh Fort	Jaipur	Maharaja Sawai Jai Singhji	1734
19. **Jal Mahal**	**Amber road**	**-do-**	**1734**
20. **Chandra Mahal**	**City Palace**	**-do-**	**1734**
21. Badal Mahal	Jaipur	-do-	1734
22. Dewan Khana Am.	City Palace	-do-	1734
23. Sharbata (Darbar Hall)	City Palace	-do-	1734
24. **Shri Govind Deoji's Temple**	**Jaipur**	**-do-**	**1735**
25. Shri Gowardhan Nathji's Temple	Gowardhan Parwat	-do-	1736
26. Ranawatji's Garden (later on called Majika Bagh or Residency)	Jaipur	Shri Ranawatji Maharani of Maharaja Sawai Jai Singhji	1739
27. Shri kalkiji's Temple	Jaipur(Sireh Deorhi Bazar)	Maharaja Sawai Jai Singhji	1740
28. **Ishwar Lat**	**Jaipur**	**Maharaja Sawai Ishwari Singhji**	**1749**

29. Shri Govind Deoji's Temple	Udaipur (Near the temple of Shri Iklingji)	Maji Sahiba Shri Ranawatji w/o Maharaja Sawai Jai Singhji	1764
30. Shri Niritya Gopalji's	Brindaban	Maji Sahiba Dhundawatji w/o Maharaja Sawai Madho Singhji	1779
31. Shri Brijnandji's Temple	Jaipur	Maharaja Sawai Pratap Singhji	1792
32. **Hawa Mahal (Wind Palace)**	**Jaipur**	**-do-**	**1799**
33. Chatar Shiromaniji's Temple	Brindaban	Maji Sahiba Shri Ranawatji w/o Sawai Pratap Singhji	1810
34. Shri Brijraj Behariji's Temple	Tripolia	Maharaja Sawai Jagat Bazar,Jaipur Singhji	1813
35. Radha Agar Shiromaji's Temple	Brindaban	Maji Sahiba Shri Rathori Udaibhanotji w/o Maharaja Sawai Jagat Singhji	1819
36. Chand Behariji's Temple	-do-	Maji Sahiba Shri Champawatji w/o Maharaja Sawai Jagat Singhji	1820
37. Sareh Behariji's Temple	Pushkar Ajmer	Maji Sahiba Shri Rathoreji w/o Maharaja Sawai Jagat Singhji	1820
38. Gokulnandji's Temple	Brindaban	Maji Sahiba Shri Bhatiyanji w/o Maharaja Sawai Jagat Singhji	1820
39. Mohallalji's Temple	-do-	Maji Sahiba Shri Jhaliji w/o Maharaja Sawai Pratp Singhji	1822

40. Krishna Chandra Temple	Brindaban	Maji Sahiba Shri Bhatiyaniji II w/o Maharaja Sawai Jagat Singhji	1836
41. Shri Anand Manoharji's Temple	-do-	Maji Sahiba Shri Bara Bhatiyaniji w/o Maharaja Sawai Jagat Singhji	1827
42. Naya Mahal Council Building	Sireh Deorhi Bajar,Jaipur	Maharaja Sawai Ram Singhji II	1853
43. Shri Ramcandraji's Temple	-do-	Maji Sahiba Shri Chandrawatji mother of Maharaja Sawai Ram Singhji II	1854
44. Shri Ratneshwarji's temple known as Deoriji's Temple	Johri Bajar	Maji Sahiba Shri Deoriji w/o Maharaja Sawai Jai Singhji III	1865
45. Mayo Hospital	Jaipur	Maharaja Sawai Ram Singhji II	1870
46. Museum	**Ramniwas Garden,Jaipur**	**-do-**	**1869**
47. Ram Prakash Theatre Hall	Jaipur City	-do-	1879
48. Extension to the Sudershangarh Fort (Nahargarh Fort)	**Jaipur**	**Maharaja Sawai Madho Singhji II**	**1887**
49. Shri Ramchandraji's Temple	Chandpole Bajar,Jaipur	Maji Sahiba Shri Dhirawatji w/o Maharaja Sawai Ram Singhji II	1894
50. Gangaji's Temple	Gangotri	Maharaja Sawai Madho Singhji II	1915
51. Mubarak Mahal	City Palace	-do-	1900
52. Radha Madhoji's Temple	Brindaban	-do-	1915
53. Kishal Behariji's Temple	Barsana	Maharaja Sawai Madho Singhji II	1916



Historical map of the valley, with the Mansagar Lake, (Courtesy National Museum, Delhi)

54. Madho Behariji's Temple	Station Raod Jaipur	Maji Sahiba Shri Tanwarji w/o Maharaja Sawai Madho Singhji	1926
55. **Ram Bagh Palace** (Remodelled)	**Jaipur**	**Maharaja Sawai Man** Singhji II	**1926-42**
56. Zenana Hospital	Jaipur	-do-	1932
57. Maharaja's College	-do-	-do-	1934
58. Bhagwantdas Barracks	-do-	-do-	1936
59. Infantry Barracks	-do-	-do-	1936
60. Kachhawa Horse barracks	-do-	-do-	1936
61. Lady Villingdon Hospital	-do-	-do-	1936
62. King George V Solorium	-do-	-do-	1939
63. Jaipur House	Delhi	-do-	1940

PLATE XVI

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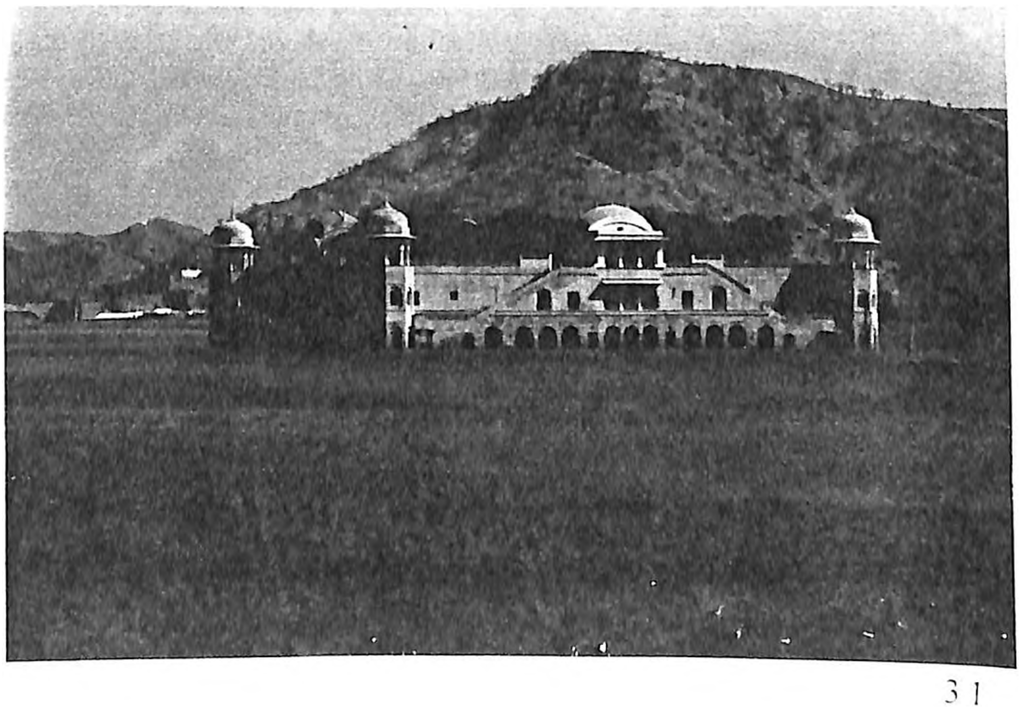

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PLATE XVII

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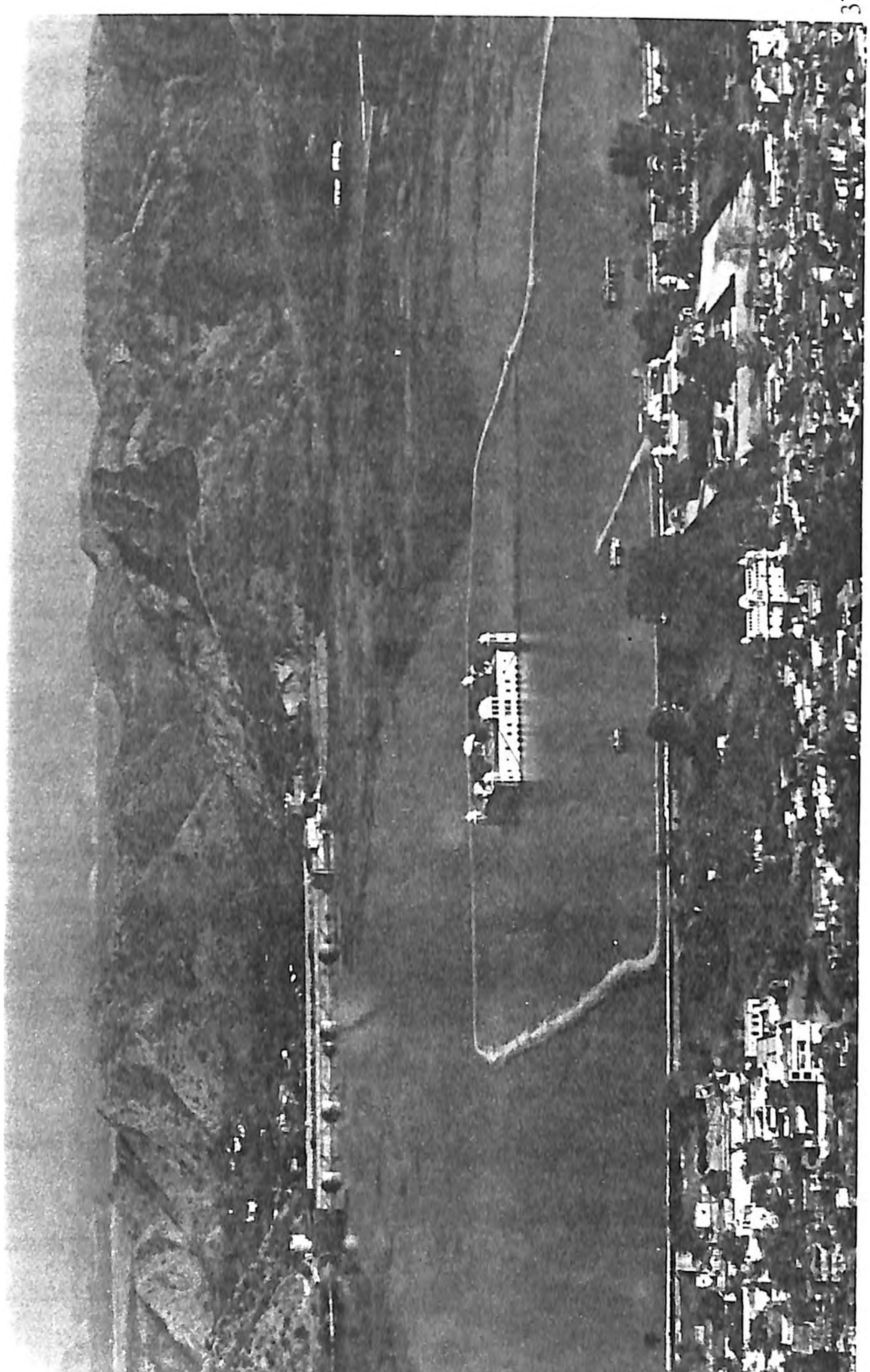


2.2.2 Kanak Vrindavan Ghati

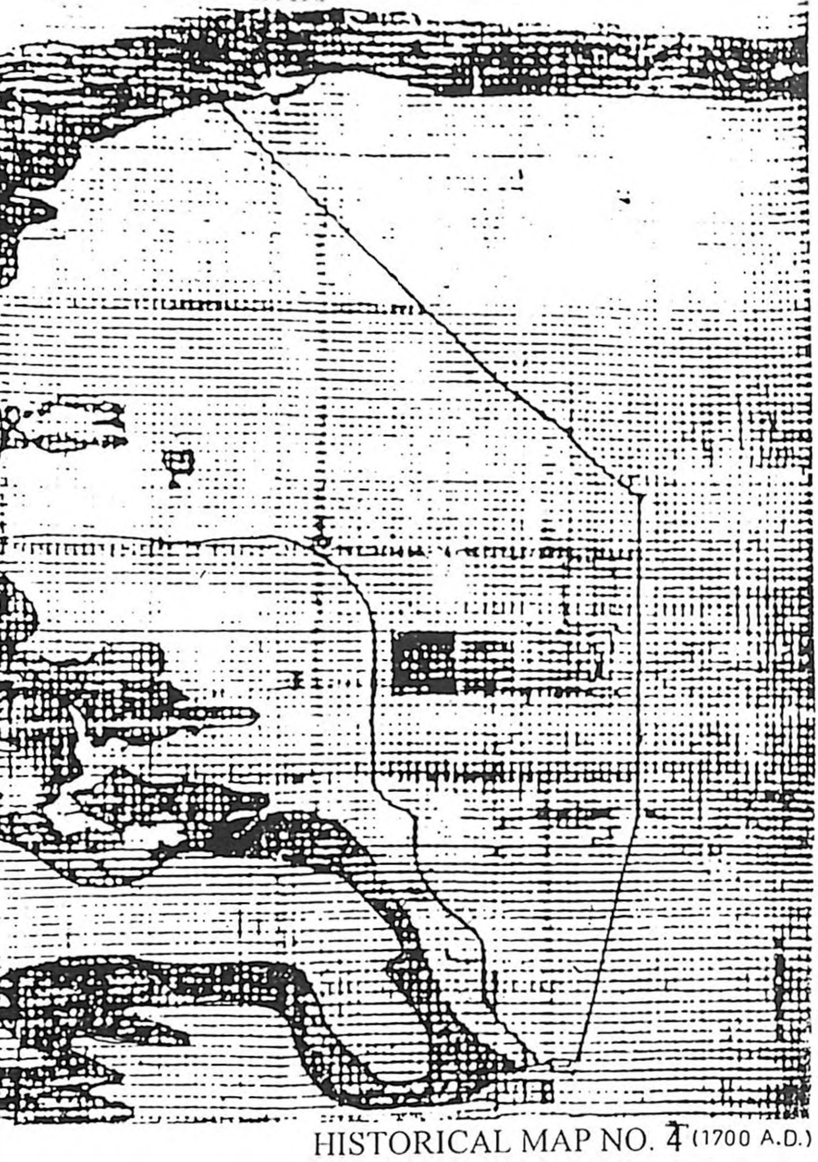
(a) Mansagar Lake

The Jaipur city was laid during time of Maharaja Swai Singh in the year AD1727. It is located on 26°55' North latitude and 75°49' East longitude. The valley adjacent to walled city on the northern side is surrounded by Aravalli ranges which was initially the hunting ground of rulers of Amber from early 10th Century AD. The site of valley is conjectured to be dried up lake according to the Imperial Gazetter of India (1908). This view is further confirmed from available plan with Jaipur Museum showing water bodies as existed before the city was laid out. This plan belongs to circa AD1700 (Map No. 4). **Mansagar lake** seems to be a remnant of the same old lake. A small river called **Dharbavati** used to flow into it.

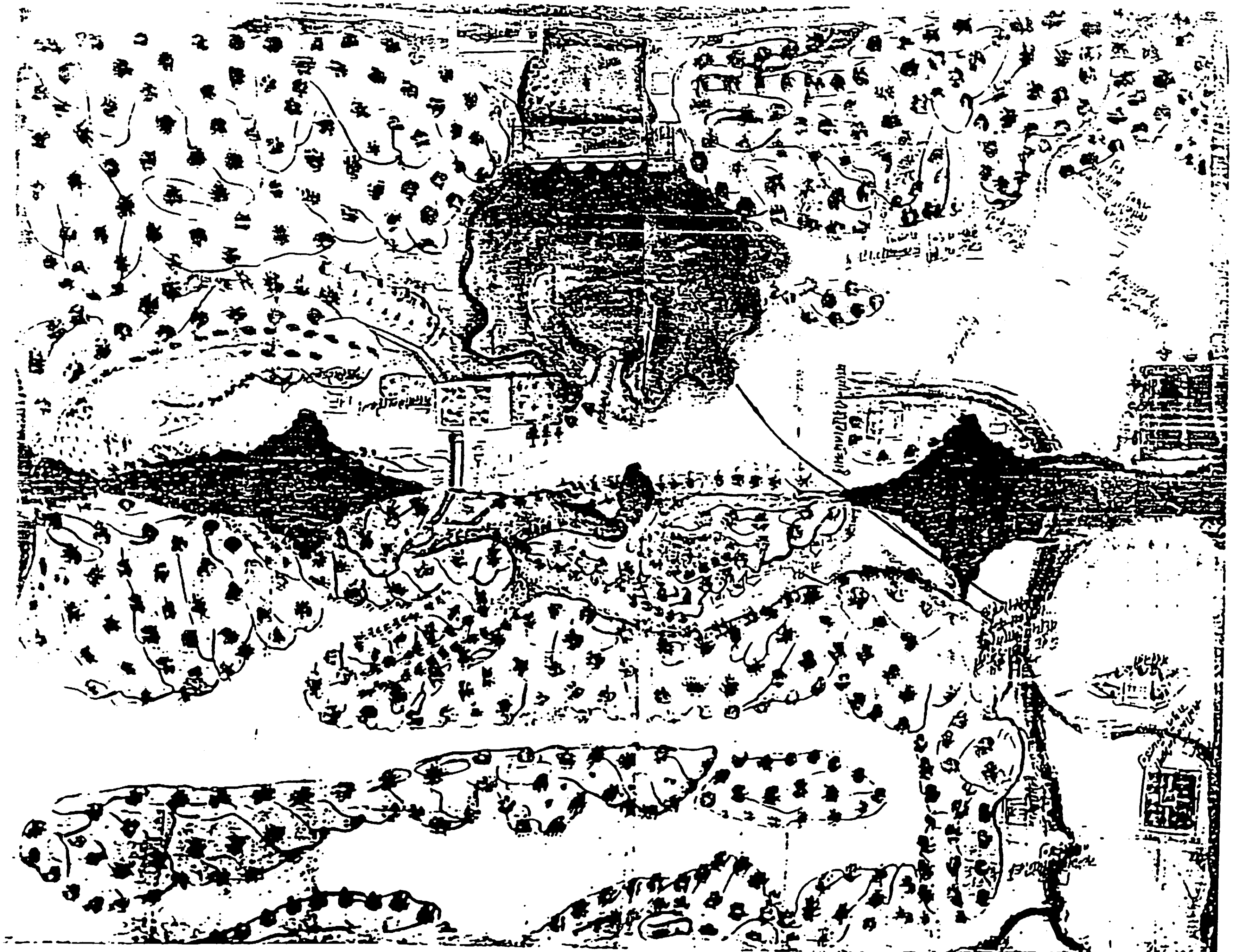
(b) Jal Mahal

A great famine occurred during the reign of **Sawai Man Singh I** of Amber in AD1596. Sawai Man Singh as the commander of Emperor Akbar's forces had supervised several famine relief programmes throughout India. He had the advanced scientific knowledge of trapping, harnessing and storing water for the lean times by building *'Talabs,_Bandhs* and *Bawris*. He thus undertook the construction of a *'Bandh'* over a river Darbhavati, across the eastern valley between the Amber hills and Ambargarh hills. The *'Bandh'* was first made temporarily of mud and Ambargarh quartzite, but later in the beginning of the 17th century under Sawai Man Singh I, the *'Bandh'* wall was reinforced with embankments, *Burjs* and spillways. Besides this, series of *Bawris*, tanks and embankments were also constructed between the Nahargarh hills and the **Man Sagar Dam** (Map No. 5). The seasonal rain water was also harnessed by means of talab and embankment walls. Some of these exist is the ruined state, even today.

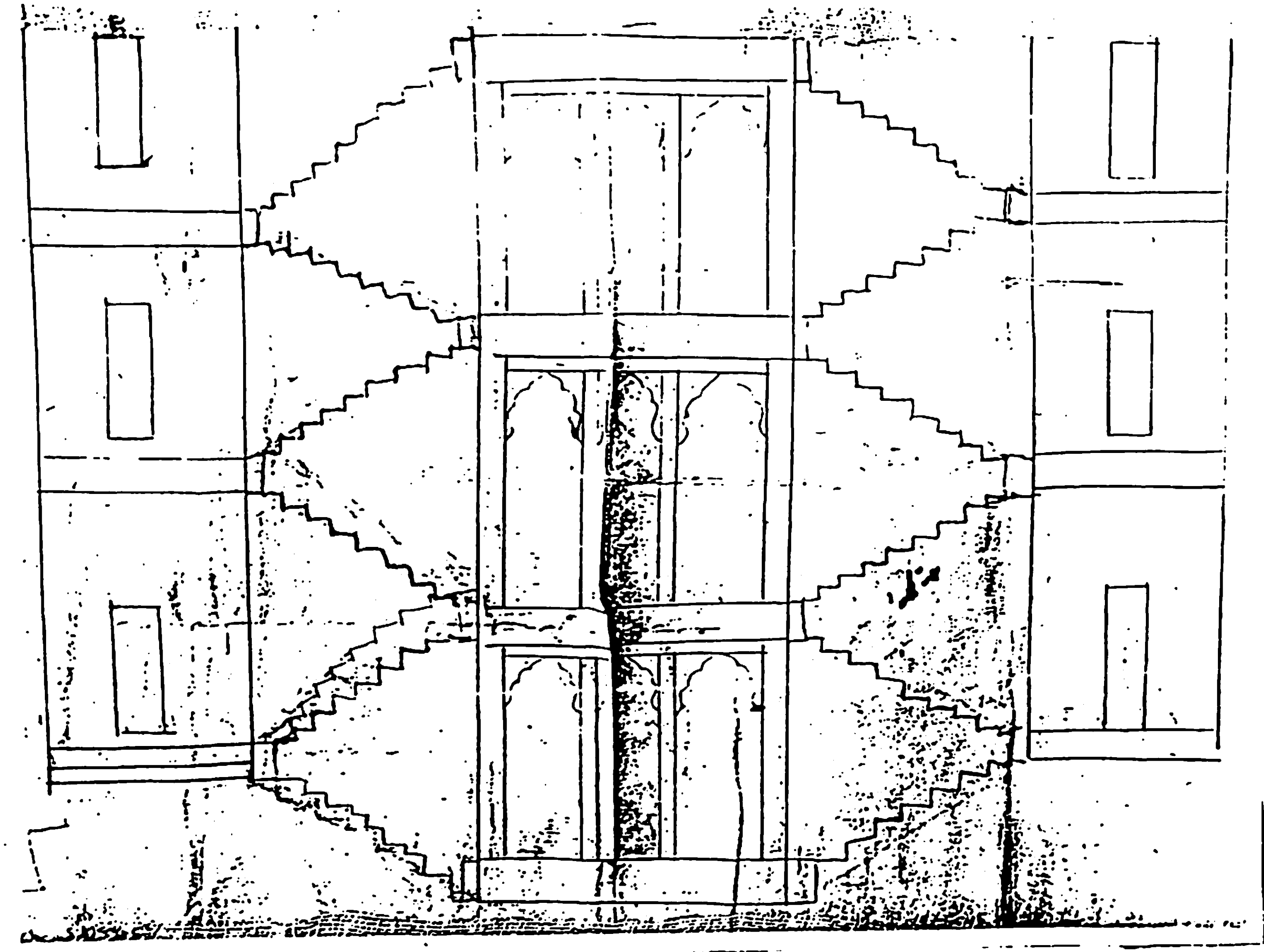
The present **Jal Mahal** was originally a small *Jal Mandir* with a *'Baradari'* in the middle of the walled enclosure built on the western Bank of Mansagar by **Sawai Jai Singh II** (Map No. 6,7,8). The enclosure walls had a passage all around and 'burjs' on each corner (Map No. 7). The raised platform few feet from the ground with a *baradari* was connected by stairs. *Jal*



HISTORICAL MAP NO. 4 (1700 A.D.)



HISTORICAL MAP NO. 5 (1710 A.D.)

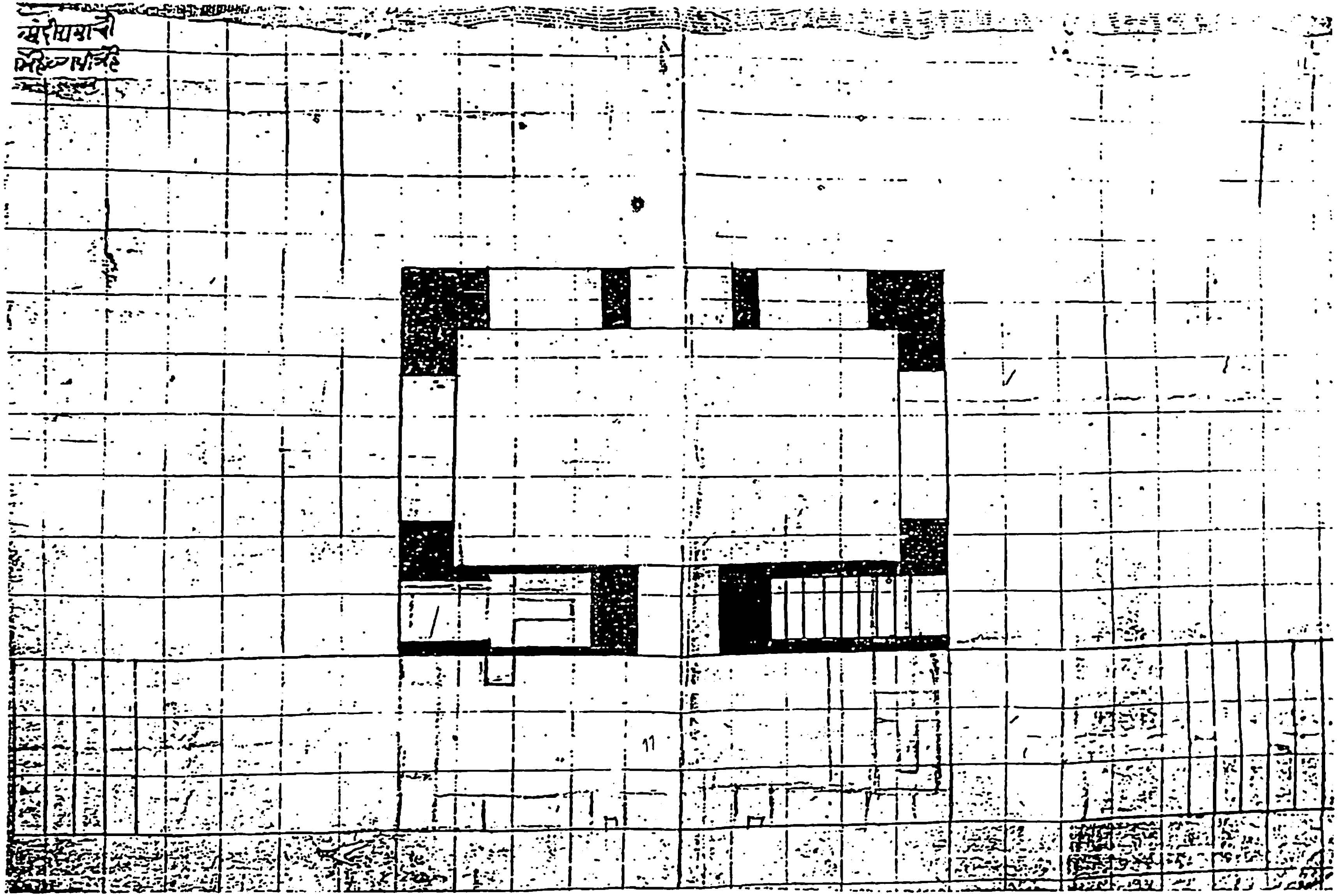


Map no.

तरह जलमंदिरकी

MAP OF JAL MANDIR
CIRCA 1600 to 1700 AD

HISTORICAL MAP NO. 6



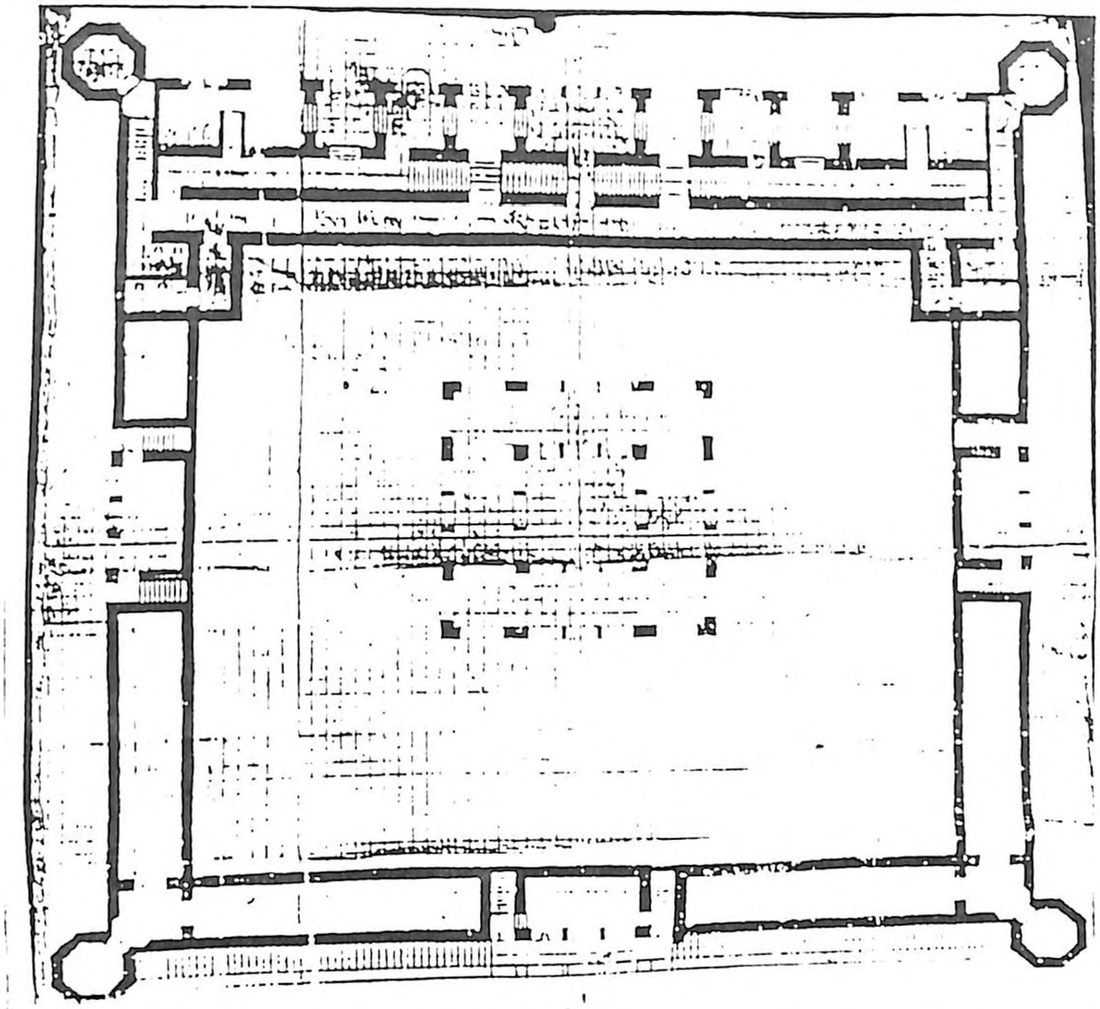
तरह जल मंदिर की माहिला चौक की

HISTORICAL MAP NO. 7 (1675 A D)

Mandir was near the eastern wall of the Mansagar but was not surrounded by it. A *'Bawri'* was built in the western side of the *Mandir* and a few more *Baradaris* were constructed on the vacant land in north and southern side of the *'Bawri'*. On the axis of the present **Jal Mahal** towards west, there was a **Varadha Raja's Temple** and a **Yagyashala**. Maharaja Sawai Jai Singh II performed *Ashwamedh yagya* in this place before laying the foundation of Jaipur and built up a *Yagya Stambh* on near small hillock near the *Yagya Shala*. Holy water from various rivers of India was collected in a *kund* adjacent to the presently known **Jal Mahal** during this legendary *Yagya*.

The Jal Mandir was further developed by Sawai Jai Singh II's younger son **Sawai Madho Singh I**, whose interest in this building was certainly not religious but was based on the designs of Udaipur building because Madho Singh I had spent major part of his childhood at Udaipur. He built two *'Hammams'* on the north eastern and south eastern corners of the *'Jal Mandir'* complex. The *Jal Mandir*, *'Baradari'* and surrounding walls with open arches that soared high above the central *'Baradari'*. It is quite possible that Madho Singh I tried to bring the water close to this *'Jal Mandir'* by building canals from **Mansagar** and diverting the water upto the eastern side of the *Mandir*.

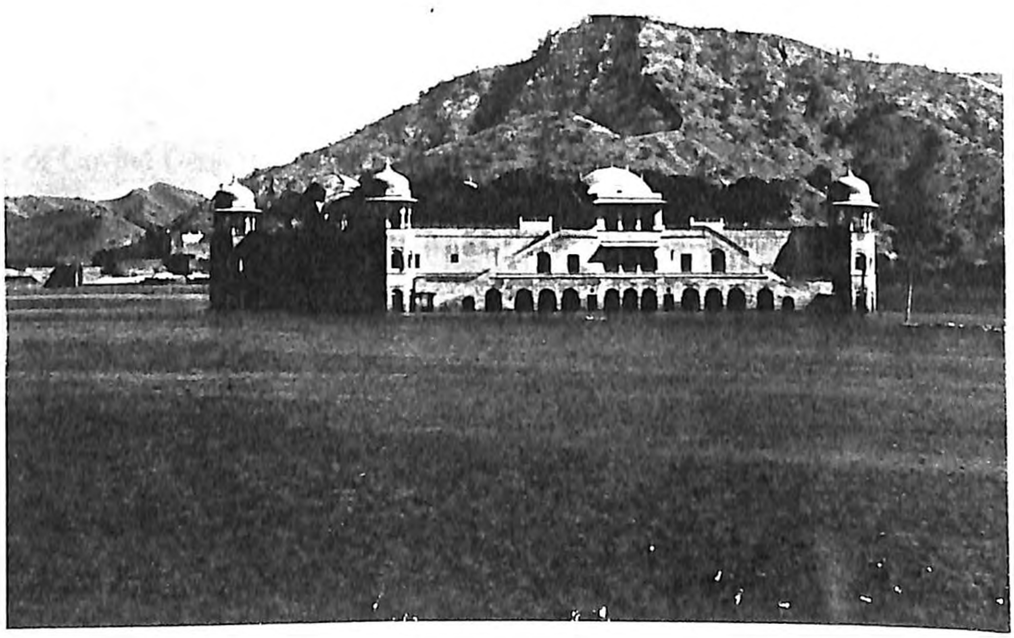
Maharaja Swai Pratap Singh son of Madho Singh I developed the raised boundary walls of the *Jal Mandir* and developed the galleries, known as *'Bhool Bholaiyan'* (a maze) around the *'Jal Mandir'*. The building structure of *Jal Mandir* became weak due the movement of water near the building and therefore the entire vacant area within the walls of the *Jal Mandir* was urgently filled by mud and some passages leading to the Jal Mandir were constructed. Gradually the structure was surrounded with water from all sides and since the Jal Mandir got burried, the building with new structural additions took the shape of a pleasure house and given the new name **'Jal Mahal'** (Plate, XVII, 32). **Maharaja Pratap Singh** largely impressed by the recreational potential of the structure, later developed it as a pleasure garden and raised the existing structure even higher (Map No. 8). Due to frequent fluctuations in lake water during the monsoon the surface area of Mansagar expanded and surrounded the structure



HISTORICAL MAP NO. 8

तरह मानसागर जल मन्दिर की

MAP OF MAN SAGAR'S JAL MANDIR CIRCA 1700 AD



(map to be referred at City Palace Jaipur). To resist the increased water pressure the entire vacant area within the structure was filled with soil. The arch and bracing walls were provided to further strengthen the structure. The central pavilion got buried by the lifted walls up to the upper floor level. The terrace garden was developed and *kabanis* were added, giving **Jal Mahal** the shape of a garden as it exists now.

Towards the north of the lake Maharaja Jai Singh II developed the temple complex in **Kanak Vrindavan Ghati** offering a pleasant sight from the lake.

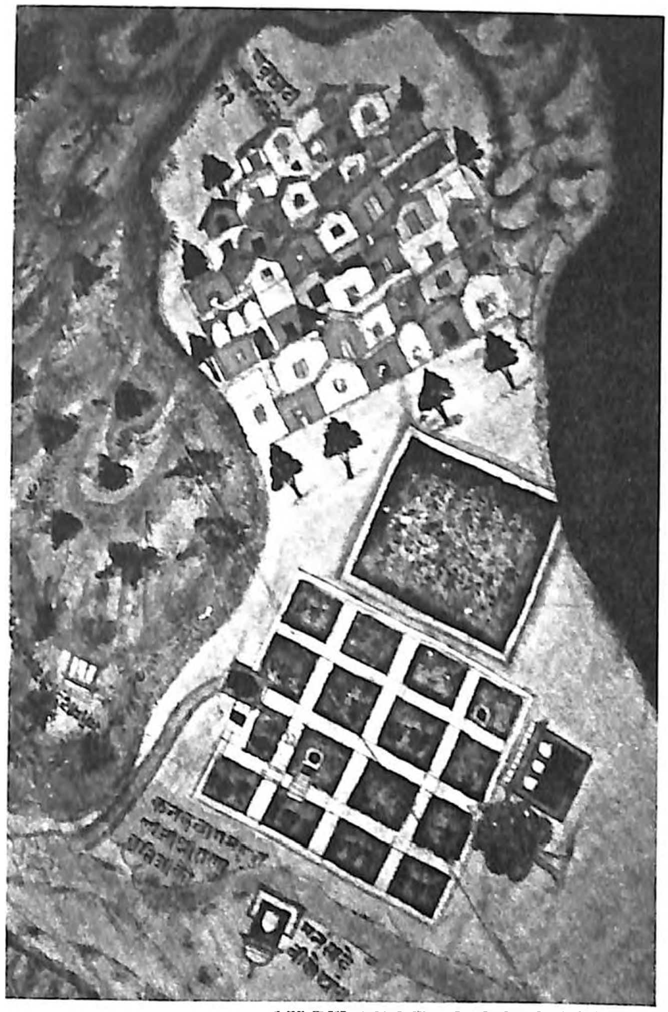
Kanak Vrindavan Temple Complex

The Kanak Vrindavan Valley is about 4 kms. from **Zorawar Singh gate** in the north of Jaipur city. **Sawai Man Singh I** developed the Valley. **Sawai Man Singh I** was worshiper of the Sun God he built a small Jal Mandir in the form of a *'Baradari'* on a raised platform to the west of **Mansagar**. Not much development occurred during the reign of Sawai Man Singh (AD1589-1614) upto the beginning of the reign of Sawai Jai Singh II (AD1700-1743).

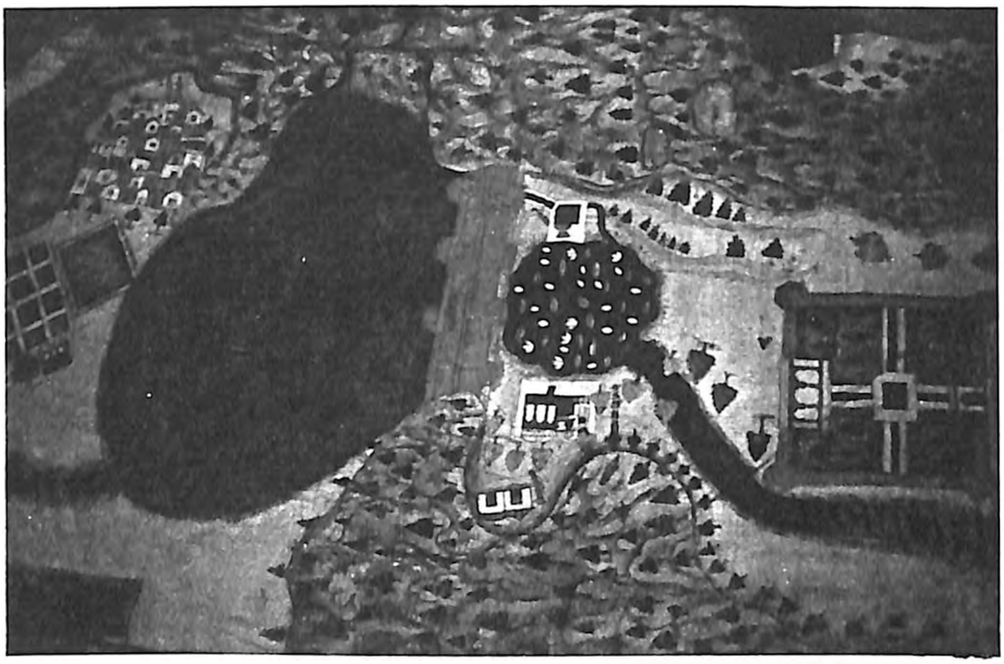
Sawai Jai Singh II brought the idol of **Shri Govind Deoji** from **Vrindavan** in AD1706 and installed it in a temple in a small village called Gopalpura near Amber. In AD1714 the idols were shifted to the present **Govind Deoji's temple**. In AD1714-1727 Rani Kanwar, sister of Sawai Jai Singh II, built the temple of **Natwarji** in the north east of Govind Deoji's temple.

Kanak Bagh

In the east of Govind Deoji temple and south from Natwarji's temple, there is a garden known as **Kanak Bagh**. The present Kanak Bagh was a bagichi built up by Shri Ranawatiju, Maharani of Jai Singh. The *bagichi* was later modified on the pattern of Mughal garden by Sawai Jai Singh II after the installation of idols of Sri Govind Deoji. The garden has an interesting history as mentioned below.



HISTORICAL MAP NO. 10



HISTORICAL MAP NO. 11

Following the critical examination of the maps and information available about Amber and Jaipur with the 'National Museum', Delhi and 'City Palace Museum', Jaipur, on a large map, 21x21 feet, of Amber and Jaipur made under the instructions of Maharaja Sawai Jai Singh II dated AD1710 was located. The map (No. 9,10) shows the presence of a square garden on the southern side of the Valley near the water reservoir with sixteen equal divisions. Kanak Bagh, was owned by **Maharaniji Shri Ranavatiji** wife of Sawai Jai Singh ji II. The garden had one entry towards the east and a well. Outside the garden there were number of temples. One of the temple on the north side was **Mansa Devi** (titled as **Mansa Devi Ka Dham**) situated on a small hillock and a temple of **Radha-Madhav** (as per the *Mahantji* of present temples). The map also shows the presence of habitation (number of houses) named as *Gaon Ki Ghati* (village in a valley (Map No. 10) to the east of the garden and at the base of a rocky terrain. An agricultural field and water resevoir in the south had also been prominently shown in the map.

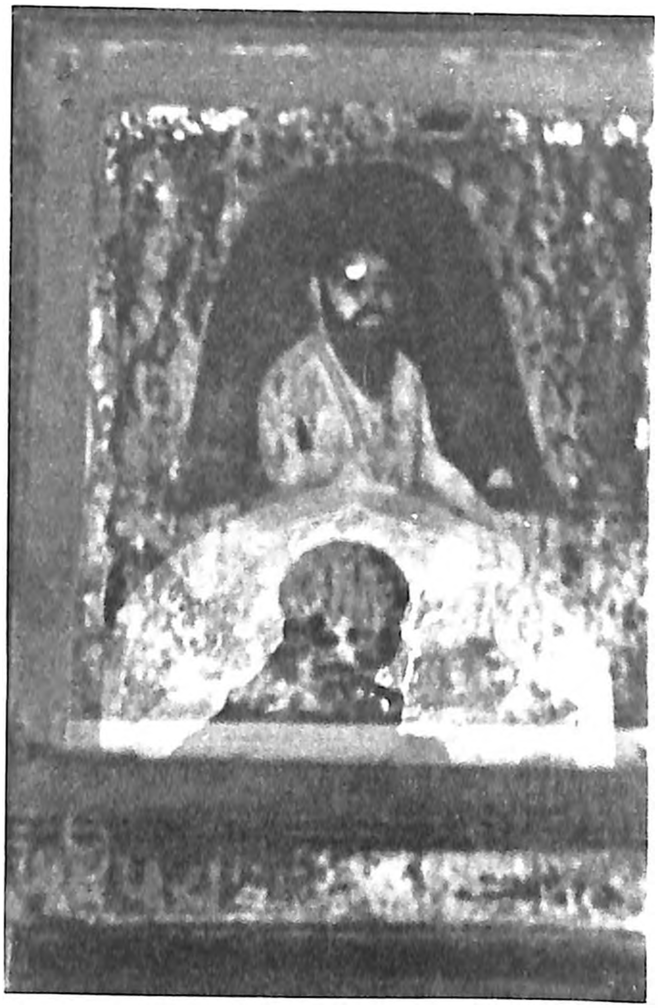
2.2.3 Galta Ghati

The name is derived from the sanskrit 'Galita' which means in 'Oozing of flowing water'. The pilgrimage place Galtaji is situated in a valley about one km east of Surajpole Gate, Galtaji is also approachable from Ghat Ki Guni which is about 5 kms away. It is believed that during 'satyayug' period **Galav** rishi meditated at this place for many years to realize the dreams of his teacher **Vishwamitra**. *Rishi* **Galav** through his meditation brought the holy water of Ganga to this place. The water flows throughout the year from a *Gaumukh* (Cow's mouth). Taking a dip in Galav-Ganga is considered very holy by the pilgrims. It is believed that the pilgrimage *yatra* begins from here and the bath taken here has its own significance. The hills 100 to 500 feet high, spread over seven kms were once covered with thick vegetation. The Valley thus formed became the abode of *Rishi* Galav - the Great grandson of Lord Brahama. The hills are known as **Ambikachal** hills. The Nature dominated decades back with abundant species of natural Aravallis flora & fauna which are now scanty.

PLATE XVIII

In the middle of the Valley at the place where *Rishi* Galav meditated and performed *Yagya* (a holy ritual). A *Yagya Vedi Kund* is made by **Mirja Jai Singh I** (AD1622-1667) the ruler or Amber who also built other *Kunds* in AD1636 and completed in AD1644. The history of Galta acknowledges shelter from various rulers of Amber even before the period of **Mirja Raja Jai Singh I**, stretching back to the period of **Prathviraj** (AD1502-1527). Although this place was prominent pilgrimage place for **Meena** tribe thousand years back as supported by recent Archaeological investigations in the adjoining areas. However, it is known that Rajputs later overpowered meena tribe in the year AD966 but systemic historical information is available only from the period of **Maharaja Prathviraj. Prithviraj** was contemporary of Mughal emperor **Babar**. During the Rule of **Maharaja Prithviraj**, Galta was dominated by *'Nampanthi Yogis'* (a Tribe of religious people) under *Mahant* (religious teacher) **Chaturnath** who was the religious guru of **Maharaja Prithviraj** and his wife princess **Balabai**. It is believed that during the period of **Maharaja Prithviraj** a sage **Payohariji** ascended to this place for meditation in (AD1503-1523) and had to confront with existing mahant **Chaturnathji**. He astonished him and his followers by his spiritual powers and made them their disciples. The Maharaja and his princess too become his followers and donated eighty villages to Galtaji for sustaining it as a spiritual centre. The place where Payohariji meditated, still exists. It is a cave named in his memory and a flame burns since the last 500 years. **Payohariji** later established this place as the seat of **Ramanuj Sect** in the North India and placed it under **Mahant Keel Das** before going for pilgramage in other parts of India. The **Kilha Dasji**, a favourit of **Payohariji** among his fifty two disciples also meditated at this place and gave blessing to Mughal emperor Akbar who visited this place before going to Ajmer for praying for a son.

Payohariji began the construction of Temples at Galtaji. **Kilha Dasji** first established idol of **Sita Ramji** in the central 'Garbha Griha' of **Sita Ramji's Temple** (Plate XX, 36). He also installed an idol of Lord Hanuman in **Hanuman Temple** with an *'Akhand Deep'*. Later *rishi Nabha* a disciple of Payohariji added another Hanuman Temple at **Hanuman Garhi**, opposite to the place now known as **'Nabha Niwas'** where he wrote a famous *Granth* (holy



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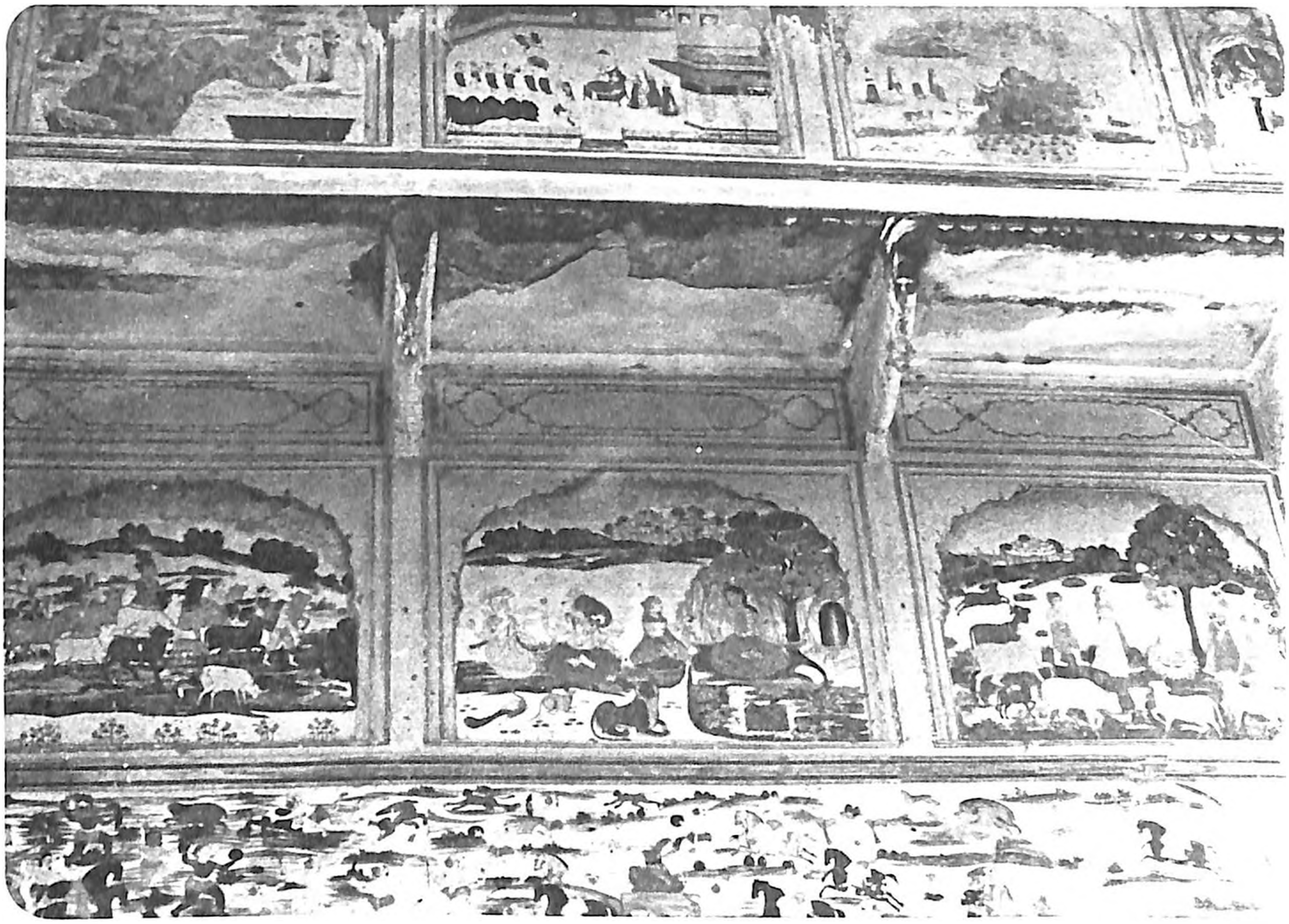
religious book) '**Bhaktmal**' which is considered even today an authentic encyclopedia of two hundred saints of this regim. Saint '**Tulsidas**' (A prominent saint who wrote **Ram Charitra Manas**), who wrote sacred religious book on Lord Shri Ram had also visited to this place to meet **Nabha Rishi** as described by him in his granth. After Rishi Nabha, another sage who gained popularity was '**Agra Dasji**' who wrote holy book *"Bhayan Manjri"* in the year AD1575.

This place kept gaining patronage from rulers of Amber. After Maharaja Prathviraj (AD1527) during periods of **Puran Mal, Bhim, Ratan Singh, Bharmal, Raja Man Singh** and **Jai Singh** or **Mirza Raja Jai Singhji**. The area was at its peak as described by the court Poet **Dawarka Bhatt**. He witnessed three rulers of Amber **Madho Singhji I** (AD1750-1768), **Prithviraj Singh** (AD1768-1779) and **Sawai Pratap Singhji** (AD 1779-1803). The poet received titles like *'Sursati'*, *'Bharti'* and *'Bani'* from them. He compared Galta in his poetry with '*Vyasashram*' (a divine place where *Rishi* Vyasji lived), '*Valmikashram*' (place of *Rishi* Valmiki), '*Sukdevashram*', (Place of *Rishi* Sukdev) and '*Vashisthasharam* (place of *Rishi* Vashistha, known for highly spiritual souls meditating in his *Ashram*).

The court poet **Shri Krishna Bhat** of Maharaj Sawai Jaisingh II described the beauty of this valley in *'Galav Geetam'* written in *Brij* as follows:

The natural surroundings of **Galta Ghati** can not be overlooked. Its enchanting beauty, the songs of birds echoing over the mango trees encompasses the human mind the poet describe these songs as melodious as that created by music over instruments and the sound of wind over the trees causes such a rhythm that leaves its impression and enhances the devotees prayers to the Lord. The sound of the lord seems to echo all around the *ghati* by the birds leaves and all says the poet, Shri Rama. The water flows in harmony to the birds songs and the peacocks dance.

The detailed account of the development of Galta temple complex has been given in the Appendix.



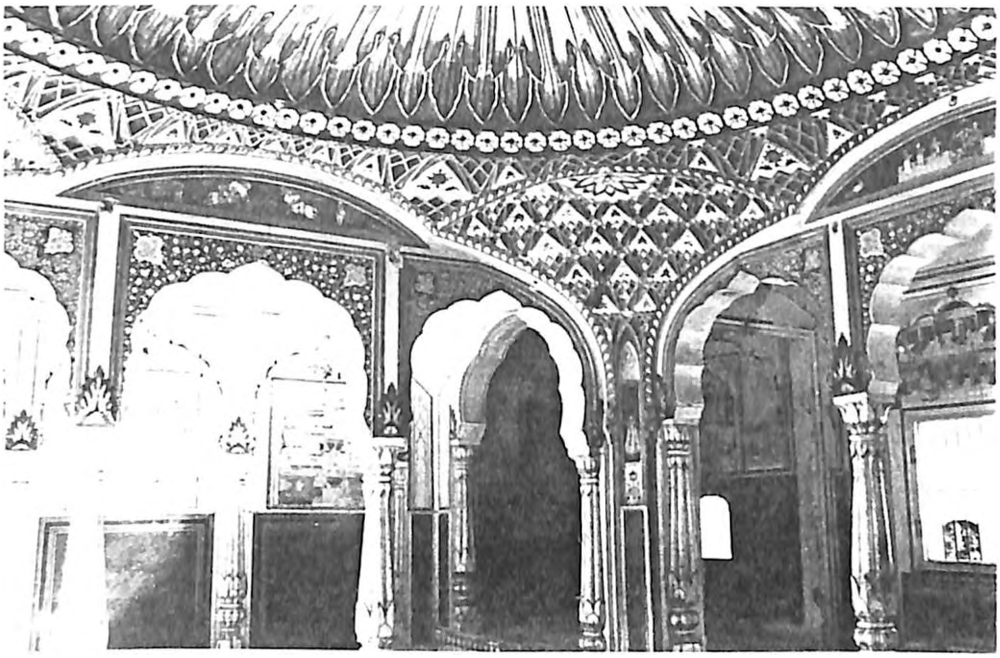


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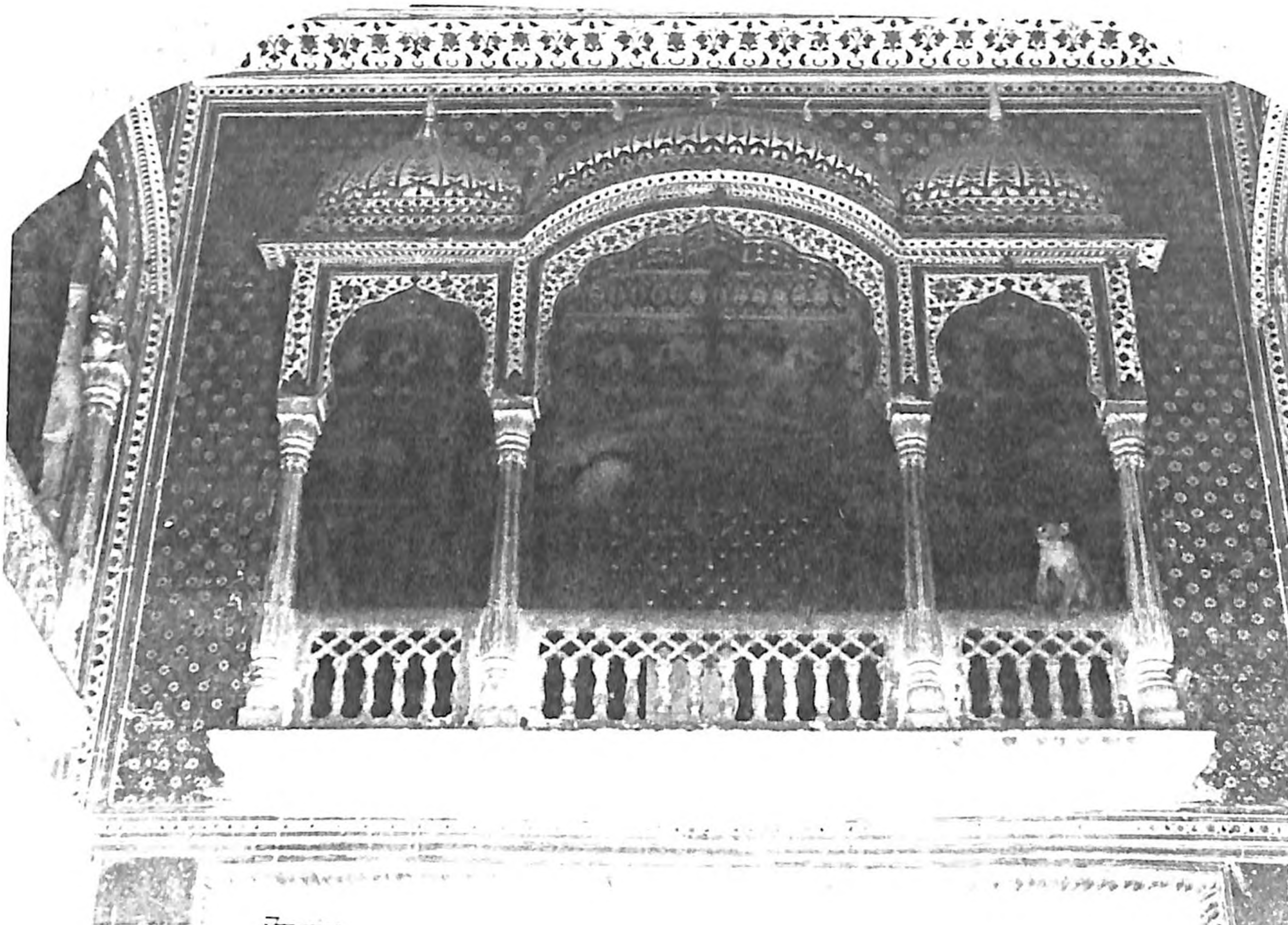
PLATE XXII



CHAPTER 3
DOCUMENTATION OF SITES

3.1 KANAK VRINDAVAN GHATI

3.1.1 Topography

3.1.2

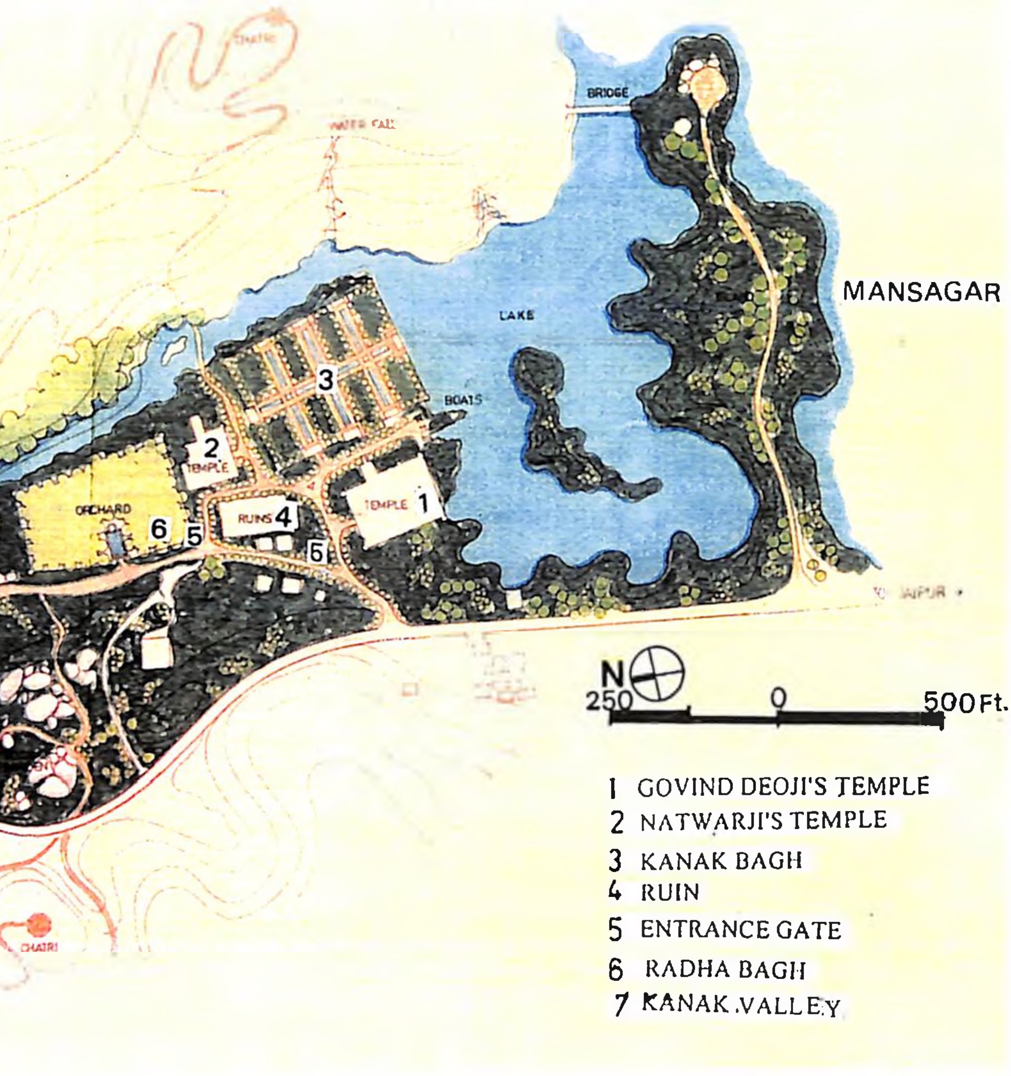
The Kanak Vrindavan Valley stretches between **Ghati gate** at the north and the temple complex towards the south, Kilangarh hills in the eastern direction and Nahargarh hills towards the west measuring approximately 2.5 sq. kms. area. The Valley starts descending from the **Ghati Gate** towards the temple site and spreads at **Mansagar lake**. The hill towards the east has the highest level of 1750 feet which streches from Amber to Mansagar Dam with appex reached at east of Kanak Bagh. (Map No. 12)

The hill towards the west i.e. Nahargarh hill has highest level i.e., 2000 feet. The hills at Amber, Jaigarh and Nahargarh Faorts have thick forests.

The level at Ghati Gate is about 1500 feet and at the Temple complex is about 1360 feet from M.S.L. The level at the periphery of Mansagar is about 1350 feet. The terrain is undulating in nature, with scattered boulders. Rocks are completely devoid of soil due to the erosion and has silted the lake over a period of few decades (Plate XXIII, 39). Seasonal streams flow in the valley. The drainage pattern is clearly visible on the ground level due to the accumulation of stones and boulders along the run-off.

The soil in the area consist of clayey loam. The soil strata below 0-10 mts. depth is dry clay and *kankar* boulders. At 20-50 mts. depth the soil is medium hard rock with fractures, and between 50-100 mts. it is hard and compact strata. The saturation level is poor at ground level but is nil at 20 to 40 mts depth. Here the soil has a low saturation level (Plate XXIV, 40).

MAP NO. 12



KANAK VRINDAVAN VALLEY

PLATE XXIII

3.1.2 Climate

The climatic variation are as follows; mean temperature is 30.8° to 32.6° and minimum 17.5° to 19.2°C. However, the maximum temperature reaches 45°C during summer.

The average annual rain fall of this area is about 600mm, with relative humidity 54.8%. The direction of the wind during summer is south west. The central portion of the valley in the north-south direction remains shady even during summer when the valley has extreme climatic constraints for vegetative growth and therefore has conducive microclimatic conditions for rich growth of vegetation. Bare rocky area experiences excessive radiation due to exposure to sun for the major part of the day.

The evaporation of water in the Mansagar lake and nearby ponds during summer reduce, the water level as per the details given in the Table in Chapter 7.

3.1.3 Vegetation

The '*climax*' vegetation of major parts of the hills is represented by *Anogeissus pendula* (Dhok), (Plate XXIV, 41), which covers most of the hills. This tree has defined branching pattern. It appears green during rainy season and remains defoliated and becomes brown during winter and summer season. The canopy of this tree is sparse spreading in fifteen feet diameter and approximately the same height. This '*climax*' vegetation is usually associated with *Boswellia serrata* and *Lannea coromandelica*.

- The west facing hills have steep slope towards the Mansagar Dam and have *Euphorbia neriilfolia* as pioneer vegetation which grows on the barren rocky regions.

- The upper region of the valley shows thick growth of *Boswellia seratta* with mixture of *Anogeissus pendula* which extend half way on the slopes and is associated with *Lannea grandias Diospyros melanxlyon* and *Grewia spp*.

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- The periphery of the lake near the temple complex is impregnated by a huge growth of *Periphyton, Polygonum,* and *Typha* species.

- The aquatic plants are *Eichhornia crassipes* which covers most of lagoon adjoining temple complex. *Polygonum glabrum, Cynodon daectlon* and *Alternanthera* Spp. are also found in this zone.

The lower tier of the valley is represented by *Crypstotegia grandiflora,* (Plate XXV, 42), which is evergreen and bears profuse mauve colour bell shaped six inches long flowers. The shrub attains a size of tall bush which grows upto 8 feet height, with lush green leathery and shiny leaves.

The small shrubs growing under the trees are represented by *Adatoda vasica, Barleria Spp.*. The species of plant *Dichrothesis sinneria,* (Plate XXV, 43), is also found in the valley which bears multicolour flowers. Yellow, white and pink resemble a tricoloured mulberry fruit shape. It is an ideal shrub which adds colour to the otherwise barren valley.

The valley also has species like *Acacia senegal, Holptelia integrifolia, prosopis juliflora* and *Mytragyna parvifolia* etc. found in clusters. The under cover is absent in this area due to soil erosion resulting from deforestation and heavy grazing of mammals. Only seasonal grasses appear during rainy season giving green look to the valley.

3.1.4 Hydrology

The surface run-off of water is a persisting phenomenon in the valley and therefore substantial storage underground in aquifers is not possible. The hydro-geological survey comprised of the study of physiography, drainage pattern, vegetational growth and soil characteristics. Other features recorded are the depth and lithology of acquifers water level during summer its quality and quantity. The **Geoelectric Survey** was carried out which shows

PLATE XXVI

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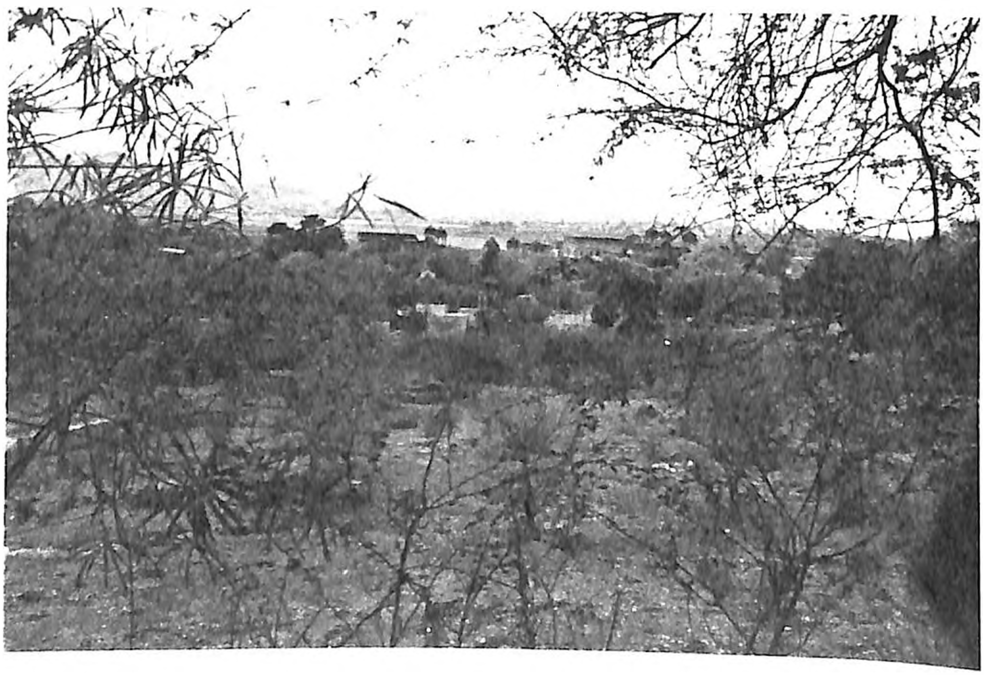

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that first regional ground water layer occurs mostly in the clays mixed with Kankars in the depth range of 10-12 meters. The thickness of unconfined aquifer varies from 20 to 26 mts. Existing investories of tubewells in the area around the site shows that yield of water is to the tune of average 3000 to 6000 liters per hour from one well upto depth of 45 meters. However, expected yield is 60,000 lit/day at the depth of 56 meters.

The surface drainage is marked by dry natural seasonal streams joining the main stream at the base of the eastern Kilangarh hill. This drainage joins the Mansagar lake behind Kanak Bagh. The run off is speedy and unintercepted thus allowing water to flow out of the valley without adding to the ground water table. The absence of vegetation cover, steep slopes, rocky terrain all contribute to speedy run- off. (Plate XXVI, 44).

Source: Groiund Water and Mineral Investigation Consultancy Centre.

3.2 KANAK VRINDAVAN TEMPLE COMPLEX (Map No. 13)

The temple complex consists of the following structures.

3.2.1 Govind Deoji's Temple

It is located adjacent to Mansagar lake with a square plan measuring 200 feet by 200 feet with four corners marked by *'Burj's* crowned by *Chhatri's*. It has a rocky terrain at it's base. The main entrance to the temple protrudes 56 feet in the east beyond the square plan. The structure is built in two levels with the *'Garba-griha'* located in the centre on a terrace level measuring 72 by 72 feet. It consists of sixty four rooms, and twelve *'Tibaras'* on the ground floor.

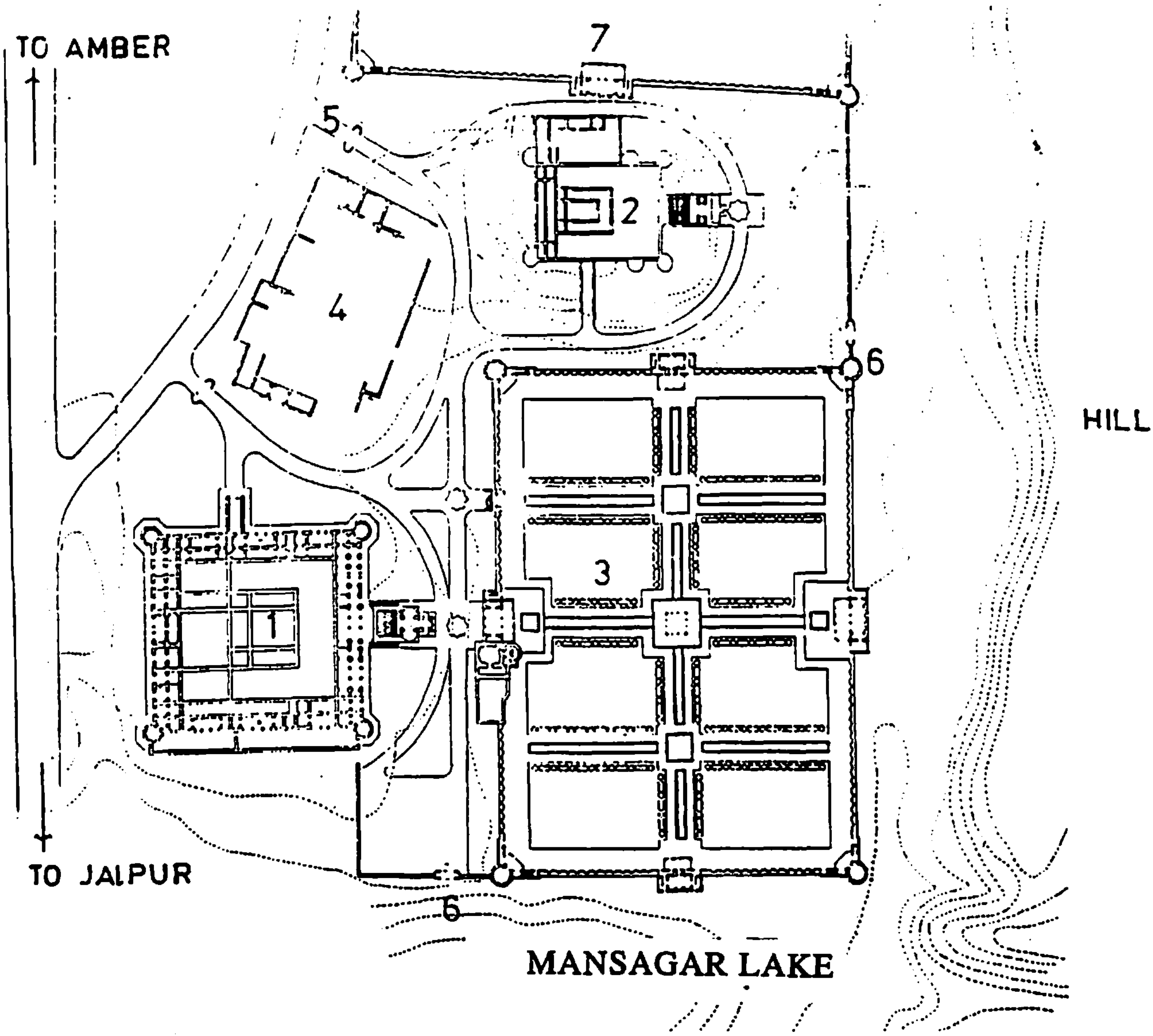
3.2.2 Natwarji Temple

It lies towards the north-east of Govind Deoji's temple on an elevated hillock. The planning and designing is similar to that of Govind Deoji's temple with a rectangular plan measuring 111 feet by 101 feet. An approach towards the east projects 50 feet from the main plan. There are rooms on the lower level and *Tibaras* around the western face.

The striking variation in the two temples is that Natwarji lacks *Pavilions* and *'Kabanis'* on the entrance gate.

3.2.3 Kanak Bagh

It is located on the axis of Govind Deoji's temple. It spreads in an area of 3.75 acres. The rectangular 'Bagh' is surrounded by an eight feet high *Parkota* wall with four 'Burj's' or corners crowned by *'Chhatri'* with pavilions in between. Adjoining the pavilion there is a well, located on the western periphery. Presently under agricultural use this *Bagh* had a *Baradari* in the centre with water channels in axis dividing the Bagh into eight equal parts.



1 GOVIND DEOJI'S TEMPLE

2 NATWARJI'S TEMPLE

3 KANAK BAGH

4 RUIN

5 ENTRANCE GATE

6 SMALL GATE

7 RADHA BAGH

MAP NO. 13.

KANAK VRINDAVAN
TEMPLE COMPLEX JAIPUR

KANAK VRINDAVAN TEMPLE COMPLEX

Surroundings

The ground remains barren and it exposes, the rocky terrain underneath resulting into shallow depressions. The scattered rubble from the broken *'Parkota'* wall, buildings and malba debris heaps, served potential ground for the growth of wild weeds and shrubs. The main species of shurbs are *Adhatoda vasica, Euphorbia neriifolia* and the most widely inhabited ground flora was Commelina undulata, *Portulacca grandifolia* and *Zizyphus* species. At intervals trees like prosopis juliflora, *Acacia senequal, Holoptelia* integrifolia resisted the growth of any other type of vegetation.

Since the soil was extremely scanty in humus, its water retaining capacity was very poor, its microbial flora found itself difficult to exist in absence of the ground cover as the rocky terrain was exposed by the scorching sun. This even raised the temperature of the valley as compared to the city. Extreme variation in the diurnal as well as seasonal temperatures coupled with the irregular rainfall making it very difficult for the vegetation to successfully adapt itself to the above conditions.

Whatever vegetation grew inspite of such extreme and discouraging conditions of climate and soil,received more detrimental treatment, due to the biotic factors. The tree species were extensively chopped for fodder, fuel and other uses. The domestic animals like Camel, Goat and Sheep were the worst enemies of the vegetation. Besides this the local people became disturbing by using the immediate surroundings of temple as a defecating ground.

Moving eastwards the landscape showed a possibility of soil erosion which exposed the eastern facade of the foundation of Govind Deoji's temple upto eight feet. The rooms on the eastern face were completely inaccessible. The main entrance pavilion of the temple in the north was also unapproachable due to heaps of malba debris and garbage dumped out of neglect.

Between the temple and the *Bagh* there existed an old. *Neem* tree giving shade to the deserted and barren ground. The roots of this tree extended into the *Bagh* with remnants of *Parkota* wall topped with broken battlements known as 'Kangooras'. The foundation of the walls had exposed masonary and was in a deliberated condition. However, this *Bagh* was being utilised for agriculture and a part of it was occupied by a carpet factory which was discharging its effluents into this land. The entrance on the western periphery had a broken ramp approach. On the north eastern corner of this agricultural land there flourished an old *'Khajoor'* tree ideally suiting the arid climate.

To the north of Govind Deo's temple were ruins of another temple located on a small hillock, known as Natwarji temple. The structure was surrounded by *Barlaria, Cryptostegia grandifloa*, and *Adhatoda vasica* scrubs, and weeds.

In between the two temples was an absolute ruin of a structure with only remains of the periphery seen buried within malba debris of the structure. The loose rubble lacking soil cover had scanty growth of weeds, (Plate XXVII, 46).

Moving towards the north, closer to the lake, white encrustations on the ground were seen at places. With careful study it was learnt that the deposition of toxic saline lake water exceeded the absorption capacity and the filtrate of salts in form of these patches was found on the ground. The area where the sewage water enters the lake is devoid of any vegetation, though the margins were occupied by *Phargmitor karka* and *Ricinus communis*, whereas the drains bringing relatively cleaner water had profuse growth of *Periphyton spp.* at the point of entering the lake boundary and immediately after entering the lake. It harboured a huge spread of *Polygonum spp.* and few patches of *Typha. spp.* (Plate XXVII, 47).

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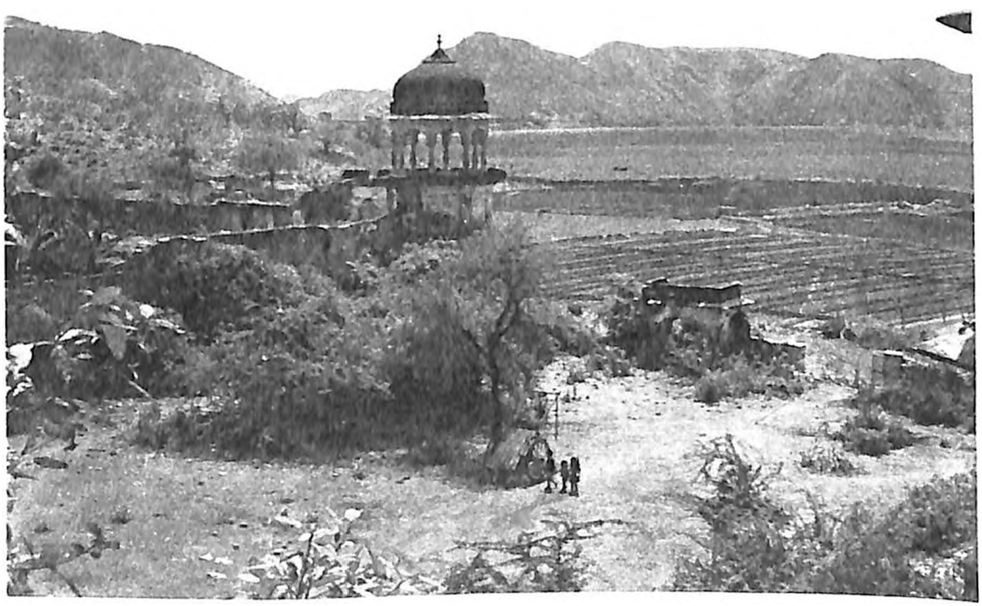

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3.2.1 Govind Deoji Temple (Map No. 14)

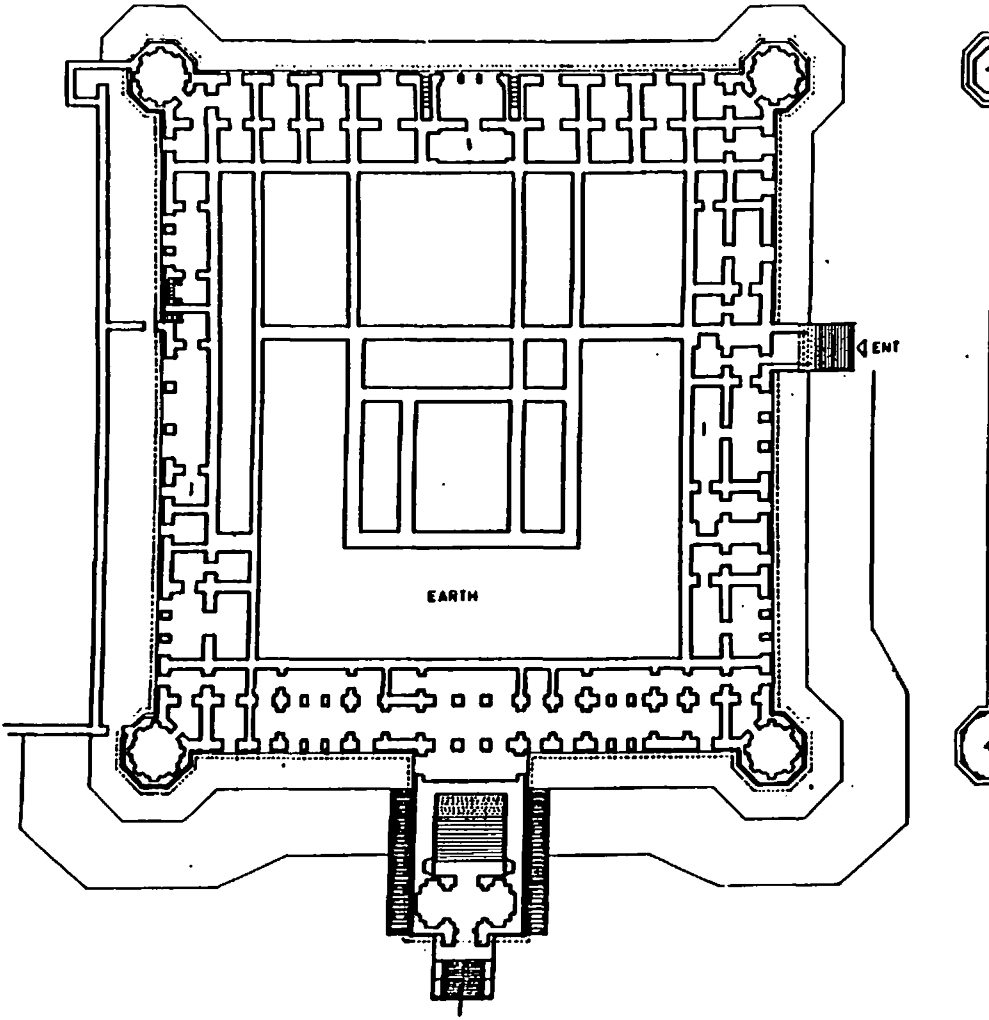
Description

The ground floor plan is a square measuring 200x200 feet with the corners having the octagonal Burjs. Each Burj measure 15'x15' outer dimension forming an octagonal small room. The plinth level with respect to the main entrance gate of the complex is three feet. East face has the main entrance with narrow ramps about eight feet in width, on either sides of the entrance gate. The gate is located in the middle of the east face and is approached by a flight of eleven steps leading into the protruding pavilion measuring about 36'x28' feet internally. The second flight of twenty one steps reaches upto the terrace level. Between these two flights, there lies a longitudinal room crowned by a *Kabani*. The narrow three feet wide galleries join the *Kabani* to the terrace and overlook the open flight of steps. At the ground floor, the periphery has sixty four rooms and twelve *Tibaras*. Broadly, the rooms are square in shape and are about 10x10 feet size made up of solid masonary piers and columns.

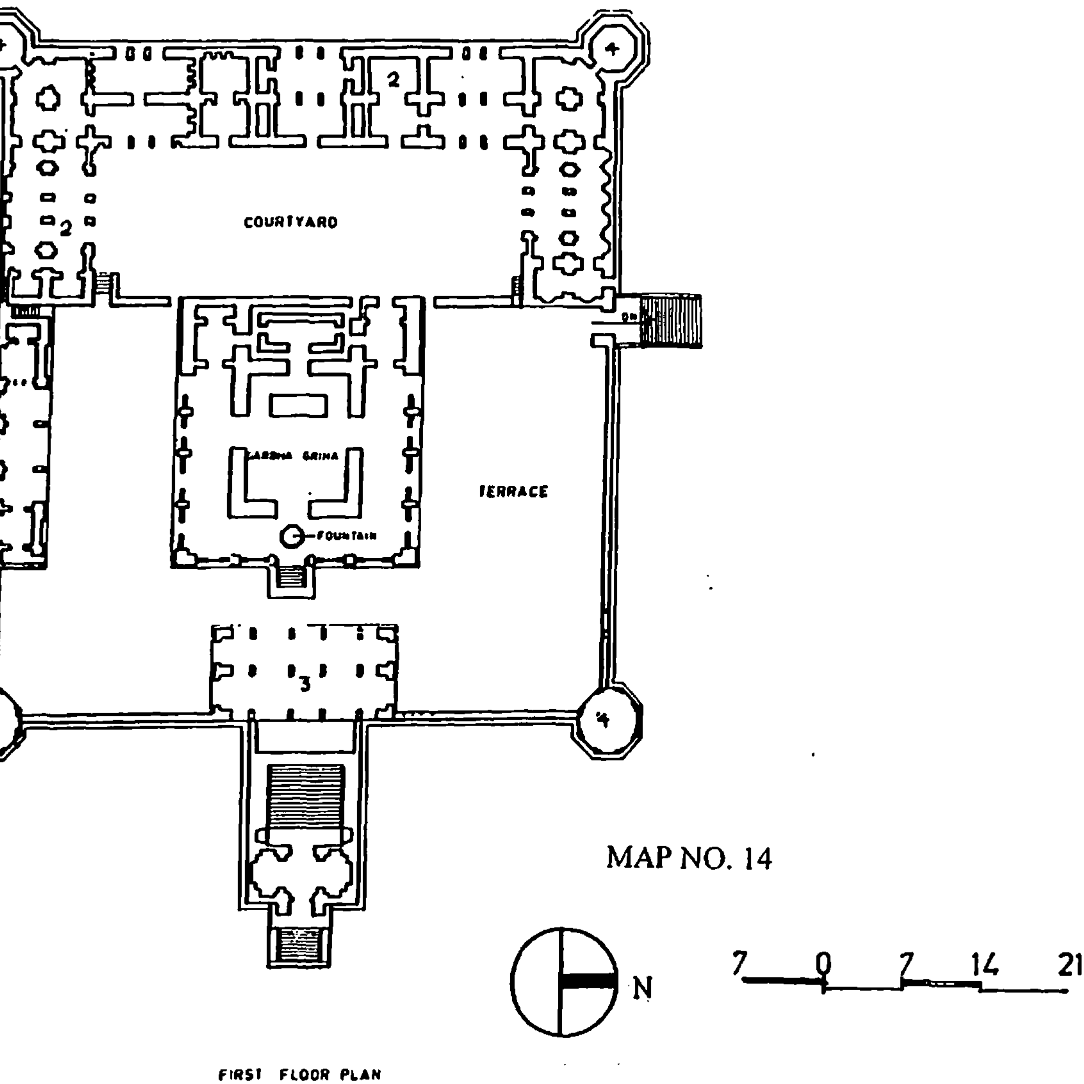
The central portion of this structure is filled up with rock and mud, except for the thick foundation walls for the superstructure above. On the northern face, another open staircase reaches the terrace adjoining the *Tibara*. This staircase is located slightly away from the centre of the northern wall and structurally bears no connection with the main building. Presumably it is a later addition to the temple.

The first floor plan rises directly above the lower plan with one third portion of the superstructure from the western side raised to a plinth of five feet height.

The octagonal *Burjs* at four corners are highlighted by a special architectural feature, an open *Pavilion* crowned by a hemispherical roof known as *'Chatri'*. The two *Chatris* on the eastern face are at the terrace level. The two *Chatris* on the western face are elevated upto the upper terrace level. The south western portion of the temple is heaviest in terms of building height and volume.



GROUND FLOOR PLAN



MAP NO. 14

GOVIND DEOJI TEMPLE

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There is one *'Kabani'* above the eastern entrance pavilion and one located directly opposite on the western side. The rooms below these *'Kabanis'* are larger than the other rooms. On the elevated terrace towards west, the *Kabani* is flanked by rooms on both sides. These rooms are identical with multiple uses and are approximately 30 in numberincluding 11 *'Tibaras'* (Plate XXVIII, 49).

The central mass measuring about 72x72 feet occupies the maximum mass and houses the sanctrum or *'Garba-griha'* and a *'Parikrama'* on three sides with the western side blocked by the rooms. This western side has one large courtyard behind. The *'Garba griha'* had rooms all around and this area is termed as *'Tibara'* located on a raised platform (Plate XXIX, 50).

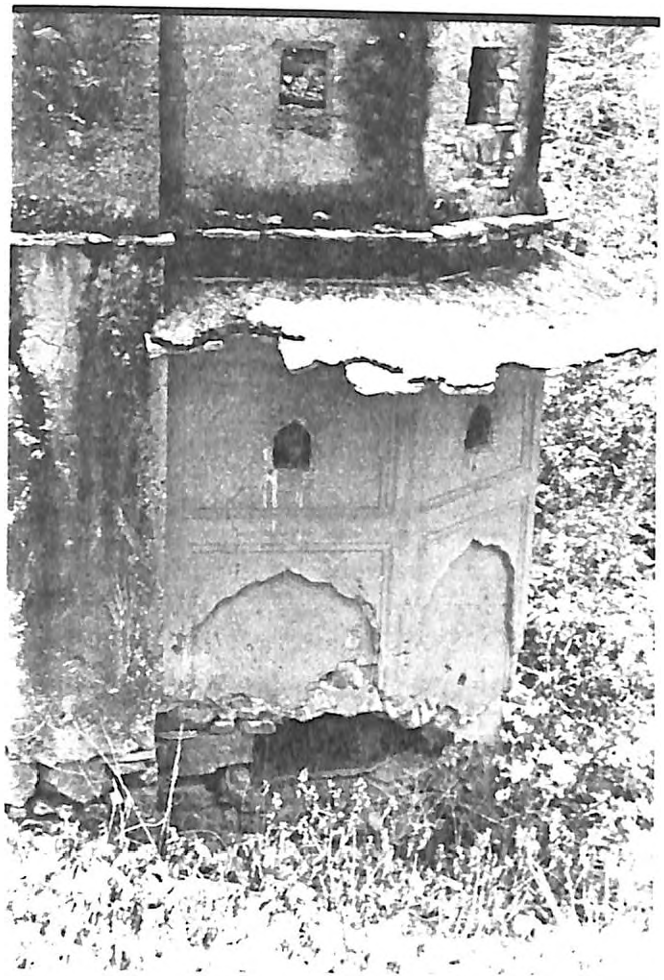
The *Parikrama* is about ten feet wide at a five feet plinth. It is supported by twin columns and arches with a flat roof. The three sided *Parikrama* is completed by a hidden path beneath the *Garba griha* at terrace level joining north to south directly.

(b) Foundation It is a well known fact that stronger the foundation longer the life but another fact is that for all creation aging is inevitable. The foundation of all buildings weakened due to various causes of decay, biotic and abiotic, over a period of three centuries. The hard rocky terrain served a firm foundation but the collapsed architectural components of the superstructure such as *'Chatri'*, *'Chajjas'*, *Verandah's* admit the weakening of the foundation, super structure and building fabric as a whole (Plate XXIX, 50).

In addition to uneven settlement which is an ever- present cause of decay. Climatic, biological as well as natural disasters such as thermal movements, frequent floods etc. add to the weakening of the foundation.

Fluctuating ground water table has damaged historic buildings causing uneven settlement of the walls. The larger the structure the more sensitive it is. Constant seepage from the adjacent Mansagar lake continuously kept the foundations wet. Assessing the depth of foundation it was found that the moisture in the soil rises up by capillary action to evaporate.

PLATE XXIX



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But the thick foundation walls became weak with the **'rising-dampness'.** (Plate XXIX, 51). This rising dampness carried dissolved salts, sulphates, nitrates, chlorides etc. which crystallized and this condition became extremely destructive to all types of masonary. This problem was especially acute in arid zones like in the valley. The extreme variations in diurnal temperature and seasonal changes caused the mass of masonry to expand and contract which formed cracks in the exposed weathered masonary.

The dampness crumbled the lime mortar into powder and proliferated the growth of moulds, fungi and algae. The uneven depressions in the ground formed a breeding place for microbial flora and thick algae deposits.

The foundation was adversely affected further due to the trees of the *Ficus* family which had taken root in the crevices of masonary and infiltrate moisture. Moisture seeped inside the masonary through the roots causing variation in internal and external pressure. During Monsoons these damp crevices attract microbial growth and ground termites and during extreme arid conditions these crevices expanded to widen the cracks attracting burrowing animals and insets.

Superstructure

The main entrance to the temple through a flight of broken steps terminate at the terrace level. Apart from these eastern and northern stair ways, remanates of two narrow ramps adjoininng the eastern gate on either sides were found. These ramps were directly connected to the lower floor rooms but since the foundation was eroded till eight feet on east facade the approach to these rooms was not possible (Plate XXX, 52). There was complete loss of lime *'Dar'* flooring owing to stagnant water on the surface and the continual dampness succeeded the absorption capacity of material, thus resulting in loss of upper layer. During archaeological findings sixty rooms and twelve *'Tibaras'* were revealed on this lower floor which were all closed by masonary. The lack of aeration coupled with continual dampness promoted salt deposition, microbiological growth which feeds on

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calcium in lime (Plate XXX, 53). The lime mortar of walls and floor thus became powdery and disintegrated giving rise to undulating depressions.

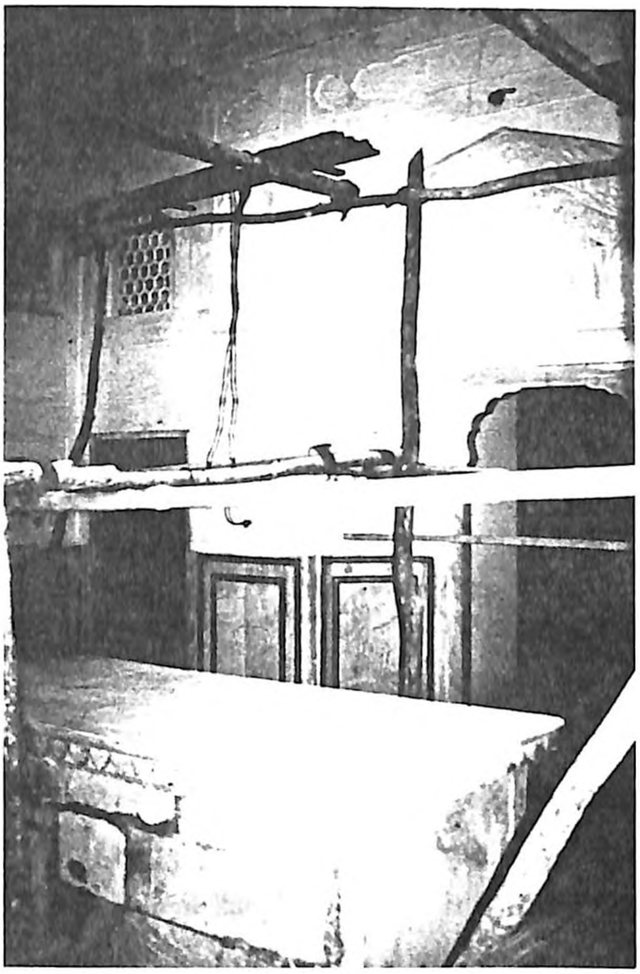
The floor was largely damaged by cracks. When carefully inspected and traced it was found that these diagonal cracks appeared as a result of foundation movement. The cracks which were widest at the middle and tapering rapidly normally result due to uneven settlement of the base rock.

On the terrace level the *'Dar'* flooring was exposed in various levels due to the variation in temperature. Severe heat and high dusty winds with equally rapid lowering temperature and rains have led to decay of the organic additives. This loss of adhesions of binding materials resulted in cracks. Through these fissures and cracks, water percolated into the masonary and the salts and other impurities proved structurally hazardous. This distressing rate of change is sometimes very slow and sometimes very rapid but for a structure which has been aging for centuries every passing day is a step towards weathering.

The flooring of the first floor rooms had undergone similar decay, especially the *'Garba griha'* of Govind Deoji's temple which was closed for decades. When opened the *'Garba griha'* (sanctum) was black and dingy. Hundreds of Bats hung in the cracks of the ceiling and the floor was completely rotten and flaky. Plaster was covered by spiders and ground termites. Dense cobwebs hung with stinking odour of excreta of bats and pigeon droppings which made it unbearable to stand (Plate XXXI, 54).

Walls

Walls constitute the most vital part of the superstructure of any building. The thick random rubble masonary in lime mortar extends above the foundation to form the subsequent floor due to continual weathering owing to various causes of decay acting independently or in unison and often affecting each other. The microbiological growth such as fungi, moulds, algae etc. and the entromological decay was caused in the crevices. The roots having higher water



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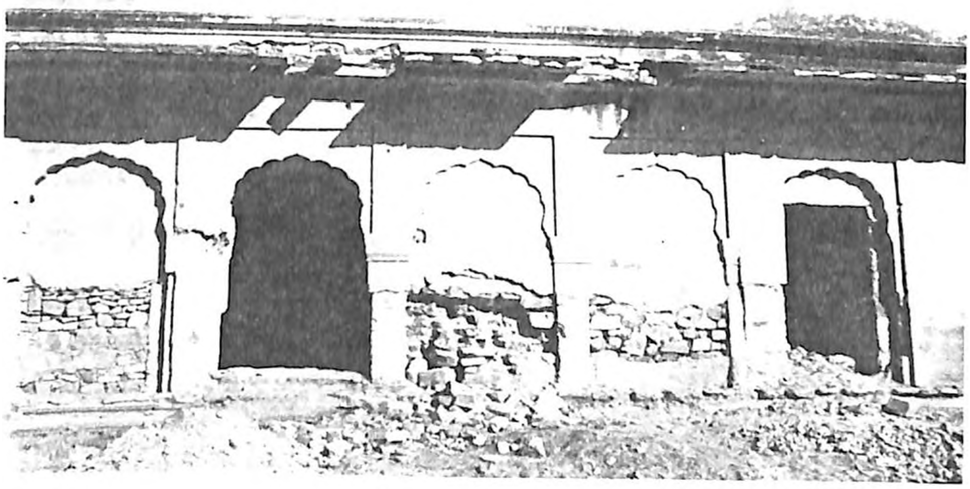
content infiltrate deep into the fissures as they grow and force it to a further open. Lime mortar is highly porous and thus allows access of water and damp air, hence promoting weathering.

In the lower floor walls the major cause of decay was **'sweat outs'**. Due to lack of air circulation and increase in humility level the vapour pressure increases considerably above that of the outside atmosphere and drives water vapour outwards from the building through any porous material. Since the wall surfaces had become weak and gaps were developed between the masonary and the plaster and condensation of moisture gathered on the internal lime plastered surface. Due to a long period of over three centuries, the water proofing agents *'Methi'* **(Fenugreek)** and Lime-*Surkhi* mortar had given away and flaking of the lime plaster was seen on all the inner walls. This **'Bleeding'** of moisture occurs when a thin layer between the mortar and masonary is created which results in decreasing the bonding. The sweat bleeds out moisture causing leaching of original core mortar and increases the further flaking of lime plaster. This leaching of soluble salts i.e. nitrates and chlorides present in lime in small quantities, are hygroscopic in nature, and thus **efflorescence** occurs.

A thorough observation showed that due to the differential variation in temperatures at different areas of the same temple the degree of aging and deterioration varied. The facades which suffered extreme fluctuations in diurnal temperature showed signs of blistering, cleavage and excessive crumbling and powdering of external surface of lime plaster with efflorescence.

The external walls of the temple exposed the weak masonary since the lime mortar had disintegrated owing to dump collection at various places and urinating of animals. The ammonia concentration in urine is readily absorbed into the porous lime mortar and lime plaster. The invariably present bacteria called Nitrosomonas converts ammonia to nitrates. The Nitrobacteria further converts nitrites to nitrates which ultimately weakens the plaster (Plate XXXIII, 57).



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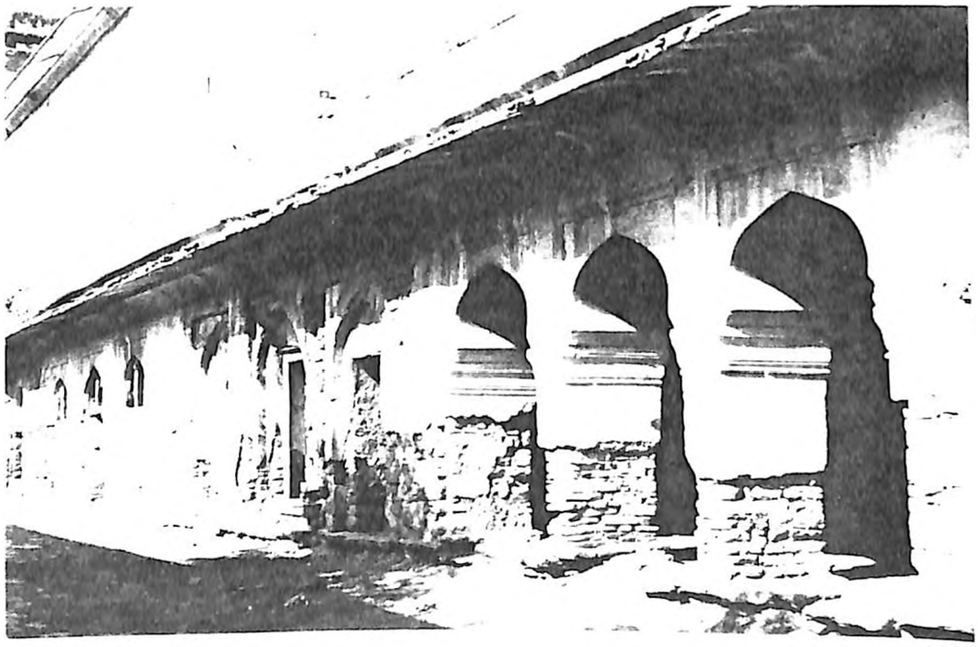

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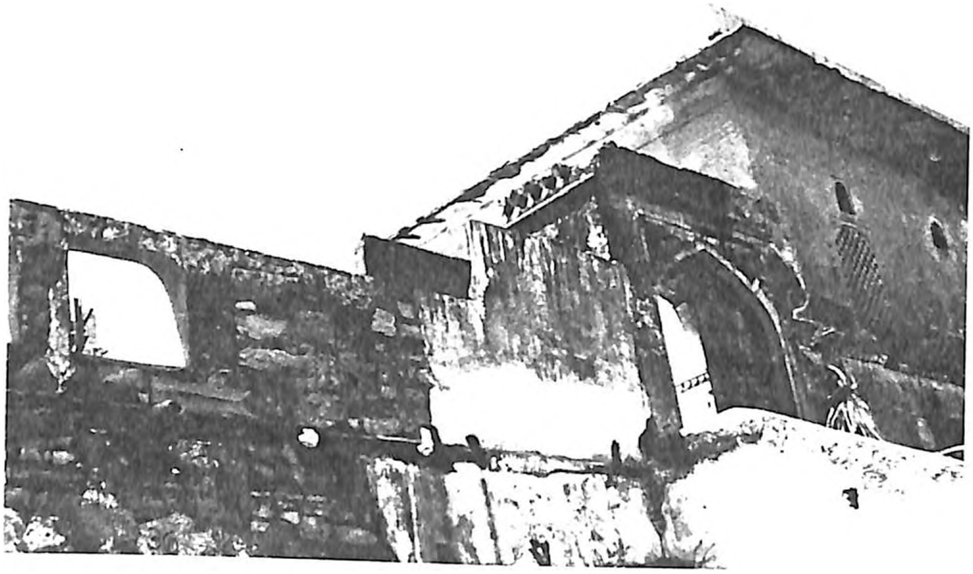
Roof and Ceiling

Roof of a building marks the enclosure and transfers its load to the walls beneath which in turn rest on the deep and spreading foundation. The internal side of the roof is termed as ceiling, which serves as a sound base for various finishes and ornamentation such as relief work and paintings are carried out.

The rooms at **Govind Deoji's** temple are flat and domelike. The special architectural features such as *'Chatris* and *'Kabanis*, employed ribbed domes and curvilinear roofs respectively. The rooms in the lower level had completely blackish appearance with exposed concentric rubble work on the ceiling. This type of flat dome is traditionally called *'Ladav ki chat'* and shows deep cracks across (Plate XXXIII,59).

The accumulation of debris on terraced roofs favoured the growth of vegetation. The cracks on the terrace allowed seepage to rain water forming certain soluble salts as bicarbonates, chlorides and nitrates leading to crystallisation. With constant aggravation it resulted into crumbling and flaking of lime plaster from the cracked *'Gardana'* (cornices) ceiling surface of the *'Parikrama'* around the *'Graba griha'*. The extreme variation in diurnal temperature and seasonal changes resulted the domed and ,arched roofs into **'Map Cracking'** where the plaster surface cracked into an all over web like crackle design, six to eight or more inches interval due to lack of adhesion between the coats of plaster.

The ceiling of *'Tibaras'* and other encroached areas had deposition of **soot and grime** making the ceiling black due to cooking. The ceiling of *'Graba-griha'* was in the most obileterated condition. It was black, moist, dingy and odourous due to the bats and other birds and insets thriving on the calcium in lime plaster and nourishing due to the dampness and lack of aeration. The ornamentation was nowhere to be seen except a few traces of a floral motifs. Apart from these biotic and abiotic factors the ceiling ornamentation had also outlined its age (Plate XXXIV,61).



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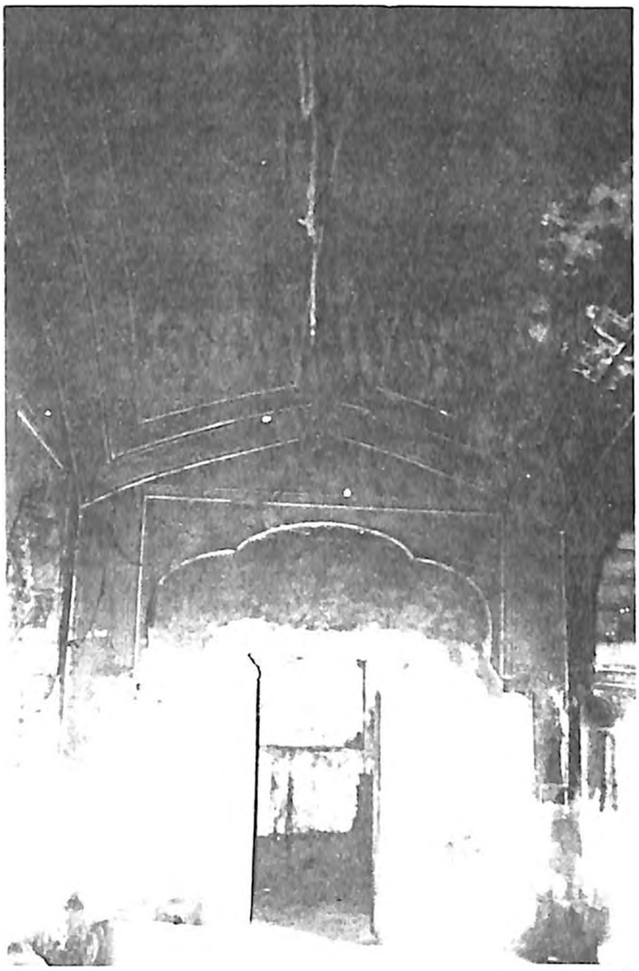

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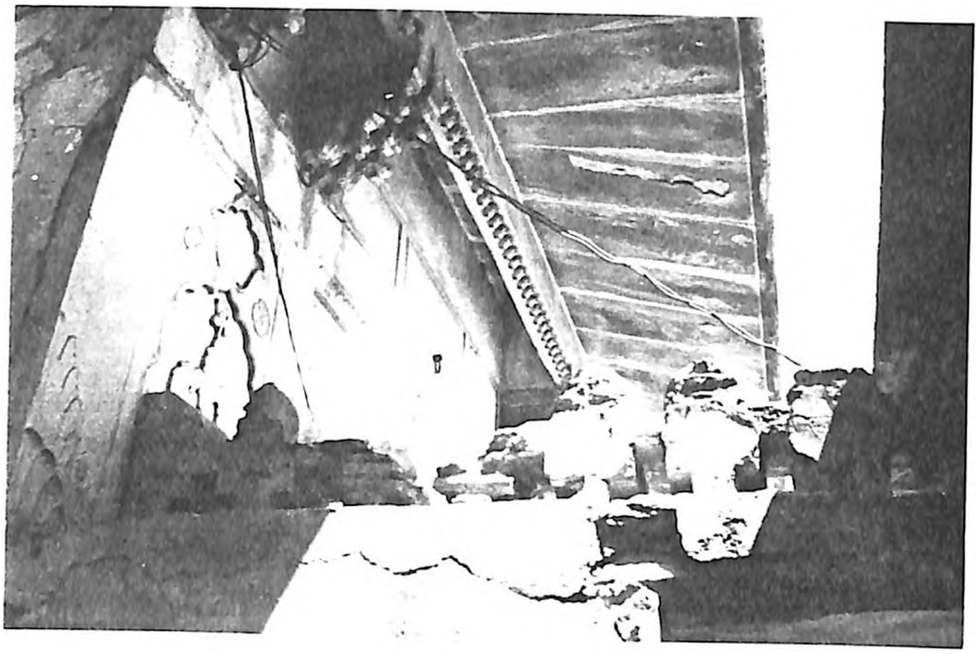

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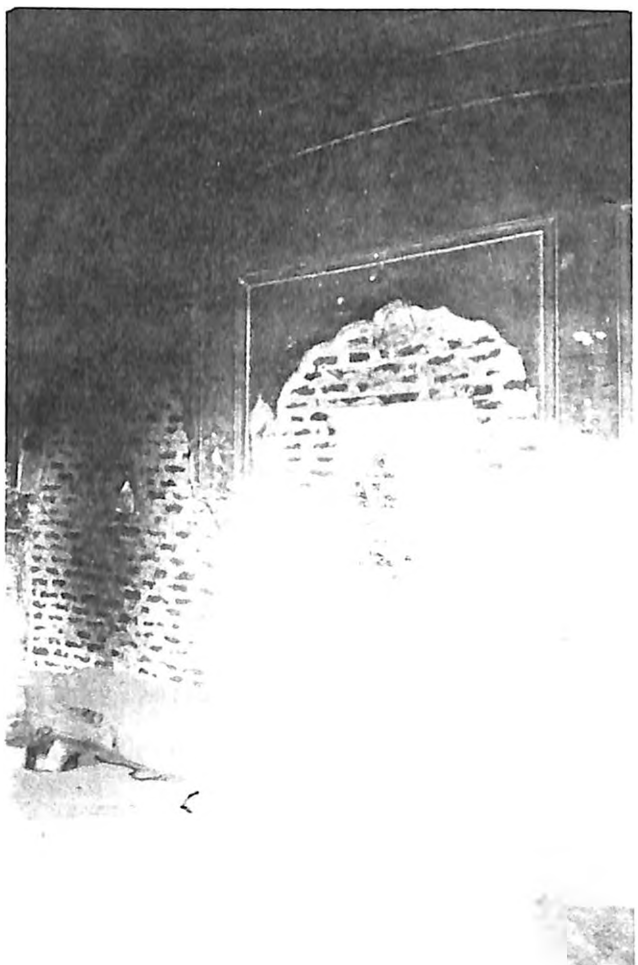

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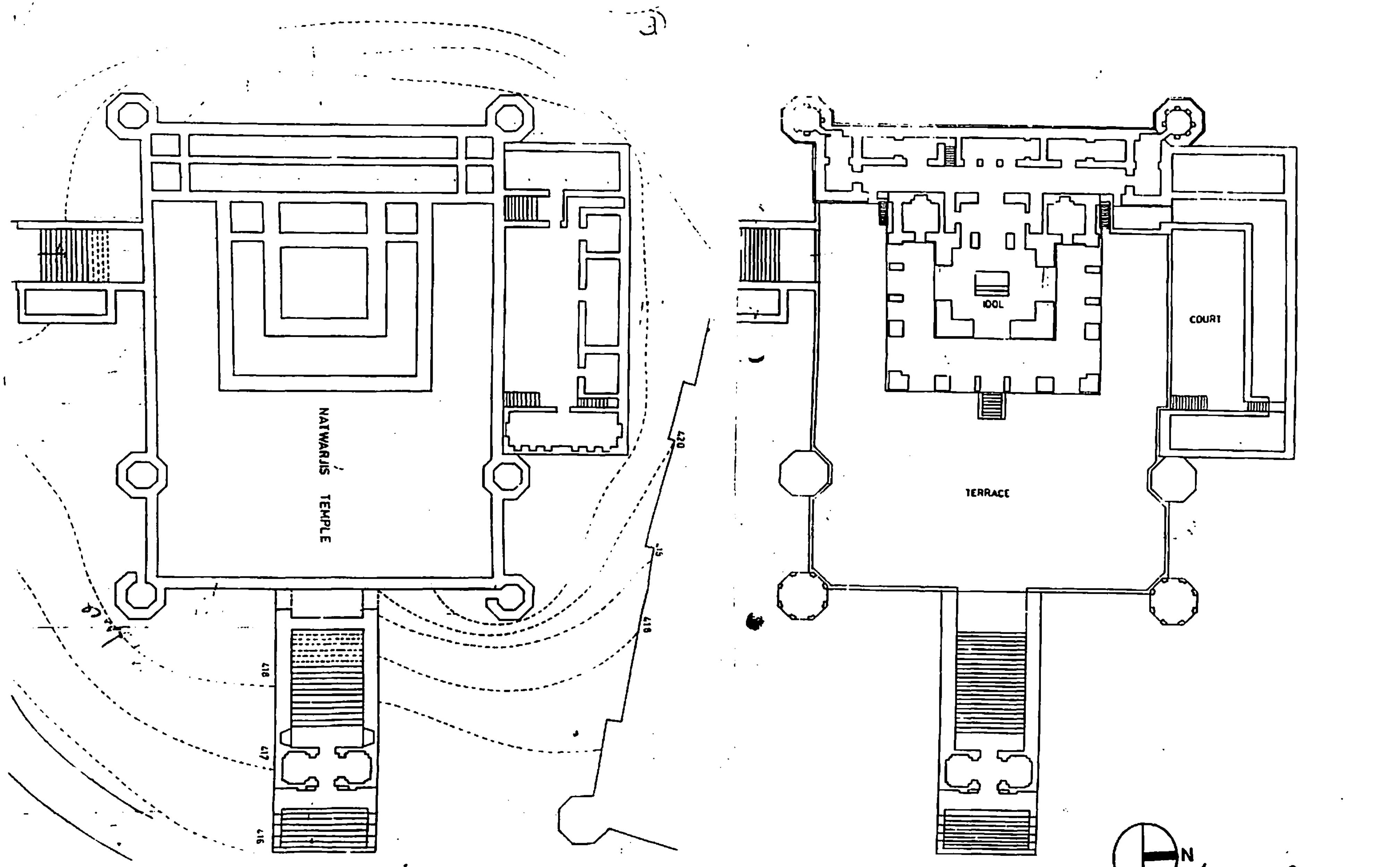
The upper level walls too, suffered cracks, especially the *'Burjs'* on the western side. The vertical cracks resulted due to the poor material strength and differential settlement of foundation. The inconsistent and unplanned growth of the building with the subsequent change of occupants and its improper use resulted in incongruous alterations and additions. The extension of a masonary wall over *'Kangooras'* around the *'Tibaras'* of the Govind Deoji temple caused damage (Plate XXXV, 62). Similarly at several places in the open courtyards and lower level people encroached upon increasing the loads more than what the structure was designed for (Plate XXXV,63, XXXVI, 64).

The *'Tibaras'* on the west had small compartments for private use including cooking, bathing, and washing. To secure the arches and other weak areas from collapsing people had either filled these arches with brick masonary or embedded iron grills and girders. All these additions added to the load on the already weak walls (Plate XXXVI, 65).

3.2.2 Natwarji Temple (Map No. 15)

In plan the temple measures about 111x101 feet with solid octagonal *'Burjs'*. Each side of the *'Burj'* measures 7feet 6 inches. The location of crowning *'Chatris'* on four corners, the central *'Graba griha'* with three sided *'Parikrama'*, raised *'Tibara'* on the western side is identical to that of Govind Deoji temple. But unlike Govind Deoji temple, Natwarji temple has one strairway protruding towards the middle of the eastern facade, and the other lies on the south side of the hillock. The difference in both the temples is that, in Natwarji's temple the architectural feature of *'Kabani'* is absent. The north side constitutes an ancillary block of rooms for housing the temple priests and other religious activities. This supporting wing lies adjacent to the northern wall of the temple flushing with the western face. The western face thus measures 120 feet. The south stair case projects 60 feet out of the square block. The temple has two large rooms on lower floor of the southern side. The remaining portion is solid constituting the hillock as a rocky strata for foundation of the temple above.



MAP NO. 15

NATWARJI'S TEMPLE

Natwarji's temple was found in a lesser deteriorated condition than the Govind Deoji's temple after analysing the difference in the level of decay in the two temples. Although the two temples were built around the same period, their micro climatalogical setting varied greatly. Natwarji's temple was located on a high elevated hillock and at a greater distance from the lake. As a result the seepage of underwater was slower, subsequently preventing the decay caused due to **'rising dampness'**. Secondly it is smaller in size, more simplified in its structure but highly ornamental in design.

The environmental weathering however did certainly took its toll over the temple's structure. The lower portion of the building had rooms built up all around the central solid consisting of the hillock.

The approach to the temple protrudes out of the square plan towards the east. The flight of steps were weathered and broken at various places (Plate XXXVII, 66). Unlike Govind Deoji's temple which has a pavilion in the east entrance, with a *'Kabani'* (a curvilinear roof spanning a rectangular room) above, Natwarji's temple does not have *Pavilion* or a *'Kabani'*. The square plan has *'Burjs'* on four corners and are crowned by *'Chatris'*. The *'Graba-griha'* or sanctum which houses the idols of Radha-Natwarji was raised on a three feet high plinth, located in the centre of the temple. The circumabulatory path was well defined by twin columns, built in marble, on three sides except in west. On archaeological findings, a tunnel was revealed beneath the *'Graba-griha'* on the western side (Plate XXXVII, 67).

At the upper level, a terrace extends to join the *'Tibaras'* (series of room around). These rooms were encroached upon for living and other incompatible uses. The western and southern portion being the heaviest in terms of building up mass. The superstructure of walls, roof ceiling, and other elements such as *'Chajja'* etc. suffered the same fate as Govind Deoji's temple. The most severe of all cracks was one on the roof of adjoining room of Natwarji's temple. A vertical split in the roof, resulted in collapsing the entire roof (Plate XXXVIII, 68,69).

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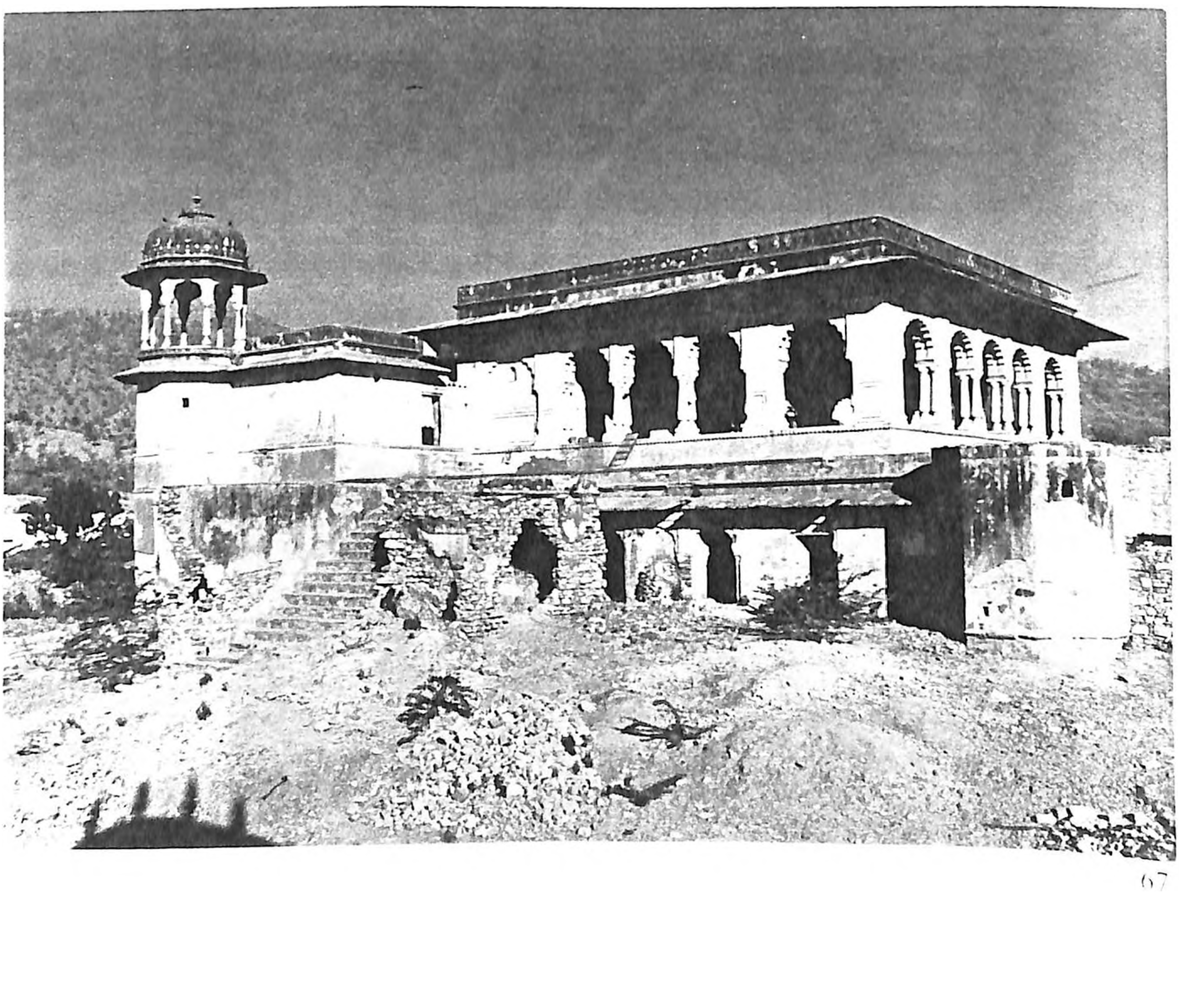

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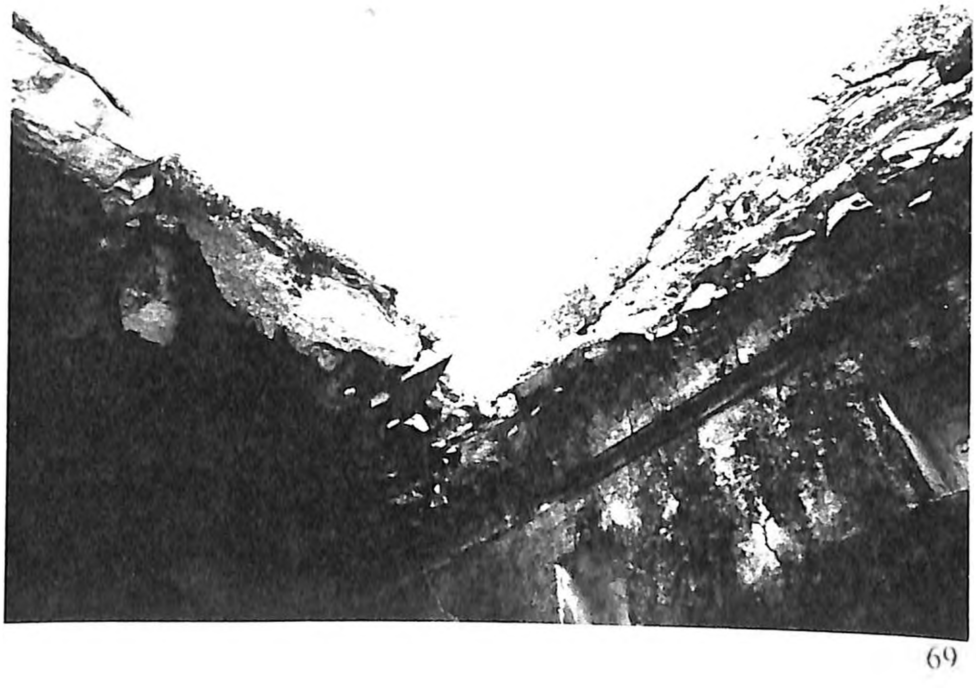

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Incongruous addition to the lower floor rooms was the closing made by plastered masonary walls leaving them inaccessible, damp, dark and dusty. The lime plaster crumbled in patches, exposing the weathered masonary structure.

Theft of previous inlay work left behind bare walls with traces of motifs behind. The railings and lime *'Jalis'* were either broken or missing completely.

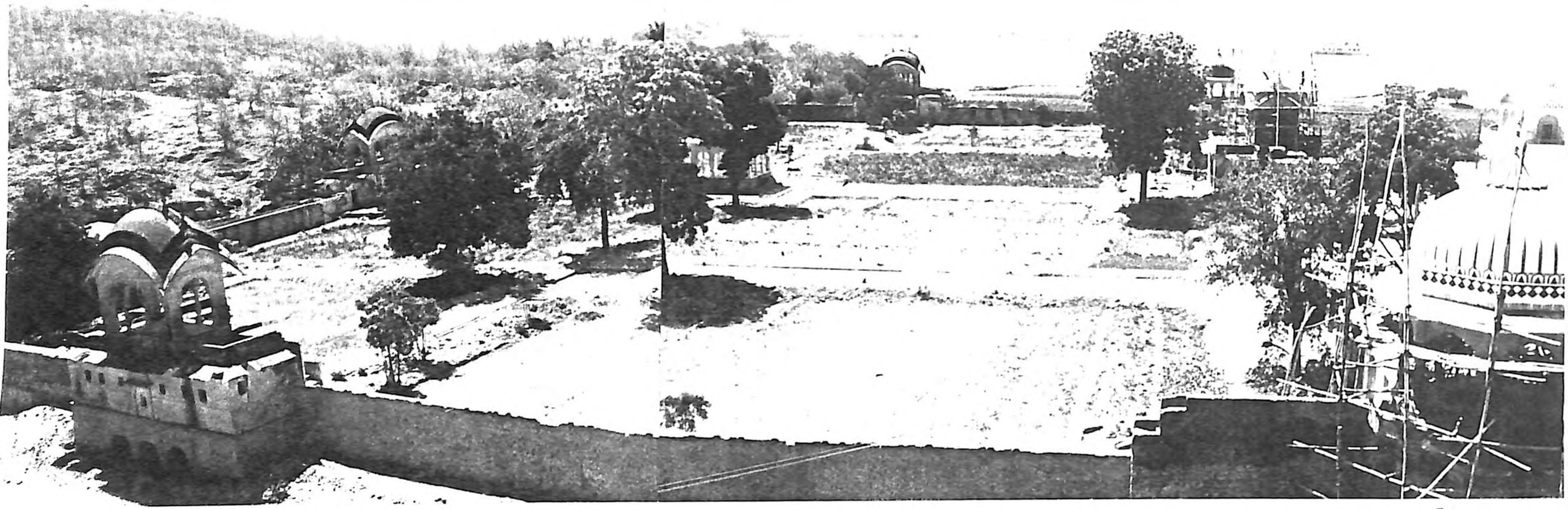
3.2.4 **Kanak Bagh** (Map No. 16)

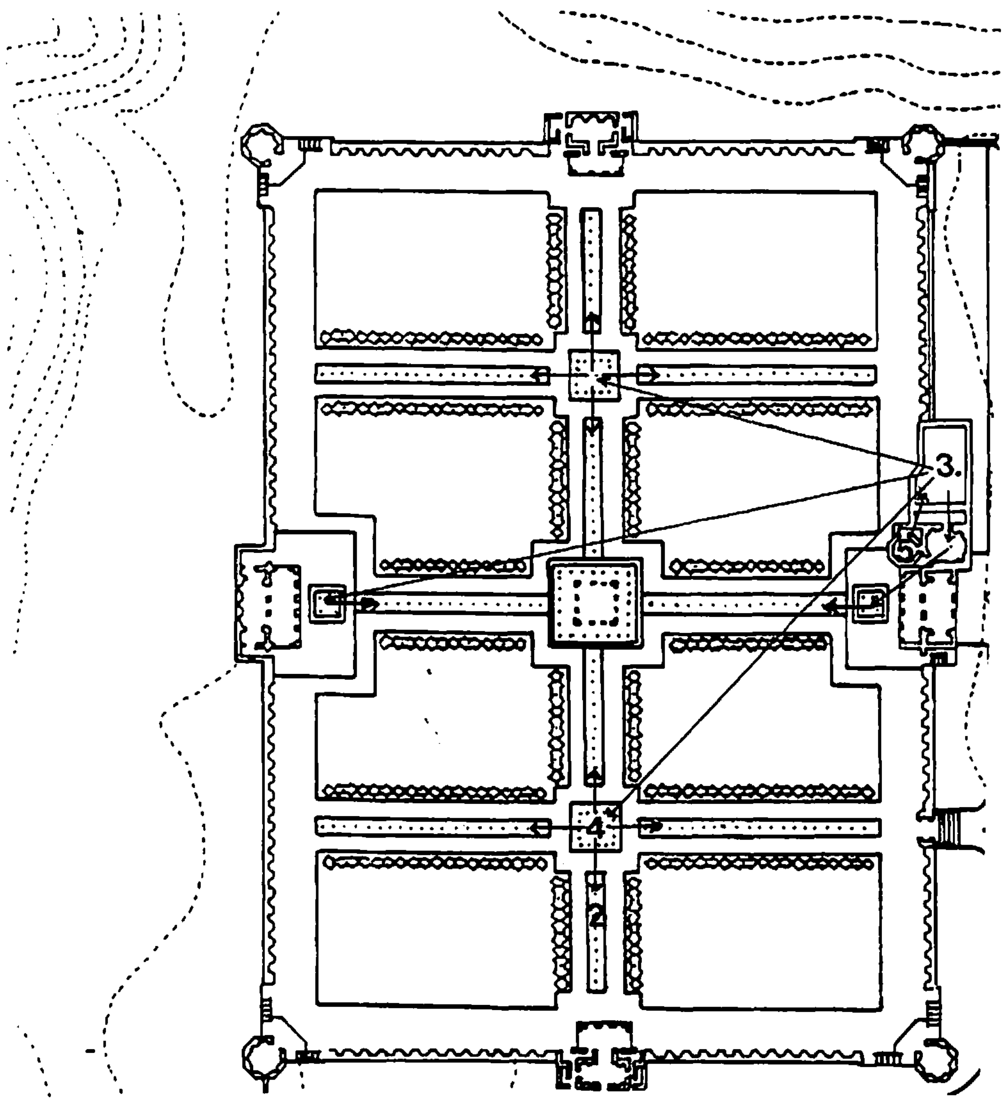
About 120 feet east of Govind Deoji temple and 100 feet south of Natwarji temple there is a 415x315 feet historical structure having a plan of a garden. The structure had a carpet factory towards its north east corner and a number of architectural components. The open land was under agricultural use with irrigation from a well located on the western side.

The ground plan (Map No. 16) of the structure shows octagonal rooms (10 feet sides and 10 feet high) with *'Chatris'* in all the four corners. Each room has a veranda with two side staircases leading to the *'Chatri'*. The design is like the other *'Chatris'* of the temples of **Kanak Vrindavan Ghati**. In the central portion of the four sides there are *Pavilions* with *'Kabanis'* on the first floor. The *Pavilions* on the north and south side are small 36 x 36 feet with a *'Tibara'* in the centre, two rooms on the sides, three arched verandha and two stair cases leading to *'Kabani'*. The east and west side pavilions are bigger in size 60 x 36 feet with central *'Tibara'*, two side rooms stair cases and five arched verandhas. These two pavilions have 75x25 feet platform in front of the veranda with 10x10 feet and 3 feet deep water tank.

In the central portion of the ground there is a 18x18 feet size square *'Baradari'*. On the western side there is a well of 20 feet internal diameter and a water tank of 36x25 feet size and three feet depth at a height of 12 feet.

PLATE XXXIX





1. CASCADE
2. FOUNTAINS
3. OPEN WATER TANK
4. TANK
5. WELL

MAP NO. 16

KANAK BAGH

The building structure of all the above mentioned architectural components were in decayed condition (Plate XXXIX, 70). The details of the actual condition of these components has been described as follows.

The verandha of all the four corner rooms and north side pavilion were collapsed (Plate XL, 71,72). The roof of the verandha of west-side pavilion was damaged and was retained by wooden rafters. This was occupied by a gardner due to the availability of water and electricity in this area (Plate XLI, 73).

The central *'Baradari'* is three feet above the ground and is open from all the sides with three arched openings. The arches are resting on two central columns and a half column and piers in each corner as shown in the photograph (Plate XLI, 74). The roof is fifteen feet high with two feet high Parapet wall and projected *'Chajjas'* on all the sides. The plaster of the masonry upto the plinth level was fully eroded, while the inner and outer plaster of the walls and *'Chajjas'* were damaged in a number of places (Plate XLI, 75).

The four and half feet high platform was broken at a number of places. On the southern side there was a raised wall with a rectangular opening where there was a pulley for drawing the water from the well. Now there is a metallic pulley on the eastern side. The wall was connected to the west side wall, which has a 36x25 feet size water tank. The well is about 80 feet deep but the water table is quite high (about 30 feet from the ground level). In the past water was drawn by bullocks but now electrical motor is used for this purpose.

The complex was enclosed by a broken *Parkota wall*. The intact portion of the *Parkota wall* shows that the wall was one and half feet thick and eight feet high with *'Kangooras'* on the top portion and niches on the inner side (Plate XLII, 76).

After getting the eviction of carpet factory the area was selected for restoration of the gardens architectural components as described above (Plate XLII, 77). Planned and careful examination followed by excavation of the area showed the presence of water channels and

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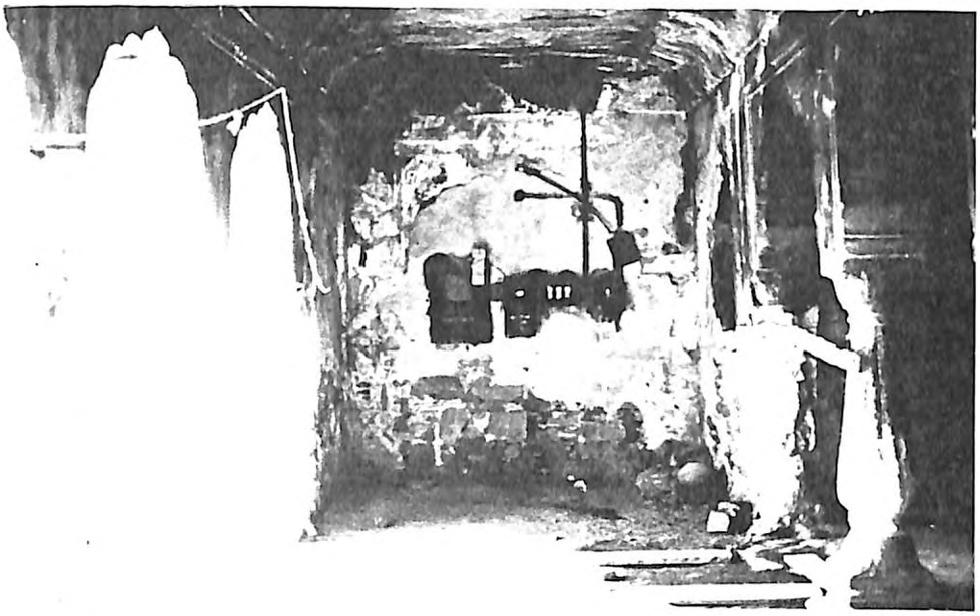

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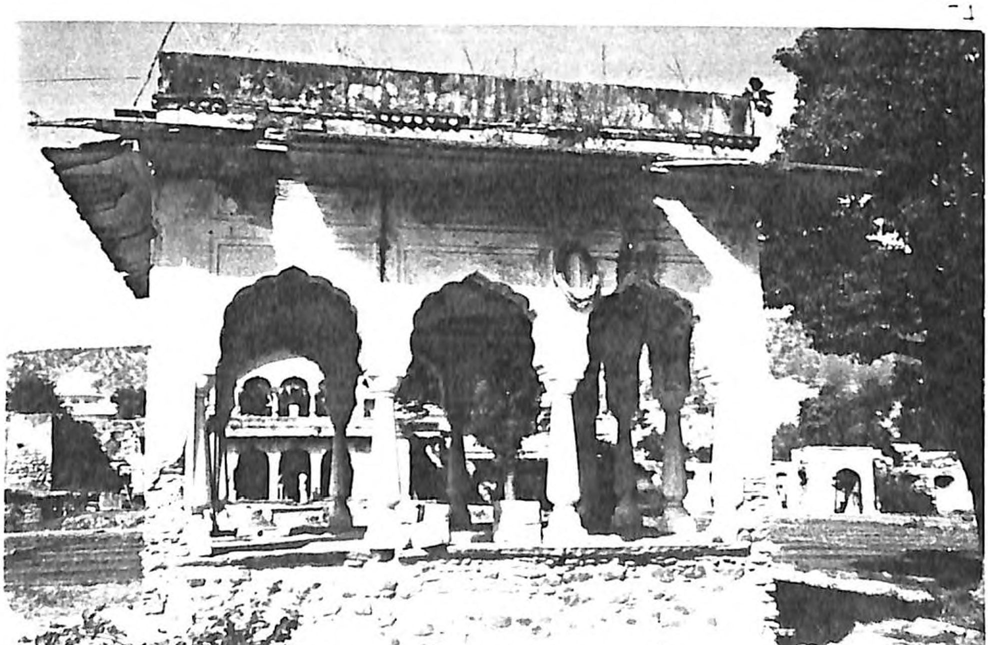

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tanks as shown in the Map No. 16. The total land was found divided into eight equal sectors with the central channel extending in north- south direction having a water tank around the *'Baradari'* and two other tanks in the north and south of *'Baradari'*. Each tank had also two channels in east-west direction with the tank in the centre. The channels also had equally spaced openings representing existence of fountains.

Further digging of the channels showed a planned design of water-way starting from the overhead tank and linking all the fountains through the various tanks. Although the complete water supply channels were not found. The careful study of the system and recovery of specially designed containers and pipes of different diameters was carried out. The following design was visualised, which might have been used for this garden.

The figure shows the direction and method by which the water was supplied to the various components of this water system.

The water was drawn from the well (Plate XLIII, 78) by the 'Wheel' system and was raised to twelve feet height to supply water to the big water tank located on the western side masonary structure made up of lime mortar. The tank is three feet deep and 36x25 feet size, with two feet thick walls made of stone rubble in lime mortar (Plate XLIII, 79, XLIV 80).

On north side water used to flow down through copper pipes of three inches diameter and covered by terracota lining. At the ground, water used to flow by gravitational force through four pipe lines of two inches diameter to various tanks as shown in the Map No. 16. The water from the tanks used to flow in different directions through copper pipes of smaller diameter to the terracota pitcher type of structures. This had three openings, two openings on the lower portion for the intake and outflow of water and the third on the top for the water to get into the systems for the fountain.

The water from the two tanks on the eastern and western side pipelines used to flow in two directions. The pipe of the lower portion was meant for the supply of water for the

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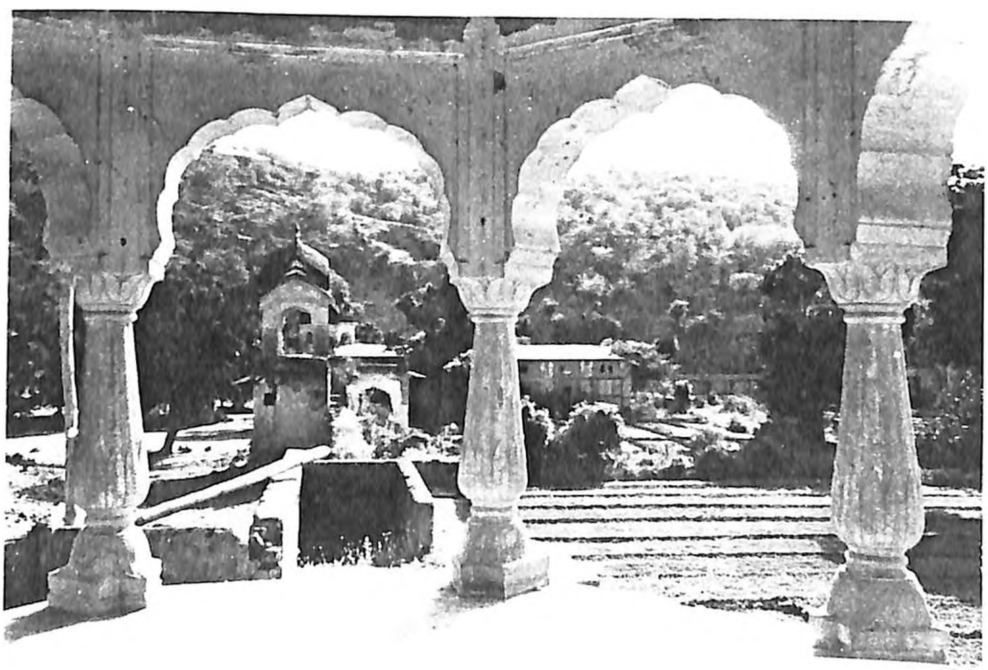

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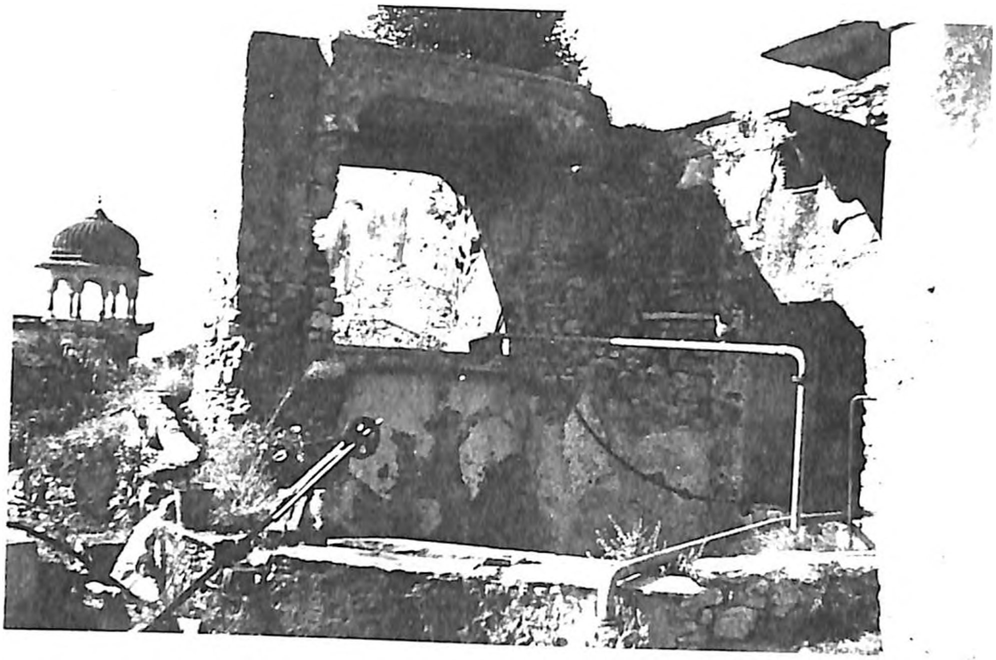

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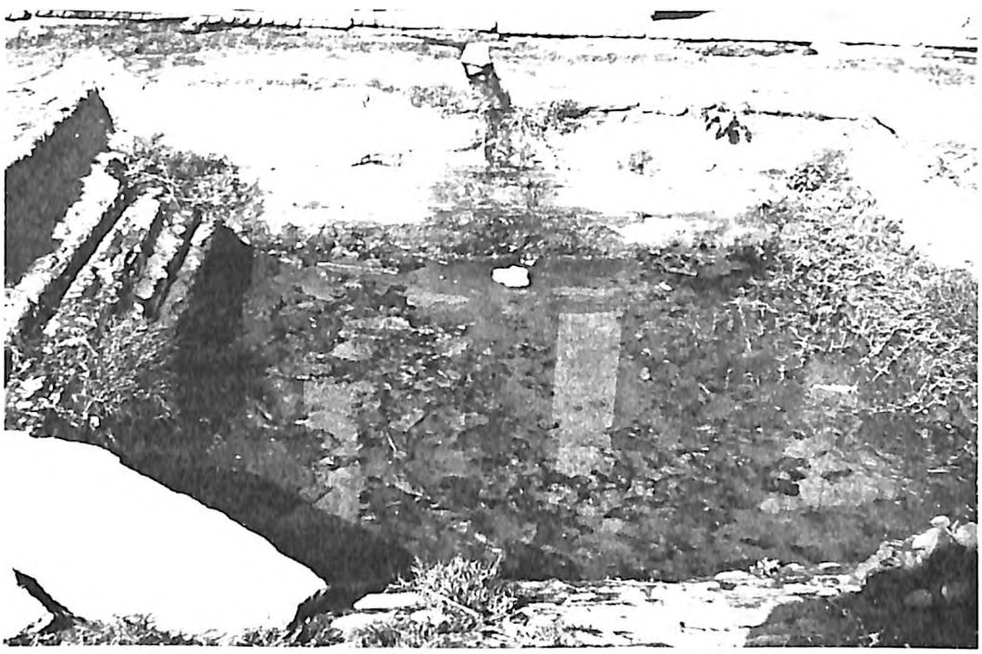
PLATE XLIV



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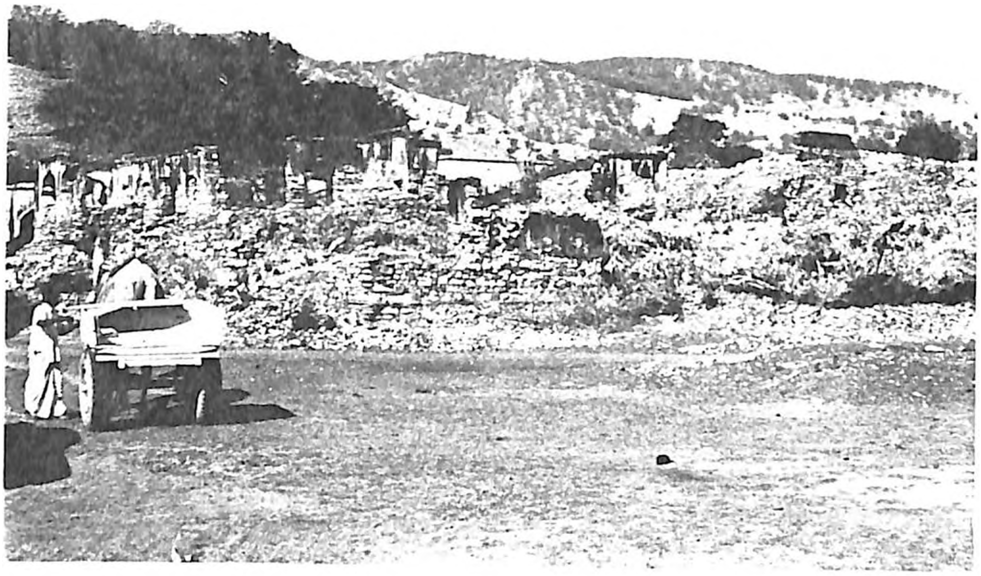

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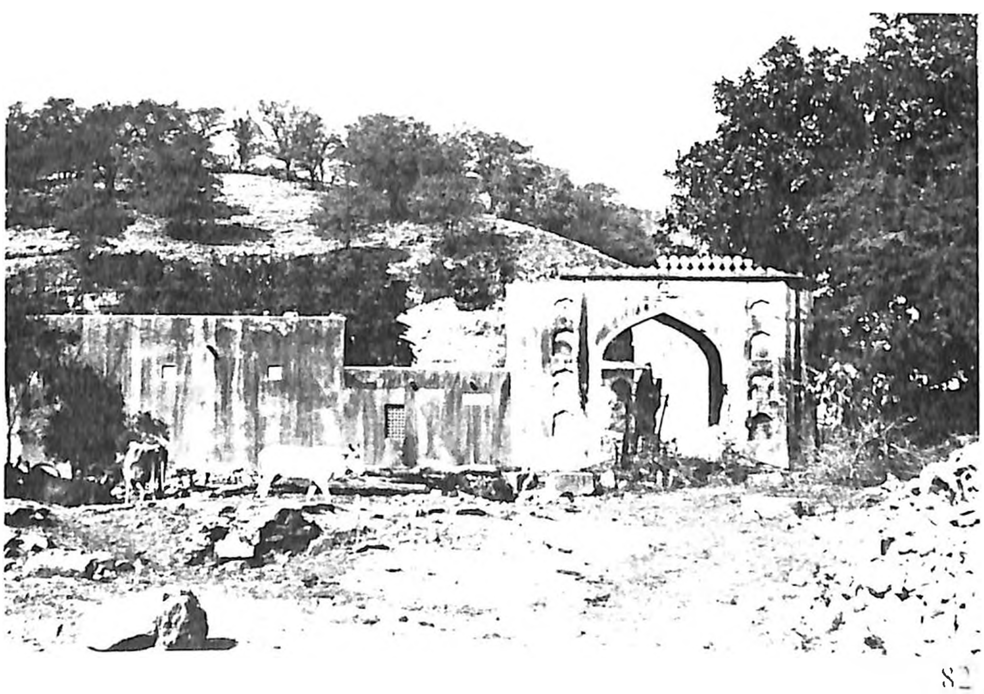

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fountains as described above and through a slip on the upper portion it used to flow out through the designed cascades to the water channels as shown in the figure. The total water from all the channels used to flow out through a eight feet wide and three inches deep outlet below the pavilion on the southern side. The water from this outlet used to fall 30 feet into the Mansagar lake located in this direction.

3.2.4 Ruins

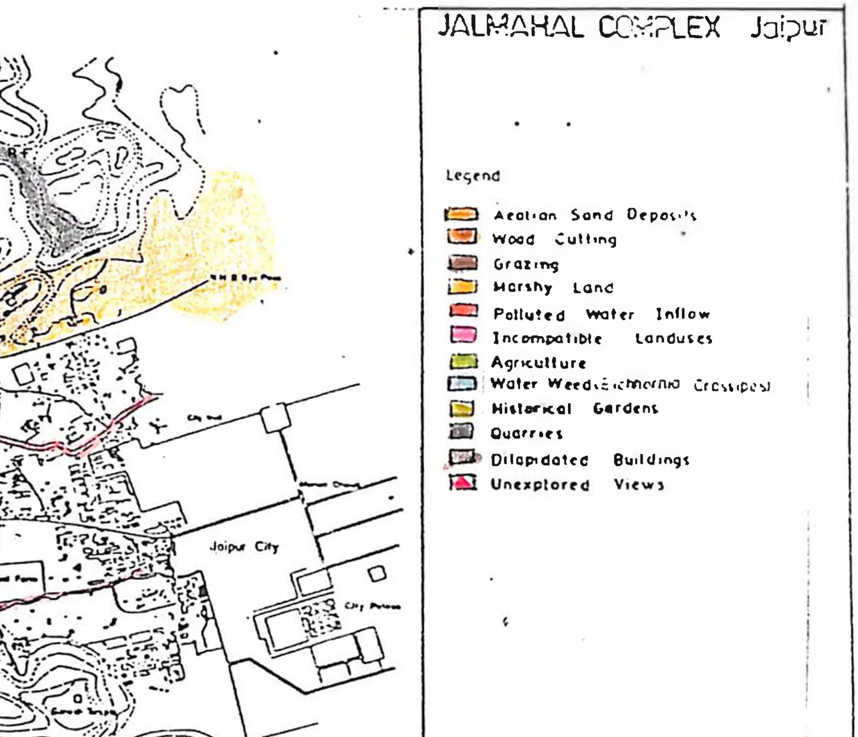
On the southern side of Govind Deoji's temple a few feet away were the ruins of a dilapidated structure with only buried and remanants of the thick *'Parkota'* wall and an entrance gate. The rectangular plan of the stable or *'Dharmshala'* was completely filled up with *malba* debris and loose rubble scattered with an undulated surface. The local depressions promoted algae, fungi and other microbial flora during monsoons with a dry weed scanty ground cover during the remaining year (Plate XLV, 81).The ruin was heaped with animal fodder, fuel wood and used as a place to tie the cattle. The settlement living in the temple complex also used the area as a defeacating ground.

There were four isolated Gates also sited with traces of *'Parkota'* wall defining the temple complex. The two main gates on the eastern side were large with encroachment abutting the sides. The other two, one facing the lake and other facing the kilangarh hill were partly buried with cowdung heaped on them (Plate XLV, 82).

3.3 MANSAGAR LAKE (Map No. 17)

The Jaipur city with its impressive architectural heritage and sprawling landscape had a clean water lake on the north of the city encircled by forested hills with floral and faunal wealth. This lake known as Mansagar in the past was the sacred spot where holy water from several rivers was accumulated for the performance of *Aswamegha Yagya.* Various historical buildings like forts, palaces, temples and gardens were full of activities. The interference with the nature's system was limited and within its regenerative power.


Nahargarh R.F.
Amber Town


JALMAHAL COMPLEX Jaipur
Legend
Aeolian Sand Deposits
Wood Cutting
Grazing
Marshy Land
Polluted Water Inflow
Incompatible Landuses
Agriculture
Water Weeds (Eichhornia Crassipes)
Historical Gardens
Quarries
Dilapidated Buildings
Unexplored Views
Jaipur City

Mansagar lake measuring 400 acres during rainy season lies to the north of the historical city Jaipur. This area is flanked by hills of Nahargarh and Kilangarh in the west and east respectively forming a valley with lake at its centre and a catchment area of 26.88 sq. kms. Roads connecting Amer and Delhi with Jaipur walled city lie on two sides of the lake whereas the other two sides touch beautiful narrow valleys now known as Kanak Vrindavan Ghati and Kadamb Valley. Kanak Valley has old historical temple complex structures whereas Kadamb Valley is quite an unapproached zone. The southern side of the lake is encroached by unauthorised construction. The remaining side facing west of the lake has old buildings, presently under occupation of educational and semi-government bodies.

When the rapid growth and lack of amenities, lost aesthetical and cultural values, stresses on short term considerations in development, land uses not adhering to land potentials, inadequate resource management and complete lack of enforcement of law etc. resulted in the degradation of the lake and its surroundings.

The disturbed hydrological cycle of Mansagar lake resulted in frequent floods, elimination of aquatic life, depletion of surface and ground water storage, and high water pollution etc. Similarly drastic changes occurred in flora and fauna as well. The vegetation deteriorated due to heavy interferences with its natural ecosystem. Introduction of exotic plants, wood cutting, grazing, apart from climatic constraints like scanty humus soil, low water holding capacity of soil, low microbial flora, absence of carpet vegetation, and extreme dikuranal variations all combined, eliminated essential plants of the ecosystem. The effects were severe resulting in heavy erosion, heavy siltation in the lake, increased temperature and air pollution. The fauna also considerably declined with complete elimination of larger Cats from the order of Carnivora and family Felidae. Mammals like Indian Wild boar, Jackal, Indian pangolin, Sloth beer etc. disappeared from forests. Similar damages are done to Avifauna reducing it to only 12 orders of representations. Such changes that we observe now are alarming and call for immediate conservation measures to preserve the fast depleting natural resources.

3.3.1 Jal Mahal

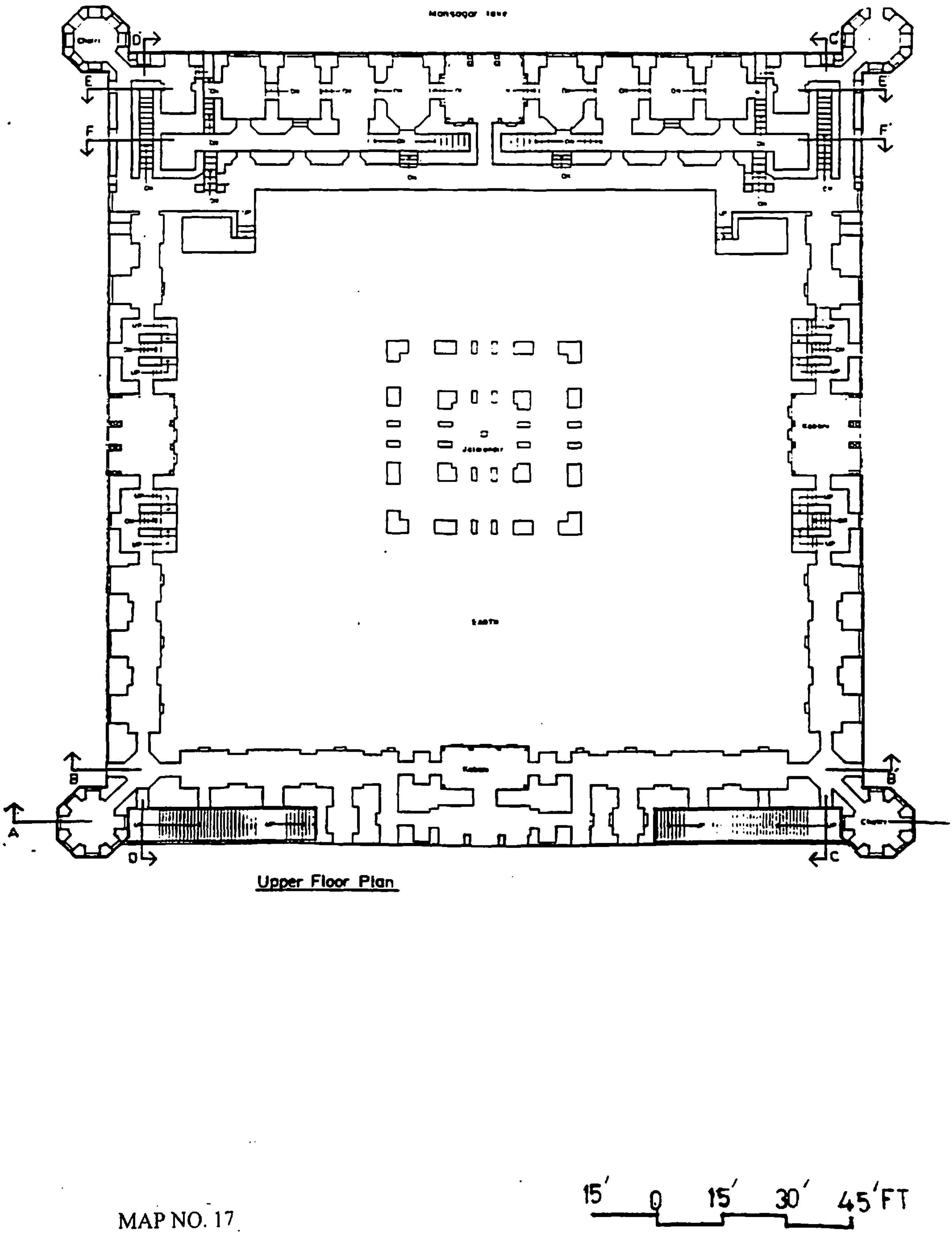
Jal Mahal has been constructed in various phases beginning from the 18th century. It presently lies in the heart of the Mansagar lake, with the Aravallis forming a backdrop. Built by Maharaja Jai Singhji II around AD1734, this structure still retains its individuality and invites people to visit it.

The two storied structure with *Chatris* on its corners and *Kabanis* in the centres of its edges, arched openings, traditional *'Jalis'* and *Parapets* present an awesome sight as one traverses towards the Jal Mahal. The monument has a strong basic geometry, satisfying both the structural and functional requirements of the building. Its character resembles that the Kanak Bagh and the Govind Deoji temple.

The whole structure is approached by boat from the east side. The square planned courtyard with four *'Burjs'* at the corners and a pavilion in the centre of the courtyard is the basic concept followed. The pavilion now lies buried under the earth, with the walls raised to the upper floor. There is an additional floor towards the eastern side. Series of rooms, large and small and typical of the olden times, lie around the courtyard. The rooms placed towards the north and south have been closed to avoid water seepage. However, on the west side a staircase projects out from the square room connecting the terrace floor to the intermediate floor. (Map No. 18).

There is an amazing circulation network in the entire structure. The corridor running all along the central courtyard leads to various individual rooms that are interestingly connected by an interplay of levels. The various floors are linked by staircases at the four vertices (Map No. 19).

Jal Mahal maintains its own identity, even with less ornamentation and the limited use of local materials. Architectural elements such as the *Jaalis, Kabanis* and the *Dasa* stone reflect the rich architectural vocabulary of Jaipur, which has evolved from the amalgam of Mughal and



Upper Floor Plan

MAP NO. 17

JALMAHAL JAIPUR

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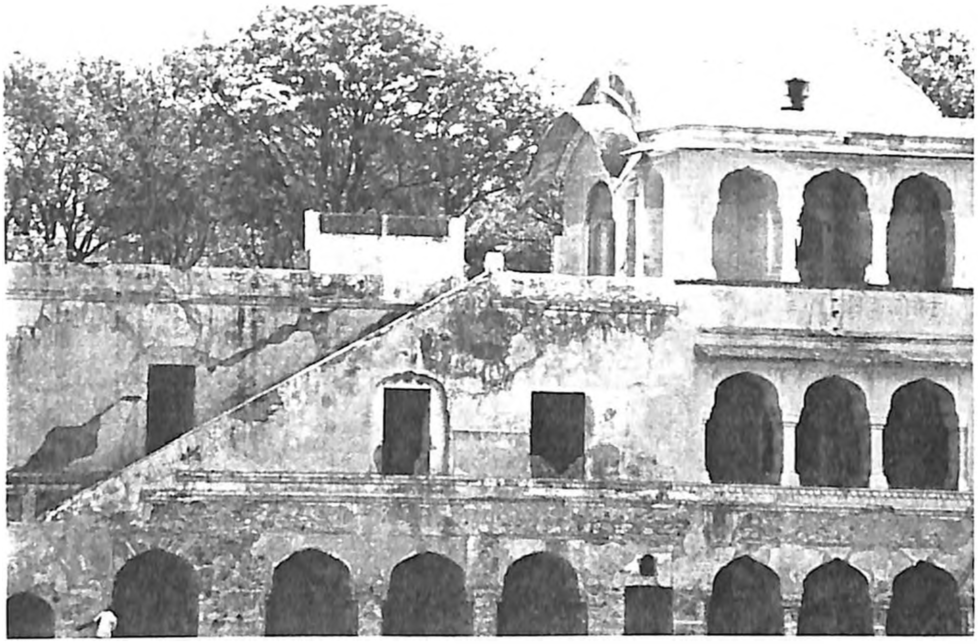

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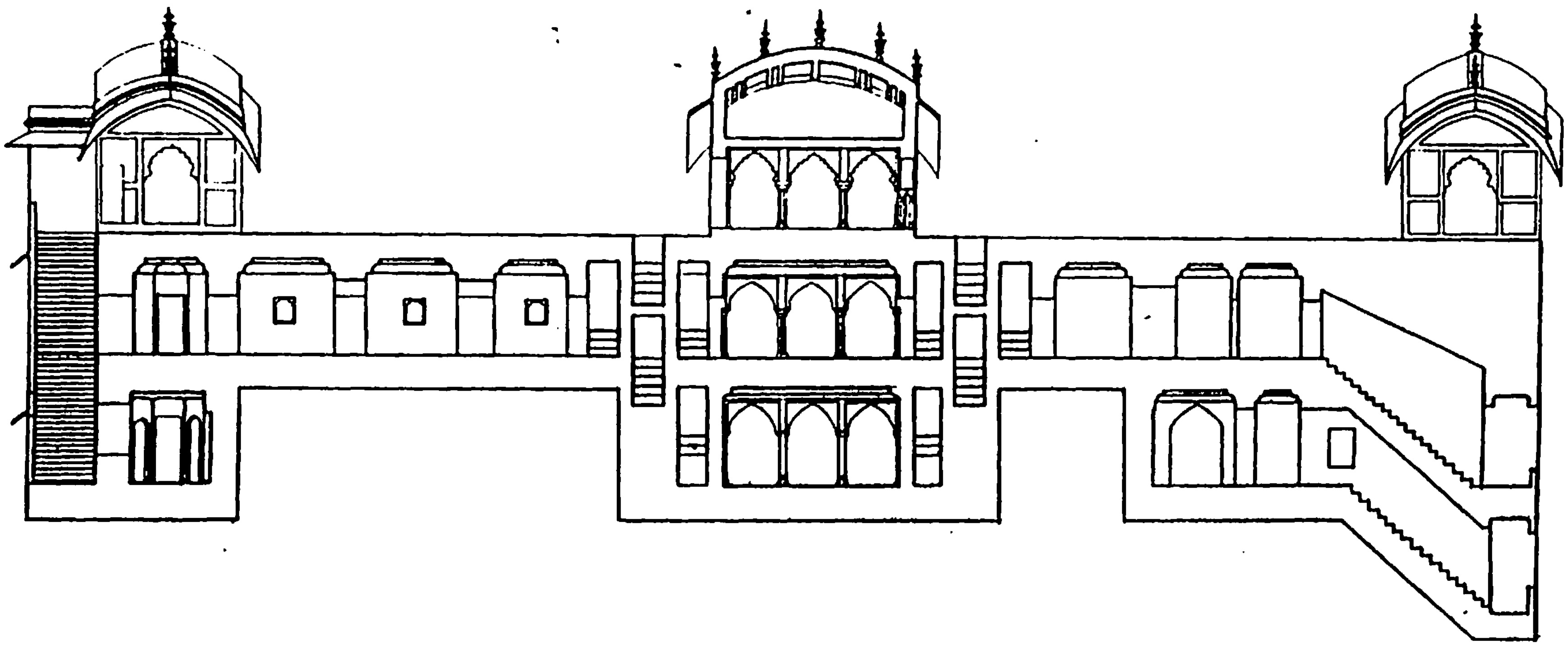

Sectional Elevation C·C'

10' 0 10' 30'

MAP NO. 18

JALMAHAL JAIPUR

PLATE XLVIII

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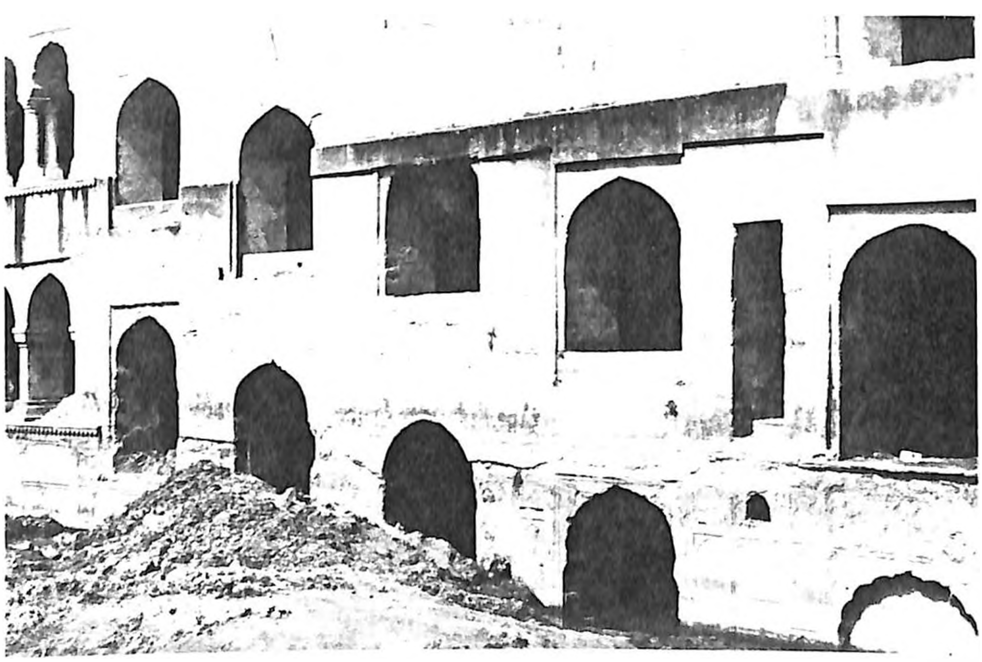

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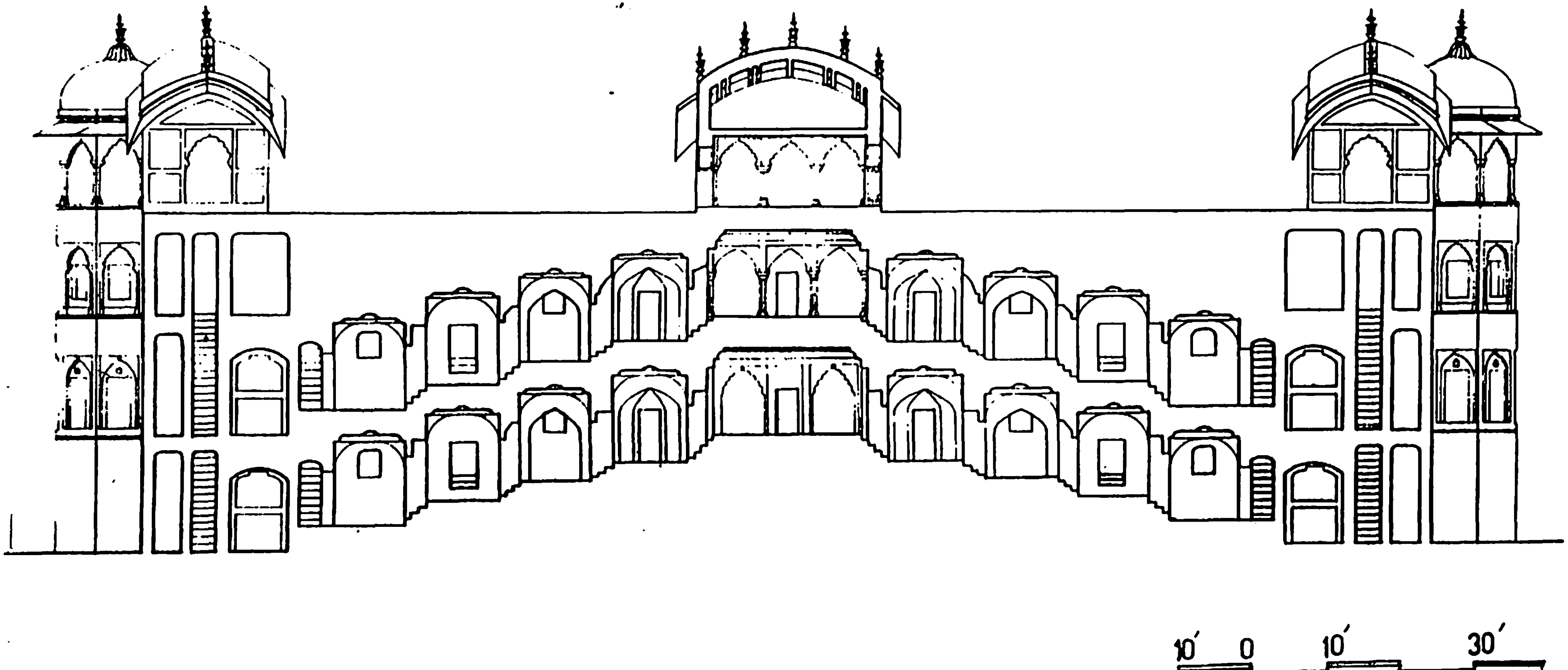
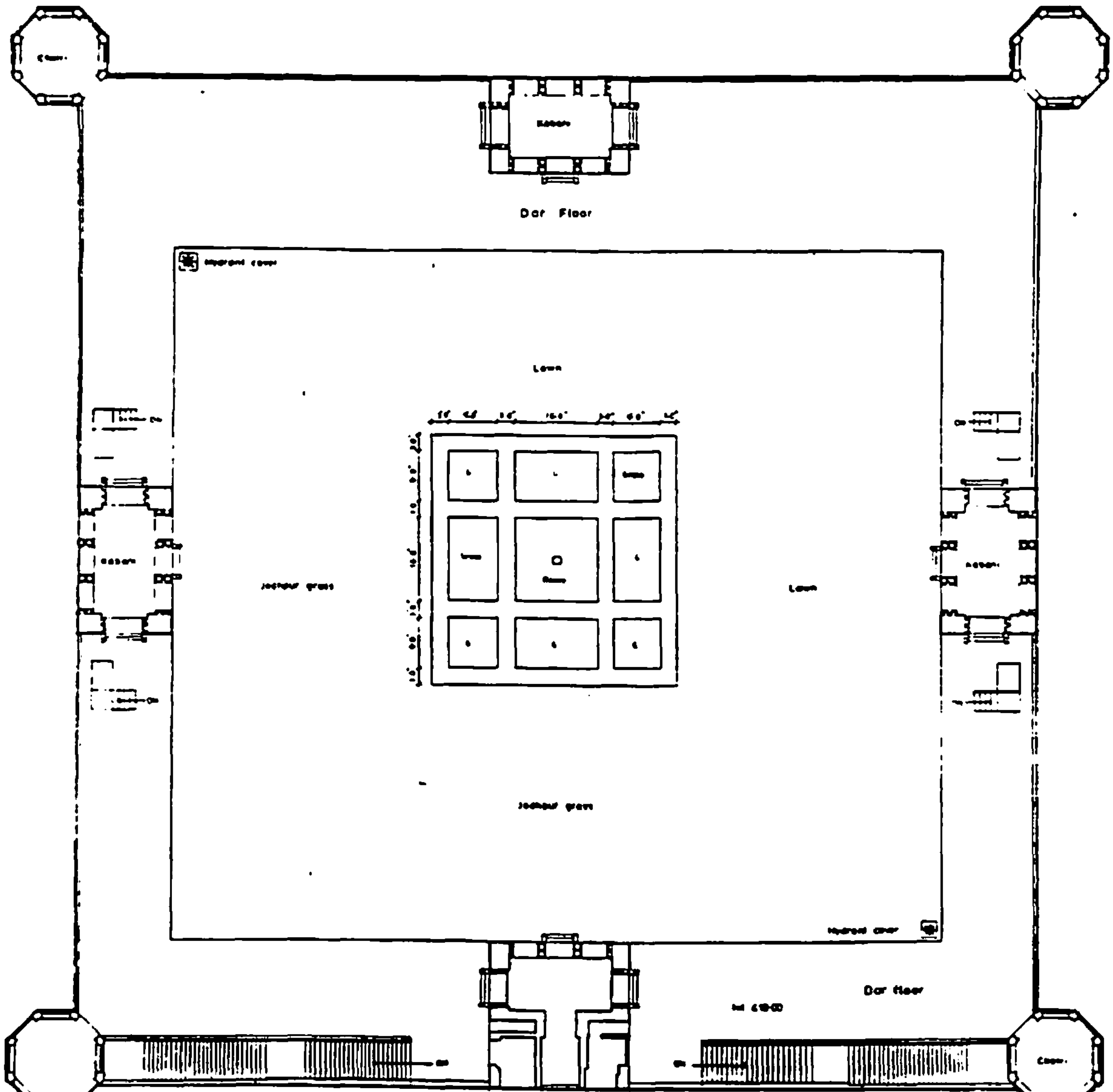


MAP NO. 19

Sectional Elevation E-E′

JALMAHAL JAIPUR



MAP NO. 20

15′ 0 15′ 30′ 45′ FT.

JALMAHAL JAIPUR

Rajputana architecture. The outer surface is painted as usual with *'Aaraish'* and *'Khamira'* and lime *'Stucco'* work with floor finish in *Dar*. The Kabanis and corner Chatris have Dasa stone in *'Andhi'* marble with finish in *Aaraish* on the walls upto three feet. The remaining surface has been painted with Khamira. Relief work has been found in various places. Some of these had been plastered lately.

As one moves around Jal Mahal, the upper terrace floor is reached. The terrace garden is the most outstanding feature with *Kabanis* and *Chatris* giving it the shape of a pleasure house. (Map No. 20).

Jal Mahal has remained in a state of neglect and is in a dilapidated condition owing to various reasons. Unfortunately, it has been observed that during the rainy season, the lake water brings with it a lot of silt and deposits it around the Jal Mahal. This structure has been subject to frequent fluctuations in the lake water. As a result a lot of dampness and algae bloom can be seen on the surface. This has considerably weakened the structure to a large extent. Moreover, the later additions of modern materials and techniques is totally incompatible to its historic fabric. Thus the structure needed to be stored. The existing conditions have been classified in Chapter 4 while identifying causes of decay.

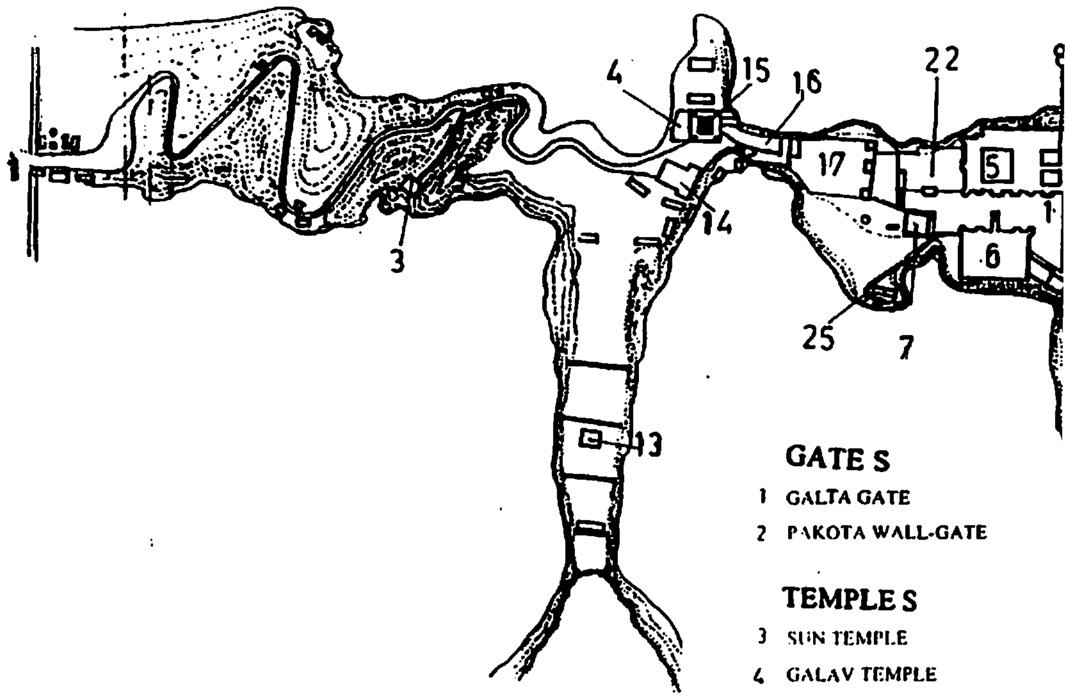
3.4 GALTA GHATI

Map No. 21 shows the location of various important historical structures located in the **Galta Ghati**.

About 350 feet down in the valley there is a water tank called **Udhar Kund**. There is another *'Kund'* known as **Kadamb** or **Raja Kund** in the southern portion towards **Kyara Dam** is the actual source of water for this region.

Close to the Udhar Kund there is another Kund called **Yagya Vedi Kund** in front of Galav temple (Plate XLIX 90). Yagya Vedi Kund is a square tank 40x40 feet size with a depth

MAP NO. 21
NO. 22



GATES

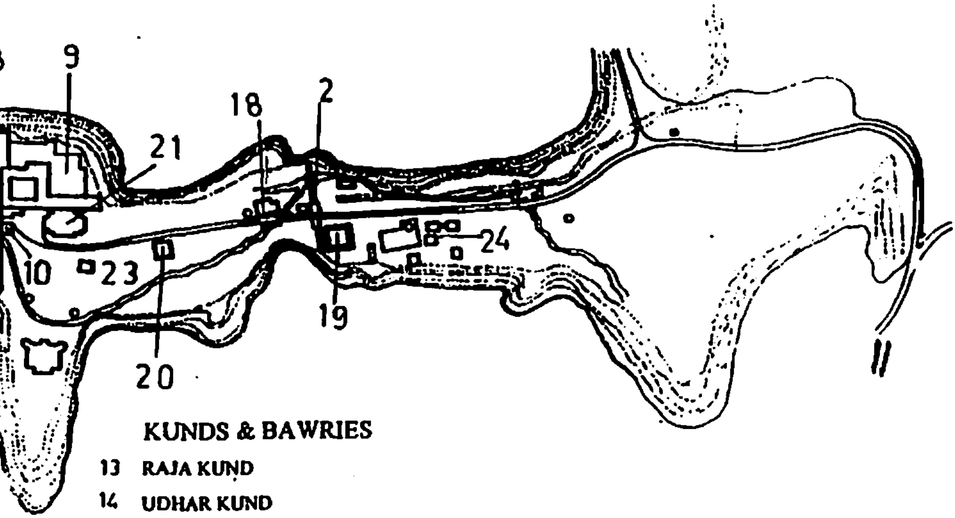
1 GALTA GATE
2 PAKOTA WALL-GATE

TEMPLES

3 SUN TEMPLE
4 GALAV TEMPLE
5 SITARAMJI TEMPLE
6 GYANGOPALJI TEMPLE
7 HANUMAN GARHI
8 AKHAND JYOTI HANUMAN JI

MAHAL

9 ZANANA MAHAL
10 RAMKUNWAR MAHAL
11 SISODIA RANI KA MAHAL
12 RAGHUNATH GARH



KUNDS & BAWRIES

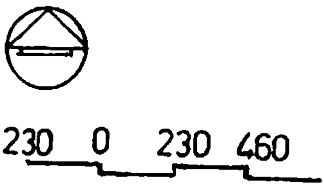
13 RAJA KUND
14 UDHAR KUND
15 YAGYA VEDI KUND
16 SURYA KUND (MARDANA)
17 GOPAL KUND (ZANANA)
18 RAM KUND
19 LAL KUND
20 BAWRI
21 MAJI KA KUAN

GARDENS

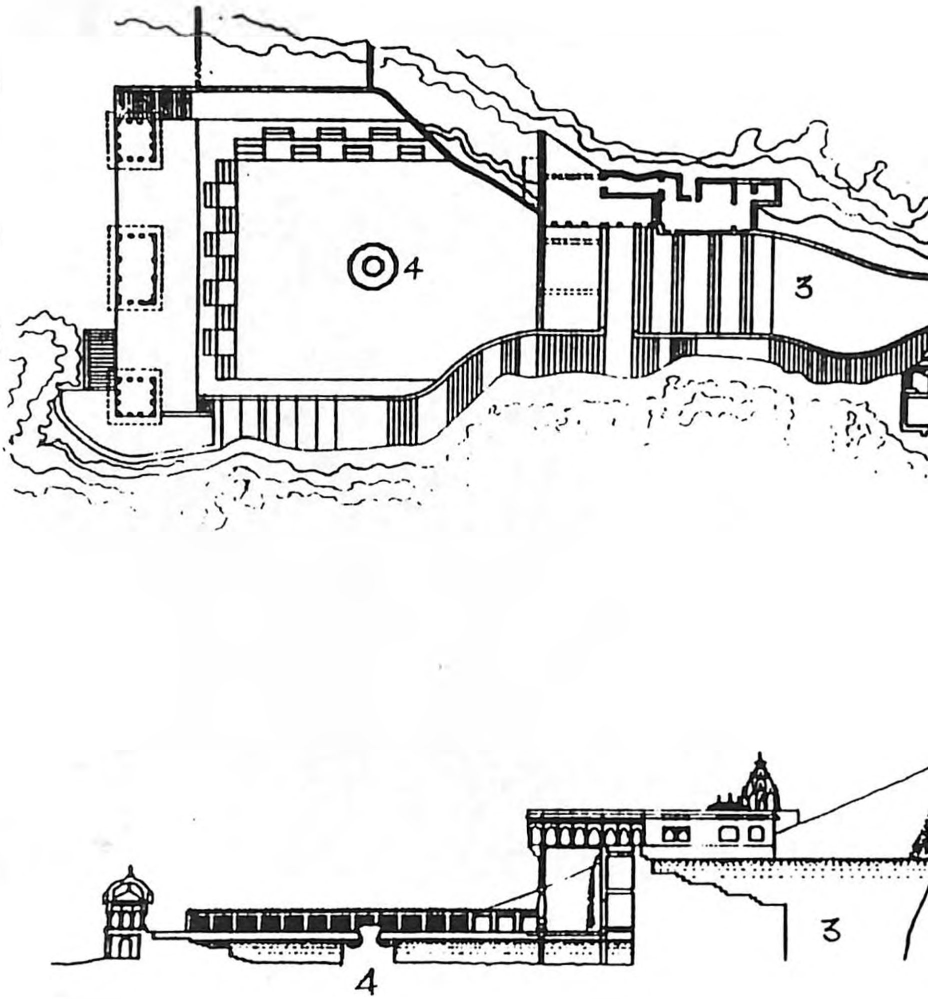
22 NABHA NIWAS
23 RAM BAGH

MISC

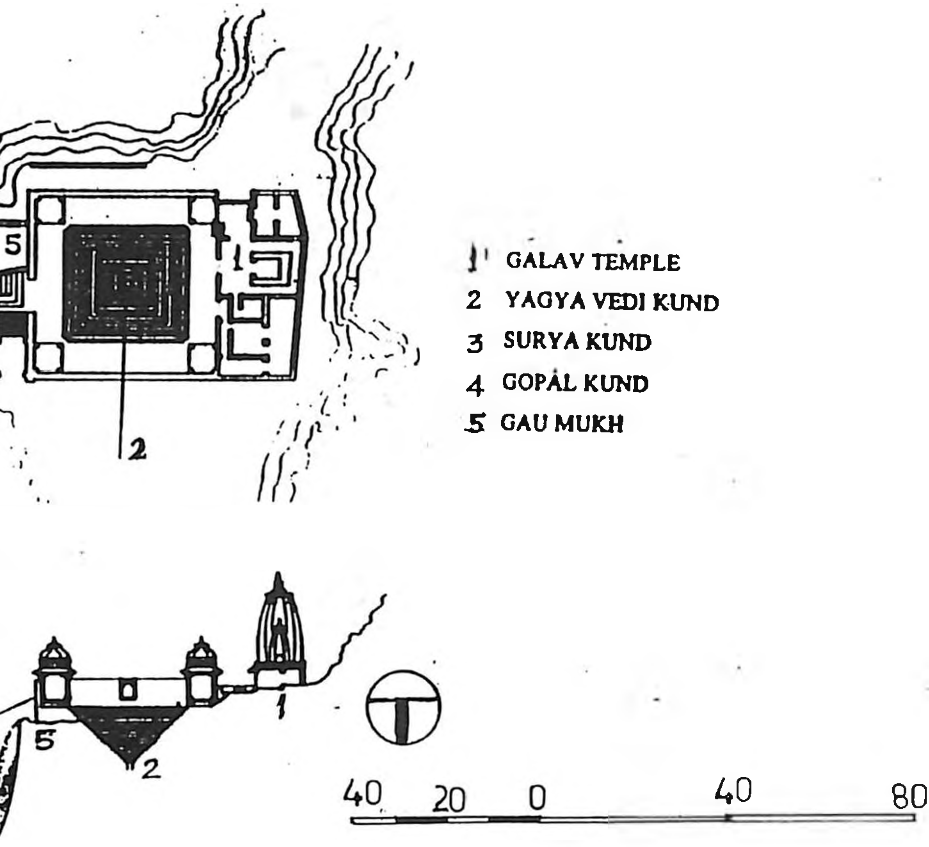
24 CHATRI MAHANT
25 PAYOHARIJI CAVE



GALTA GHATI, JAIPUR



MAP NO. 22



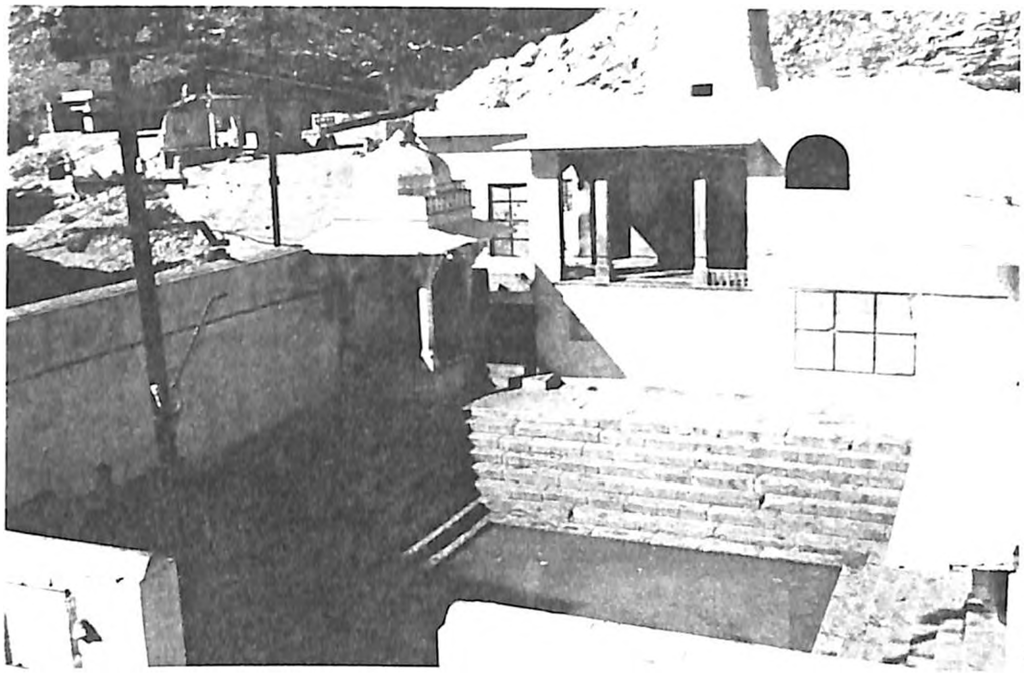
GALTA GHATI, JAIPUR

of about 50 feet connected to a water spring and the main source of water for the other Kunds. The Kund is built up in the pattern of a step-well and has four Chatris in the four corners. Adjacent to this Kund there is another Kund known as **Suraj** or **Mardana Kund** about 40 feet below the Yagya Vedi Kund. Suraj Kund is a rectangular structure of (352x100 feet) with a depth of about 55 feet with a deep well in the center from this level (Plate XLIX,91).

During the historical times Suraj Kund was a natural Kund in the mountaneous Valley as showed in the cross section of the Map No. 22. A retaining wall of about ten feet height made up in lime mortar was made during the reign of **Mirja Raja Jai Singh I**. Water from Yagya Vedi Kund falls about 40 feet deep through a *'Gaumukh'* and is considered to be sacred water coming from holy river Ganga. The overflow of water from Suraj Kund falls through a similar *'Gaumukh'* in a 40 feet deep Gopal Kund popularity known as a Zenana Kund (Plate XLIX, 92).

The **Gopal Kund** is 18 feet deep, rectangular tank of 60x80 feet size with a lotus shaped fountain made up of marble on a raised platform. The fountain is connected to the Suraj Kund and therefore water flows by gravitational force. Gopal Kund has two *Chataris* and one pavilion with a kabani. The pavilion has fresco paintings made during the reign of **Maharaja Pratap Singh** (AD1779-1803). The paintings are made up in Jaipur style with one painting in the center showing the Ashram of a saint with desciples in a forest area (Plate XLX 93). The landscape is beautifully designed. There are a number of other paintings on the inside walls.

After descending about ten feet the Valley joins a plain area with a number of historical buildings in a complex. Near Gopal Kund in the northern side, there is Nabha Niwas (Plate XLV, LI, 95) in front of a temple known as Hanuman Garhi (Plate L1, 97). Adjacent to Nabha Niwas in the eastern side there is a two storey building of Sitaramji Temple (Plate LI, 96) connected with **Zenana Mahal**. In front of Sitaramji temple in the south, there is another famous three story temple of Gyan Gopalji (Plate LII, 98).



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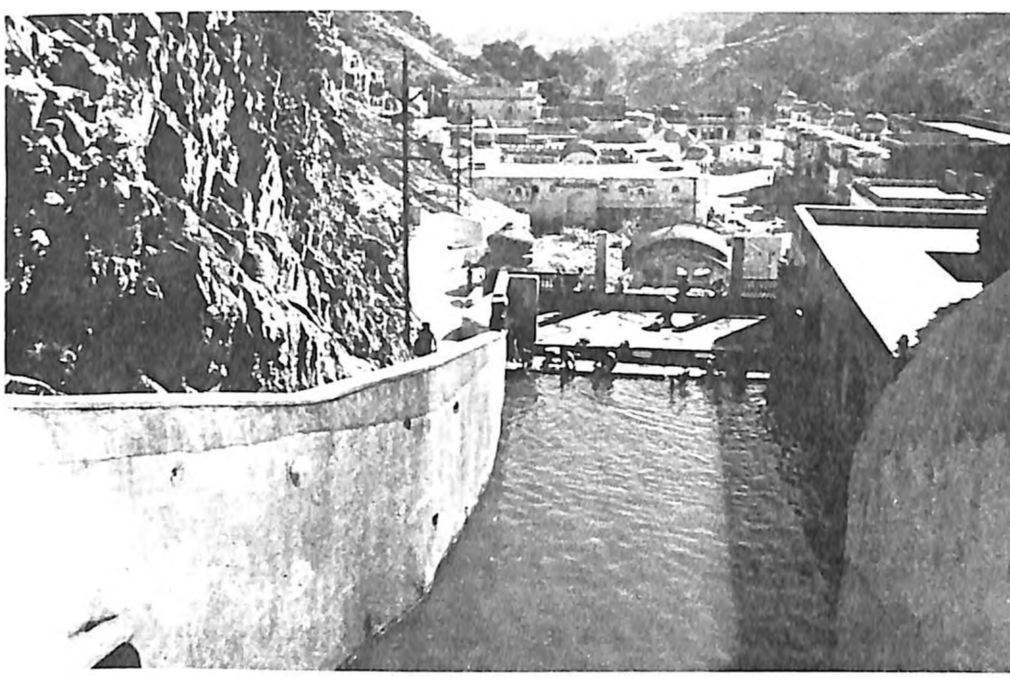

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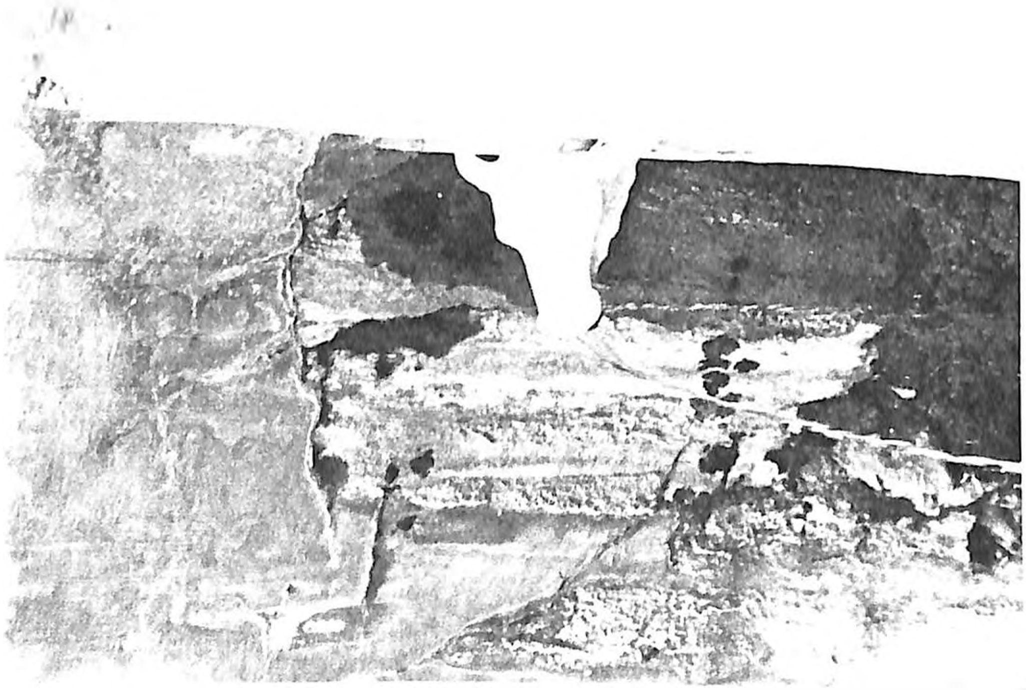

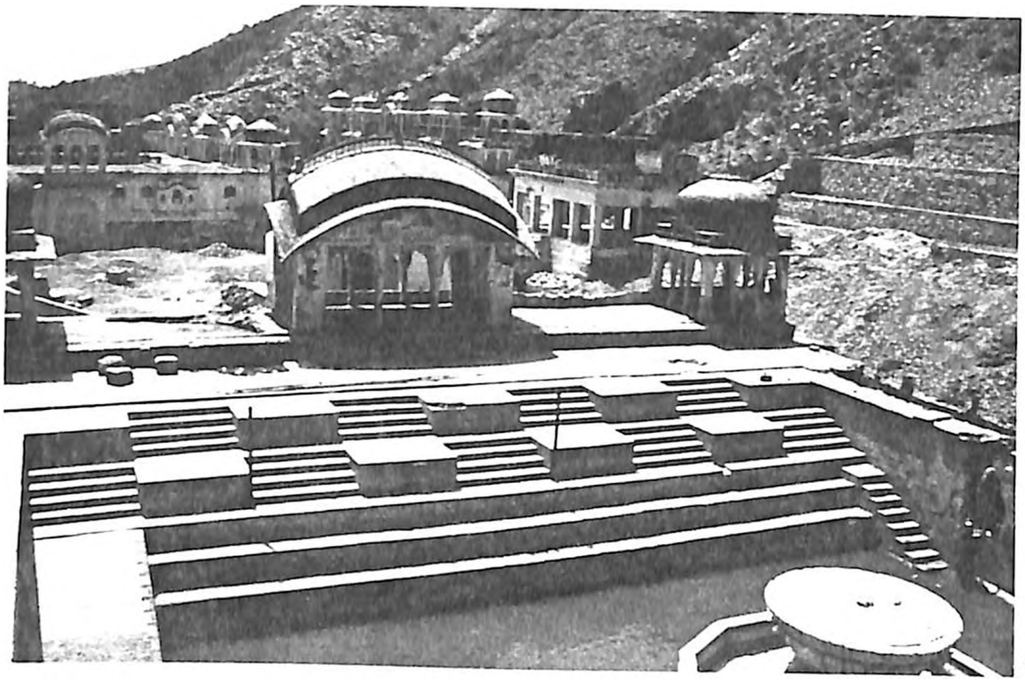

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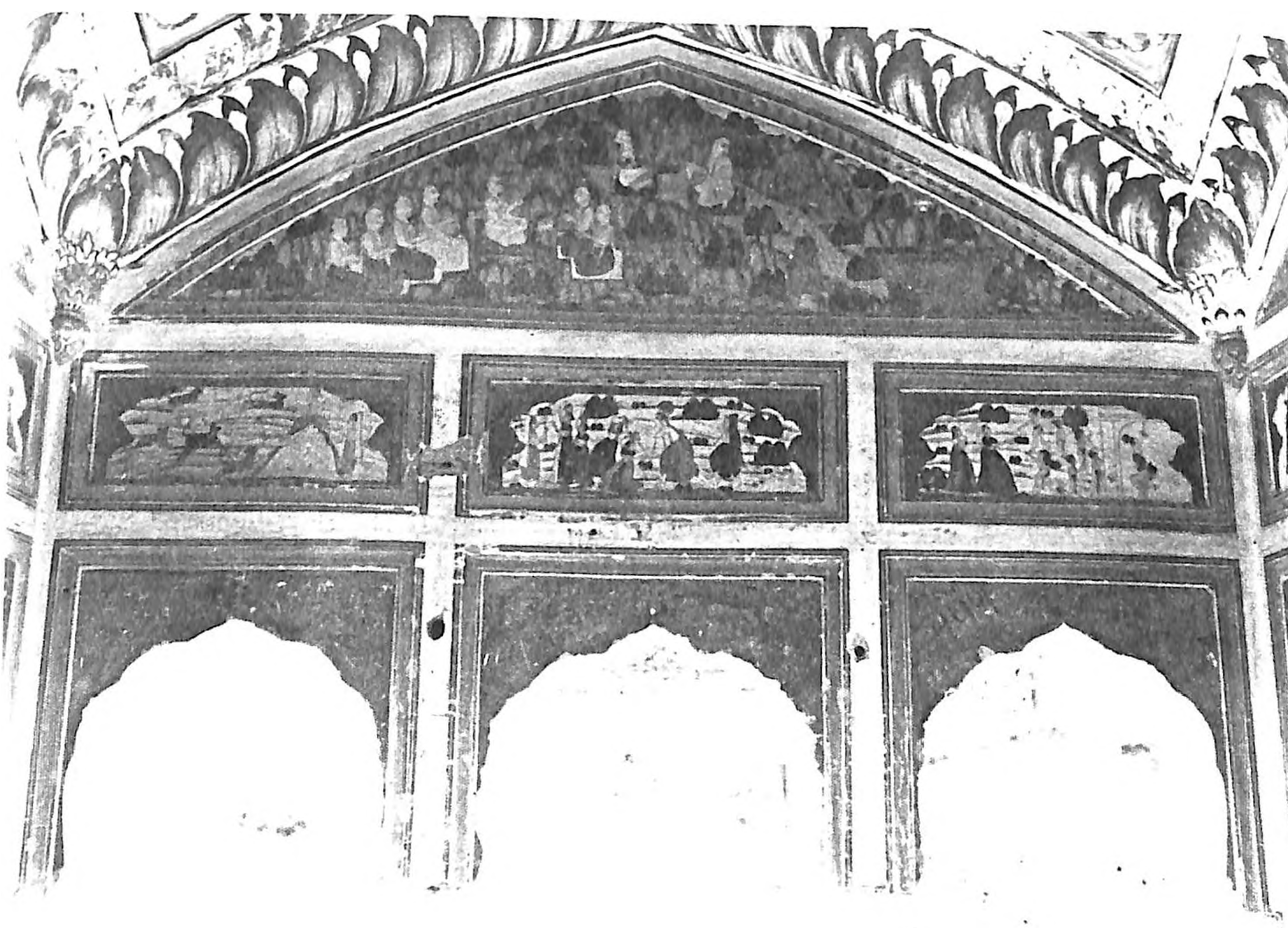

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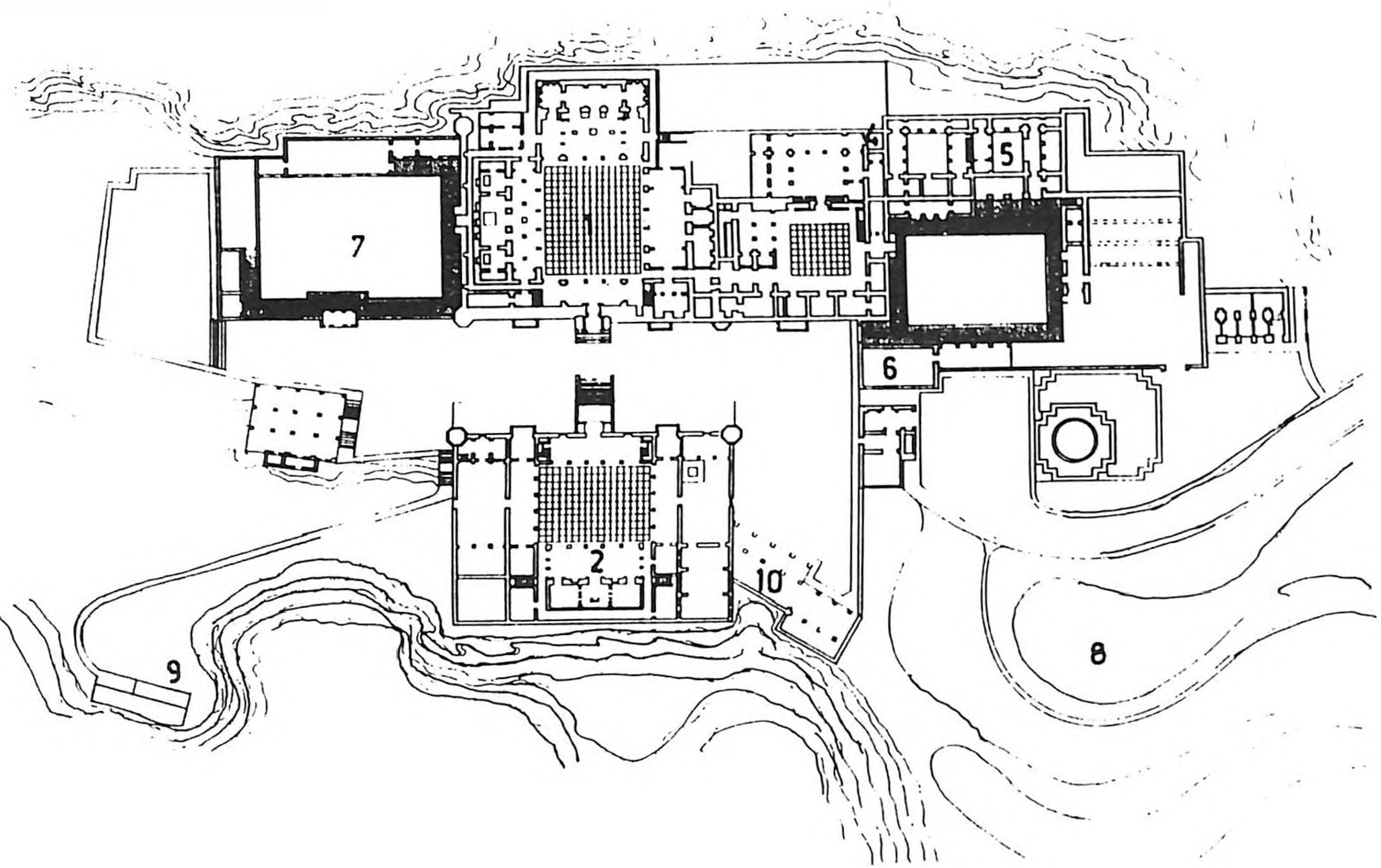

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TEMPLES

1 SITA RAM JI TEMPLE
2 GYAN GOPAL JI TEMPLE
3 HANUMAN GARHI
4 AKHAND JYOTI KE HANUMANJI

MAHAL

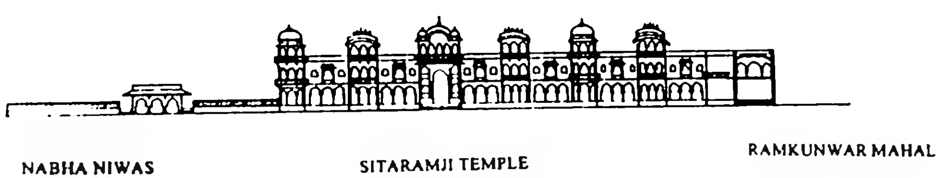
5 ZANANA MAHAL
6 RAM KUNWAR MAHAL

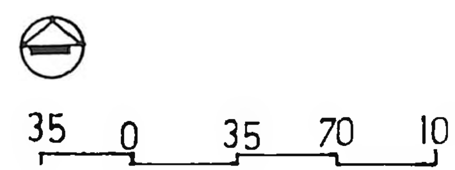
GARDENS

7 NABHA NIWAS
8 RAM BAGH

MISC

9 PAYOHARI JI CAVE
10 RATH KHANA





MAP NO. 23

GALTA GHATI, JAIPUR

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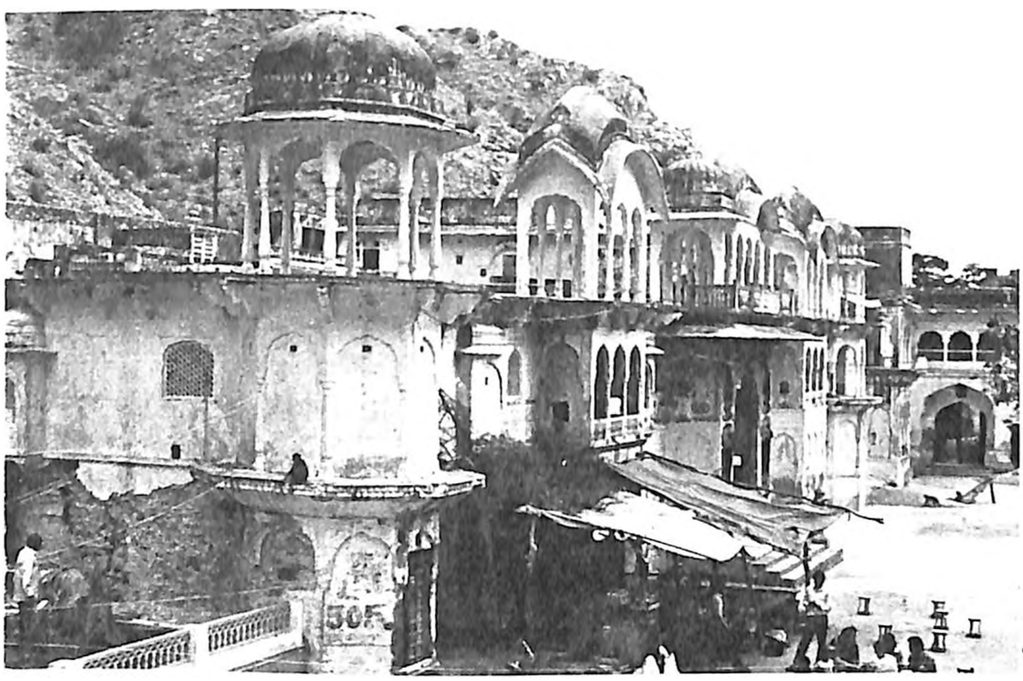

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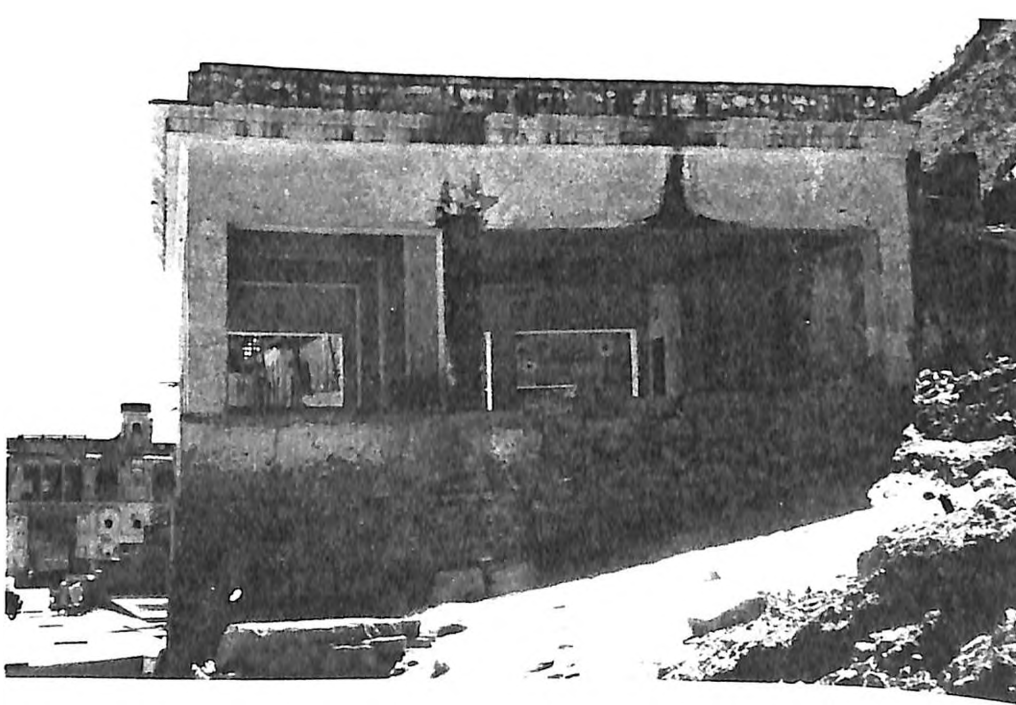

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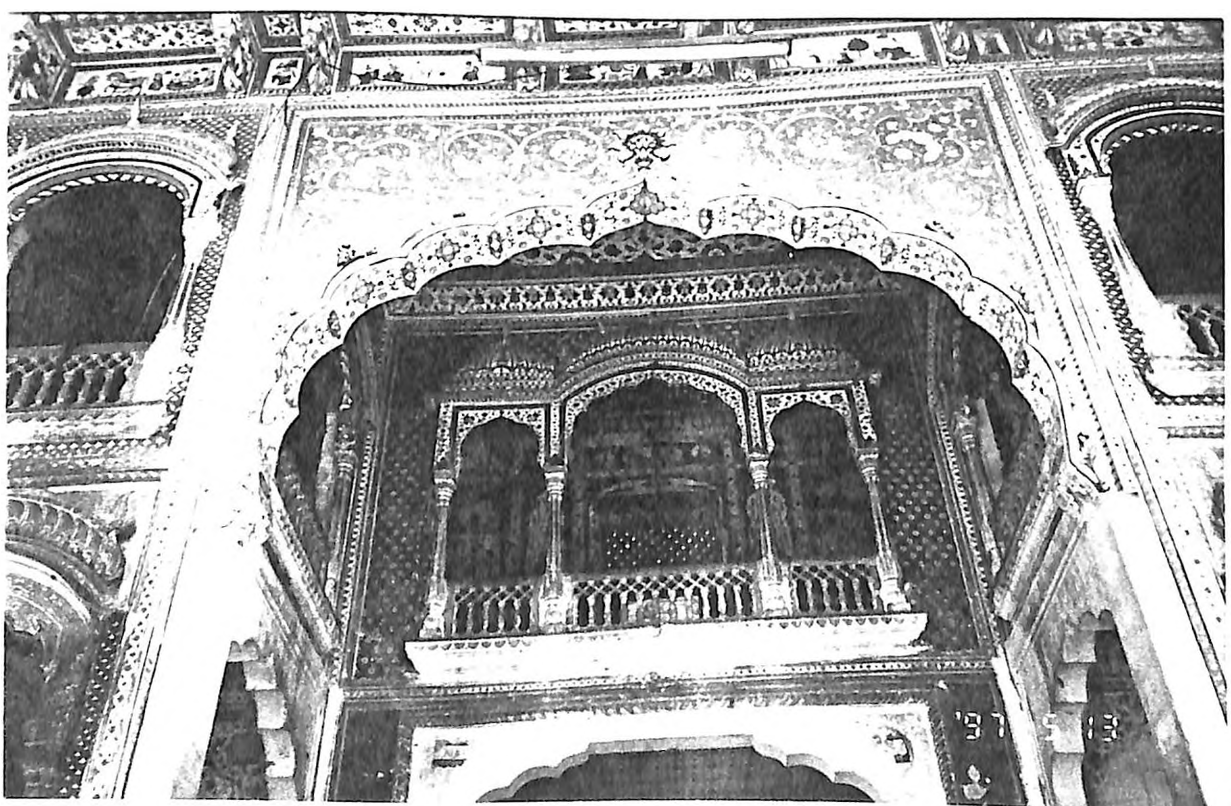

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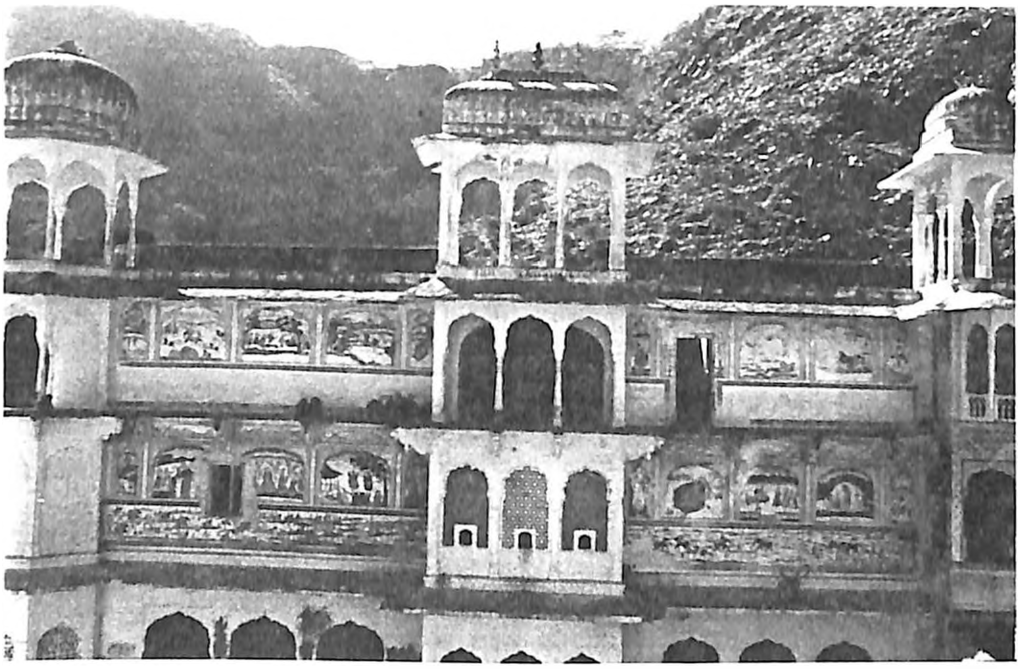
PLATE LIII



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Both these temples have beautiful structural design, similar to other temples of this area. These temples are comparable with the Govind Deoji temple for having *Chataris* and *Pavelions* with Kabanis. These buildings had beautiful fresco paintings.

The buildings of this area have undergone deterioration due to natural and human related factors. The actual condition of the structure is comparable with earlier similar structures already described.

There is an approved plan for the restoration of these buildings but only the restoration of facade has been undertaken. The procedure followed is similar to that of Kanak Vrindavan Ghati complex and therefore details are not recorded here.

Another building in the complex towards east is called Ram Kanwar Mahal. The complex also has two *Kunds* known as Ram Kund, Lal Kund and a Bawri and a number of wells. This area in the historical time of Maharaja Ram Singh was called by the name of Ram Bagh. The Valley is enclosed by a *'Parkota'* wall and a gate also known as Galta Gate. On the top of a hill in the north there is a famous fort named as **Raghunath Garh**, used as a watch tower during the reign of Meena rulers of this area. Further east this complex gets linked with another famous part of Jaipur known as Ghat Ki Guni having a number of other historical gardens namely **Sisodia Garden, Vidyadhar Bagh** etc. and many other **Havelis** and temples. This is the eastern entry point for Galta Ghati from Jaipur city.

In the year 1981, Jaipur has faced a severe natural calamity due to the heavy rains leading to the bursting of a number of natural and historical dams in Aravali ranges. Due to the heavy floods buildings in Jaipur city and other adjoining areas were severely damaged. One such area was Galta Ghati.

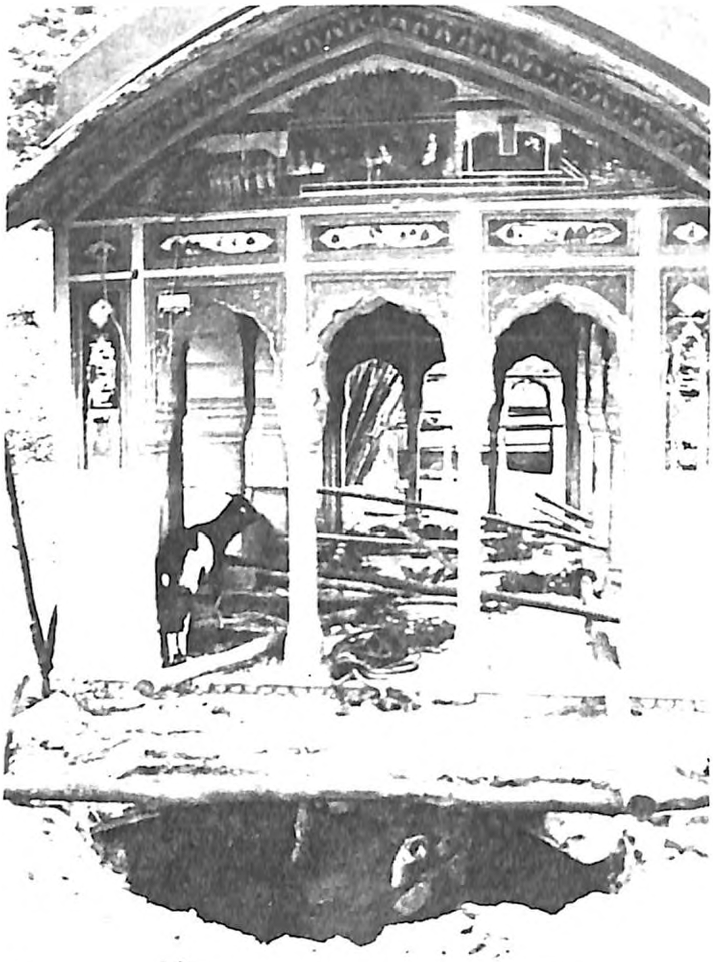
The present study deals with the condition of the three important Kunds after the floods and the procedure followed for their restoration. Restoration works of the catchment area of the Galta Ghati has also been done and has been described in chapter no. 7 under analysis of environmental components.

The Kyara Dam in the southern side of the Valley was completely damaged during the 1981 floods. There existed a sand hill in the Valley at an approximate 500 feet height below the dam, the release of huge amount of water at a time, generated great force with movement of small and big boulders from the Valley and displaced the sand from the sand hill (Plate LIII, 100). The flow of the above mentioned materials with great rush of water in a short span of time destroyed most of the buildings on its way and also damaged and silted the various Kunds. The beauty of the historically important Galta Ghati was destroyed. The restoration of this area was a mammoth task but with the financial help of Hindustan Charity Trust and cooperation of Galta Trust some portion of Galta Ghati has been restored.

The following information deals with the condition of the three Kunds namely Yagyavedi Kund, Suraj Kund & Gopal Kund and structures associated the procedure and techniques followed for their restoration.

The temple of **Galav Rishi** and two Chatris of Yagyavedi Kund were destroyed. The steps of the Kund were damaged and the kund was filled with sand and boulders. The Suraj Kund has undergone severe damage due to the destruction of the retaining wall towards the Gopal Kund and heavy silting of the Kund in the lower Valley region. The **Shiv Temple** near the Kund and the platform was also completely destroyed. The next severe impact of the flood was on Gopal Kund (Plate LIV, 102,103). It was severely damaged due to the flood waters and also by the falling of huge boulders from the hills and retaining wall of the Suraj Kund. The lotus fountain was damaged, the floor of the Kund was destroyed and other architectural features of the Kund were destroyed or severely damaged.

The Public Works Department of Government of Rajasthan and other such Government agencies had undertaken the restoration of the above mentioned Kunds of Galta Ghati in the year 1981-82. The department had no knowledge or expertise of restoration work of historical



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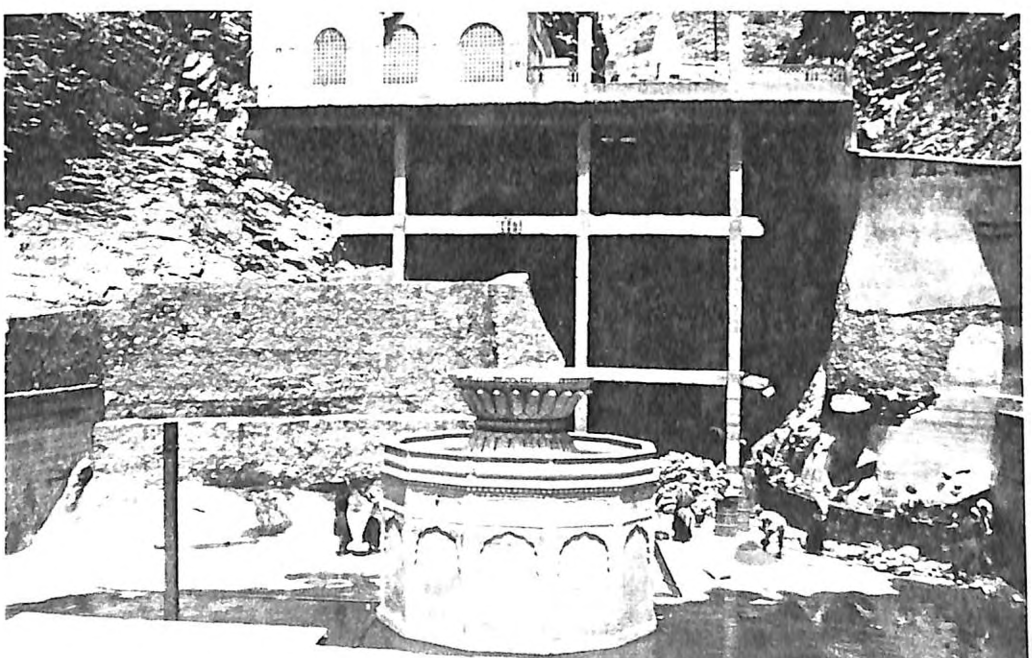

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buildings and therefore they had started the work on the basis of structural engineering. Plate LIV 104 shows the restoration work of the retaining wall of Suraj Kund. The department in actual reality had tried to strengthen only the remaining portion of the retaining wall of Suraj Kund. Later due to the lack of expertise or the availability of the funds the work was stopped. The buildings of the area remained in the form of ruins for the next eight years until the restoration work began in the year 1989.

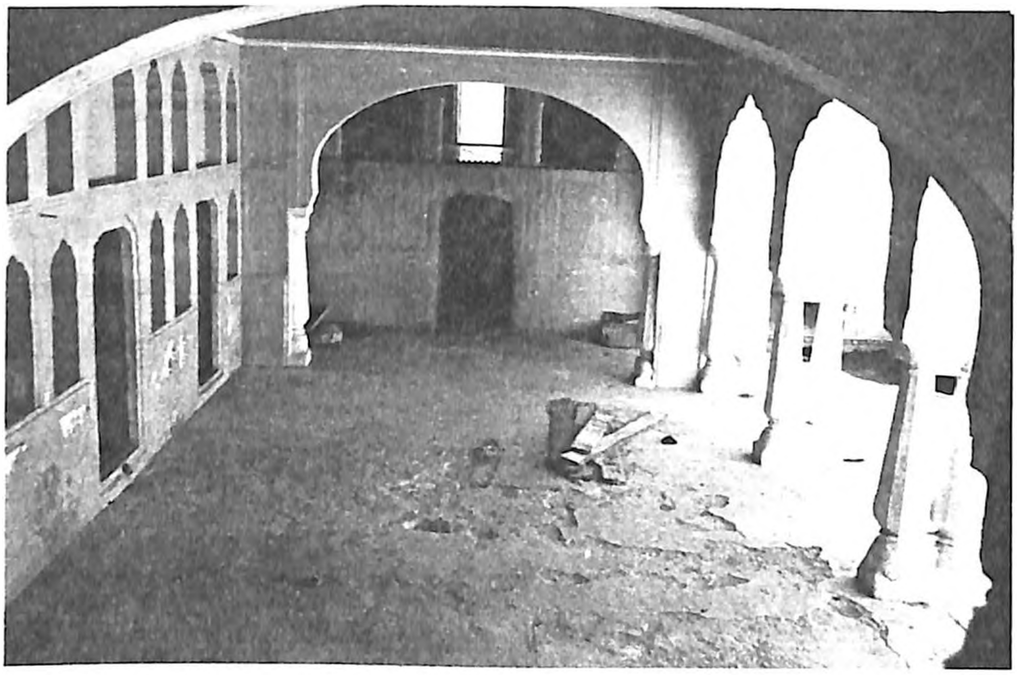
The following information refers to the restoration and rehabilitation work done in the above mentioned buildings.

The restoration work was started from the Suraj Kund because this is the main Kund in which water flows from **Yagyavedi Kund** and the water overflows to Gopal Kund and some work in this area was already done by the P.W.D.

The actual building was made in lime mortar but P.W.D. had used cement mortar for the beams and columns. The further restoration work was done in lime mortar with bricks. The structural and repair work was done as per the procedure described in the chapter on techniques.

The desilting of the Kunds was a difficult task and had taken lot of time. After repairing the various parts of structures of the three Kunds, the reconstruction of the eastern facade of the retaining wall towards the Gopal Kund was under taken. This work on the wall includes development of the designs, ornamentation and fresco paintings. The work was completed in four years and the successful results of research on lime materials, development of fresco colours and fresco designs, helped in undertaking of such work on other projects of present research.

Normally the restoration work of historical buildings/ structure is also associated with rehabilitation work, and therefore in Galta Ghati project, this approach has been given proper importance.



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The three Galta Ghati Kunds were developed during the last few centuries. Till the middle of this century there was no pressure of pilgrimage and people used to visit this area only with religious feelings during particular occasions. The Kunds had no facilities for changing clothes or toilets. The portion below the pavilion of Gopal Kund has been developed for changing clothes and proper bath- rooms and toilets have been constructed on the southern side of the Gopal Kund. Bathing steps with platform with traditional screen wall with 'Kanguras' has also been constructed on the southern side.

The building of Shiv Temple near the Suraj Kund was unplanned and people used the veranda portion of the temple for changing clothes. This was undesirable as well as inconvenient for the visitors. Under this project, the temple has been redesigned with arched openings and eautiful fresco designs on walls matching with the rest of the complex.

CHAPTER 4

CAUSES OF DECAY

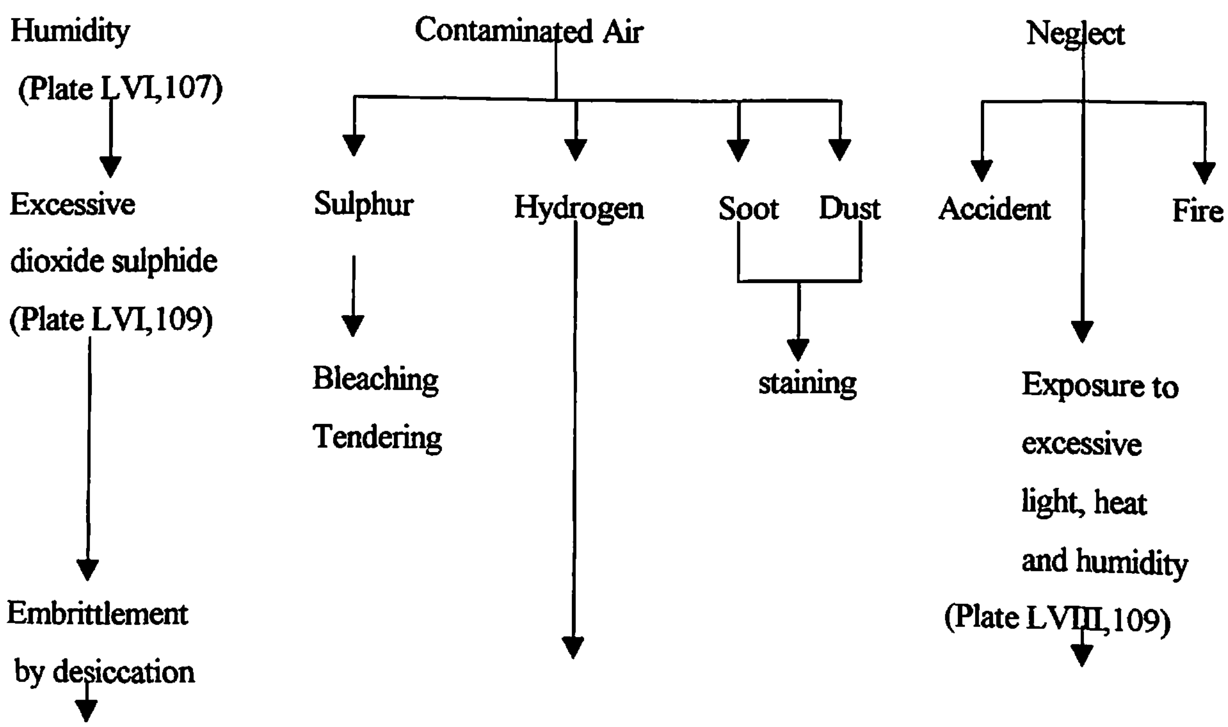
Restorers of historical buildings/monuments have to be aware of the causes of decay so that the restored building is properly maintained and suitably rehabilitated.

The deterioration/decay of the historical buildings is due to internal or external causes including its design and workmanship.

The following information is based on the opinion given by Fielden (1989) and the actual observations made during the study of historical buildings at selected sites. study.

4.1 INTERNAL CAUSES OF DECAY

The information given in the following flow chart is based on page no. 90 (Ref. 'Conservation of Historical Buildings' by Bernard M. Feilden - 1994).



Damage to marquetry

Careless handling and packaging (Plate LVI, 108)

Slackening of canvas
Rapid changes

Blackening of lead pigments tarnishing of metals

Pests

Movement of hygroscopic materials
Warping of wood
Flaking of paint
Activation of soluble salts

Excessive wetness (Plate LVIII 114, 115)

Damp heat → Fungi bacteria

Weakening of adhesives Rotting of size
Staining of paer, vellium etc. Blurring of inks
Mildewing of leather Metallic corrosion encouraged
Loss of adhesion of illuminations Adhesion of loaded papers Tightening of canvas

Moth beetles and silverfish (Plate LVIII, 113)

Wood ants etc.

White and mice

Rats

Man-Made Causes of Decay
(Plate, LVIII, 111,112)

Neglect of preventive conservation
Neglect of fire precautions

Wars
purposeful alteration
Encroachments
Fashion changes

Environmental pollution
Water abstraction
Vibrations

Vandalism and erosion
Theft
Neglect of security Precautions

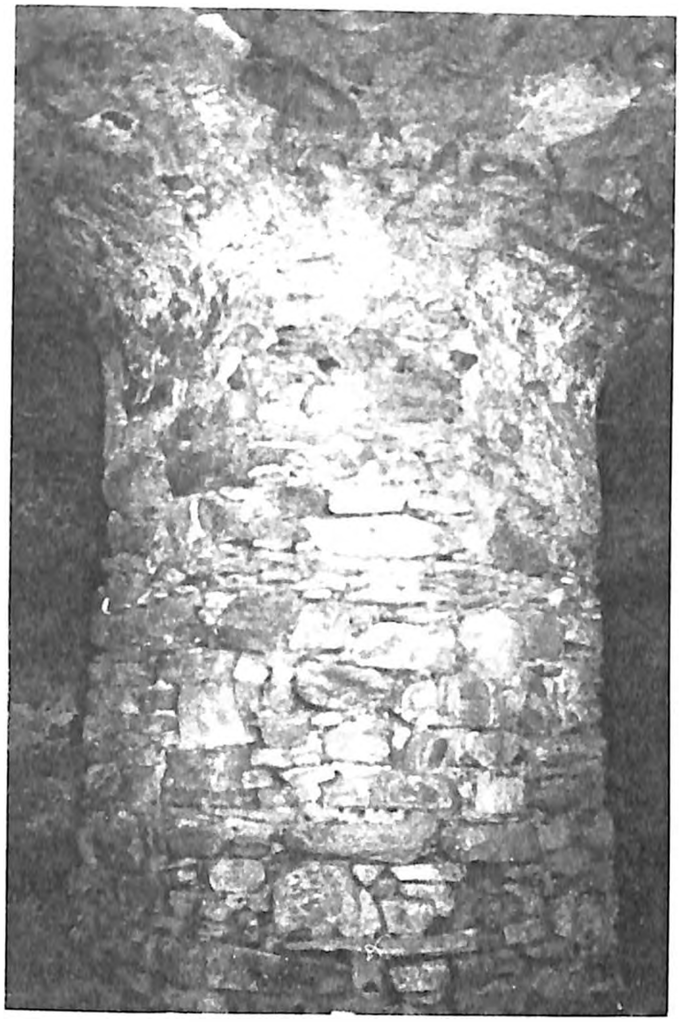


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PLATE LVII

109

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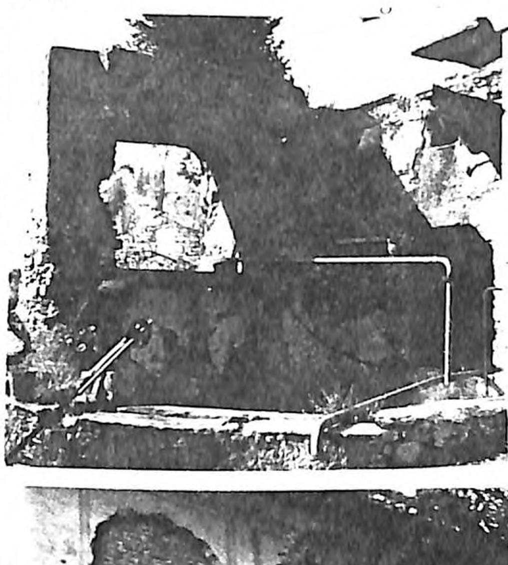

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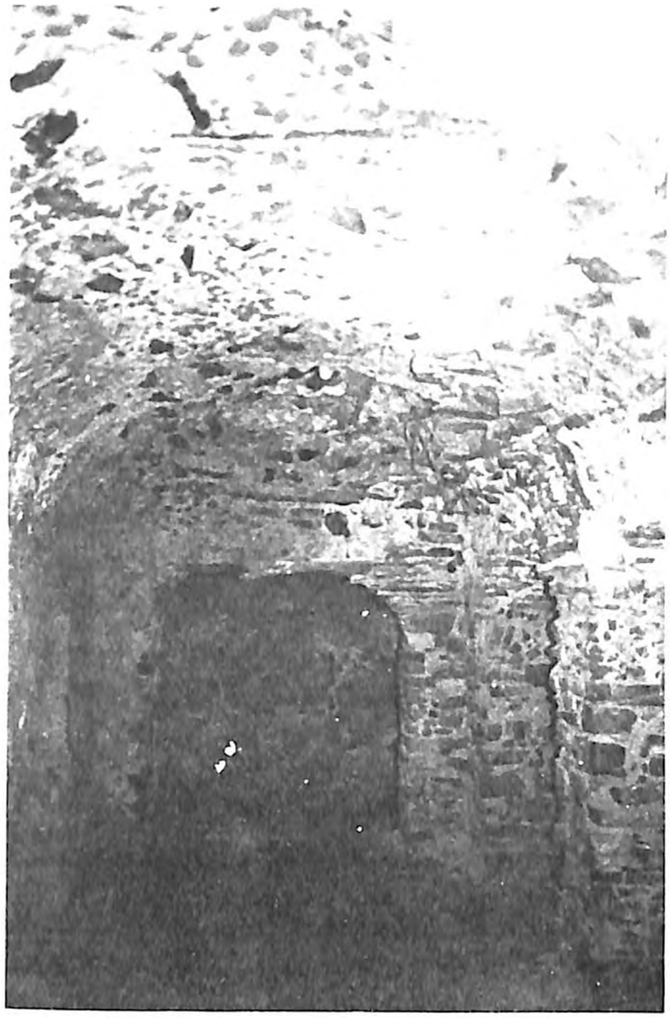

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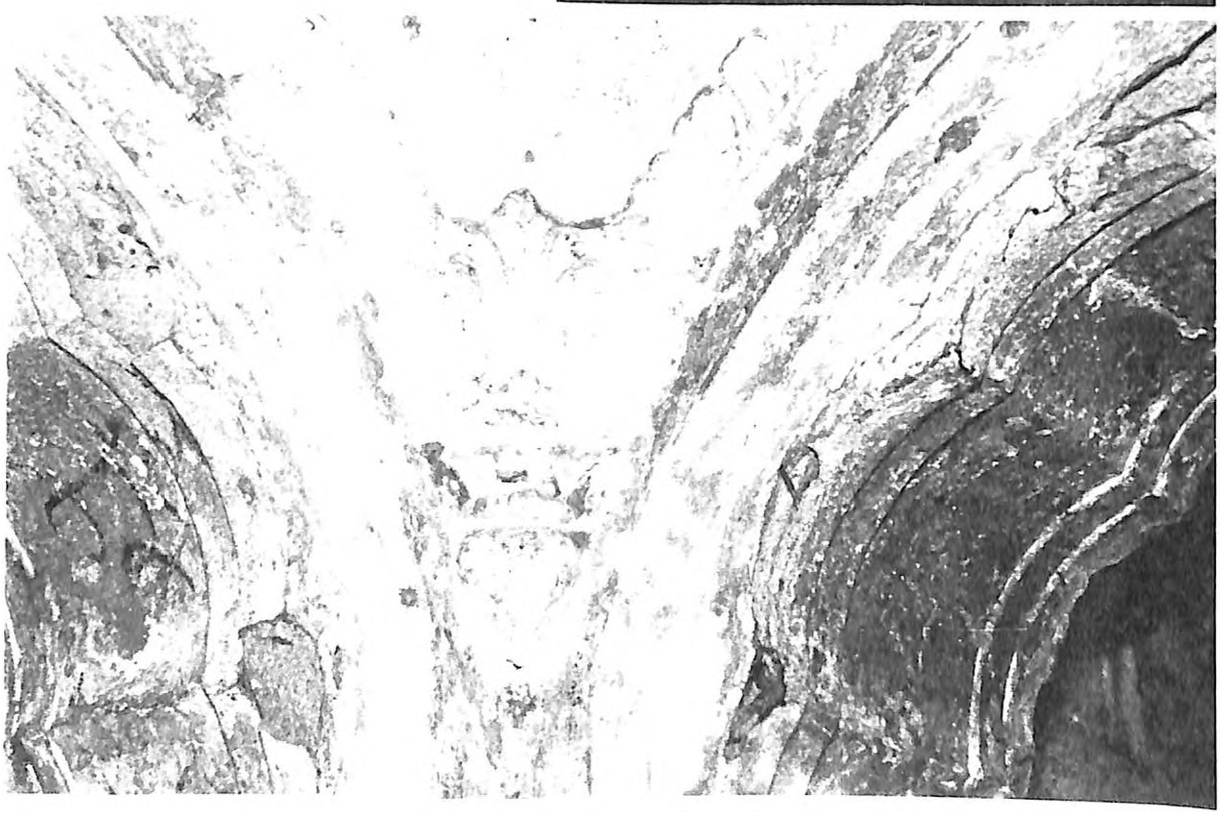

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4.2 EXTERNAL CAUSES

There are a number of external factors which are responsible for the decay of historical buildings. In the following information, only important factors have been considered. The analysis is based on the opinion of Fielden (1994) and the site assessment of the decay caused in the buildings understudy by the herementioned factors.

4.2.1 Gravity

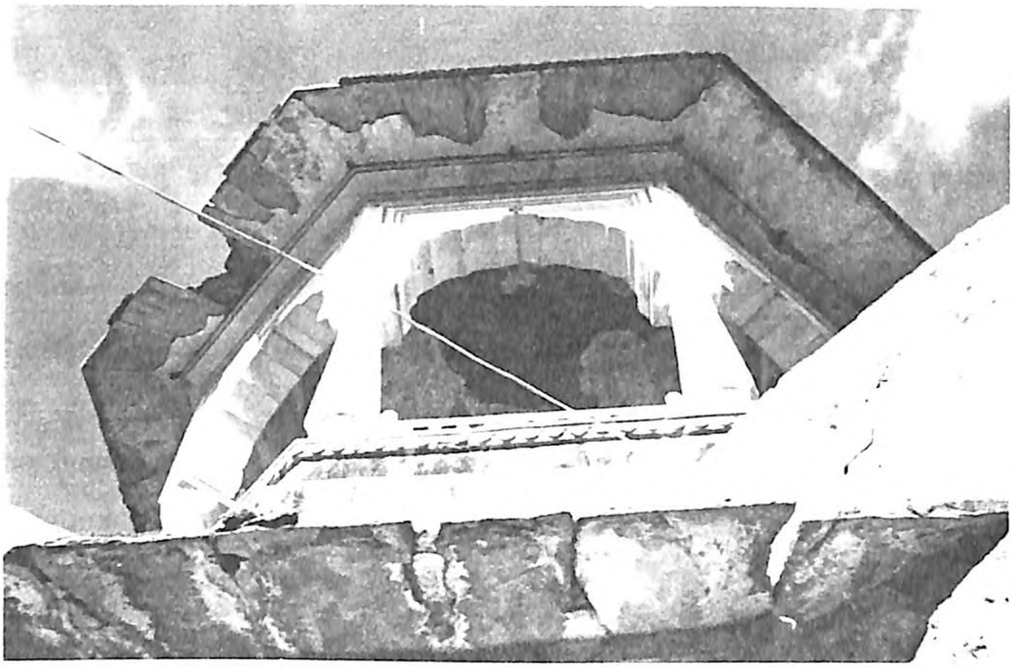
Gravity is the universal cause of decay because when the building structure becomes weak due to various other factors. The weight of the building or its components will not be able to stay in its position and the structure will collapse as observed in case of Veranda portions of various pavilions in Kanak Bagh

4.2.2 Climatic Causes

There are (Plate LIX 116,117) a number of climatic factors which are injurious to the health of the historic buildings. The main climatic factors are Temperature, Rain, Ground Water, Dust and Wind.

4.2.3 Temperature

Due to the radiant heat of sun, the surface temperature shows variation during different seasons as well as the diurnal changes. The building materials which are absorbent and have non-reflecting surfaces absorb heat upto uncomfortable limits. This causes different types of stresses on the building structure. The mass of masonry expands and contracts resulting in cracks development in masonary. These cracks are in reality expansion joints and therefore should not be filled with hard materials.



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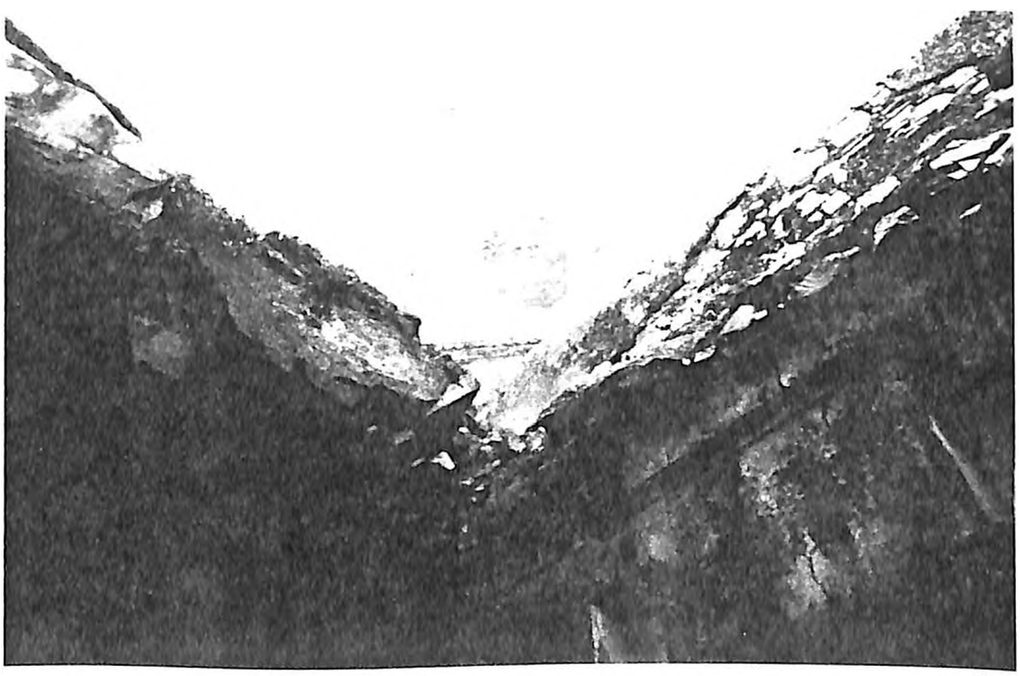

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2.4.4 Rain (Plate LX, 118,119)

The water during rainy season becomes an important cause of decay if the drainage system of the building is not in proper or blocked. The accumulated water on the terrace causes pressure on the surface due to its weight and enters through different types of cracks. After the rain the penetrated water evaporates with the temperature and increases pressure in the crevices. Sometimes this pressure itself becomes the cause of collapse.

The other influence of the penetrated water is on the mortar. In due course of time persistent moisture inside the masonry decays the mortar and in some case, stones of soft mortars also decay and make the structure weak.

The third and important cause of decay is due to the rain water or water from any other source. The foundation becomes weak due to the penetration of water in the ground near the foundation. The stagnation of water makes the soil soft and the soil particles shows movement due to the weight of the building and the foundation undergoes uneven settlement. Due to this type of settlements buildings develop cracks and water becomes an important cause of decay.

The rain water has created different types of problems in the temples of **Kanak Vrindavan Ghati** and **Jal Mahal** building of Mansagar Lake. (Plate LXI,121)

The central portion of the ground floor of Govind Deoji temple is filled with sand. Due to the seepage of water during the rainy season and rising of water level in the Mansagar lake, influences the structure in two different ways. The absorbed water in the centre creates pressure on all the sides and also this moistures keeps the mortar moist. Resulting in the decay of mortar and other building materials. The other factor responsible for the decay is the polluted water of Mansagar lake which effects the foundation masonary. In this temple and Kanak Bagh it has been noticed that the water rises by capillary action and damages the masonary plaster and the flooring of these buildings.

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Jal Mahal in Mansagar lake suffers with the different type of problems. Jal Mahal was designed in the surroundings of natural water, flowing into the tank in the form of water streams from Aravali hills or rain water in its catchment area. Now, the natural streams have dried up and due to the silting of the ground level has increased on which vegetable farming is being done. The lake gets lot of pollutants in the form of dissolved salts which damages the buildings due to their chemical interference with the building materials. (Plate LXI, 121)

The composition of salts and their action by evaporation are as follows:

1. The salts that are potentially the most dangerous to the rendering and to the painted surface of a wall are the sulphates of sodium, potassium, magnesium and calcium. Wherever they crystallize they cause serious disintegration owing to the failure of cohesion of the materials. Calcium sulphate can form a white veil over the surface or it can be crystallized within the rendering by the sulphation of calcium carbonate to which a polluted atmosphere contributes.

2. The nitrates of sodium, potassium and calcium are soluble salts which normally give rise to thick efforescences easy to eliminate and of which the disintegrating action is inferior to that of the sulphates.

3. Calcium carbonate is a main component in construction in the form of limestone. Calcium carbonate does not have by itself a disintegrating effect but once it has crystallized, it forms incrustations that are very hard and intractable.

4. Sodium chloride is normally a surface deposit, having been transported by sea air, and in itself does not cause disintegration. However, it is by a process of hydration and dehydration promotes the disintegration of surfaces by its action on other salts, which may be present under the effect of varying temperatures.

122

123

5. Silica contained in certain rocks, clays and in cements, is usually in a form, that can be transported very slowly towards the surface by infiltrating water. A long-term effect is the formation of white incrustations of silicon dioxide (opal) or of silicate mixed with other substances, notably calcium carbonate. (Plate LXII, 123)

4.2.5 Dust and Wind

Rajasthan is known for its dust storms. Now a days the frequency of storms is reduced but still during summer there is regular movement of dust particles in the air. The dust gets accumulated in the cracks and different surfaces Later the seeds (mostly of Ficus species) in the droppings of the birds germinate during the rainy season. This vegetable growth helps in the further deterioration of the historical buildings.

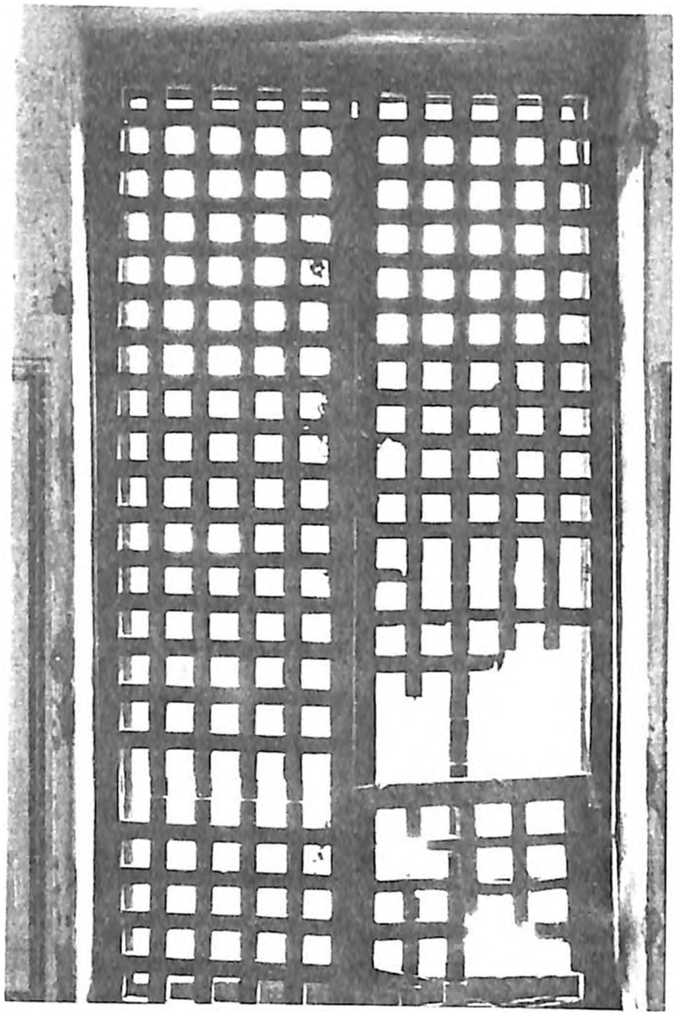
4.3 Biological Causes (Plate LXIV, 126)

Both animals and plants help in the decaying process or damage the building fabric.

Animals like Cows and Buffaloes cause abrasion to the building fabric by their movement and striking against the walls etc.

Population of Monkeys near the religious places damages the weak architectural components by their jumping from one area to another. In Galtaji even the restoration work became difficult because the Monkeys jumped or slided over the repaired structures and on the finished surface area.

Among the birds, Pigeons and Bats are more harmful for the historical buildings. Pigeons like to nest in buildings while Bats hang in crevices. Their faces contains acids which are damaging to glass and metallic parts. Faeces also creates foul smell and blocks the rain water, gutters and down pipes.



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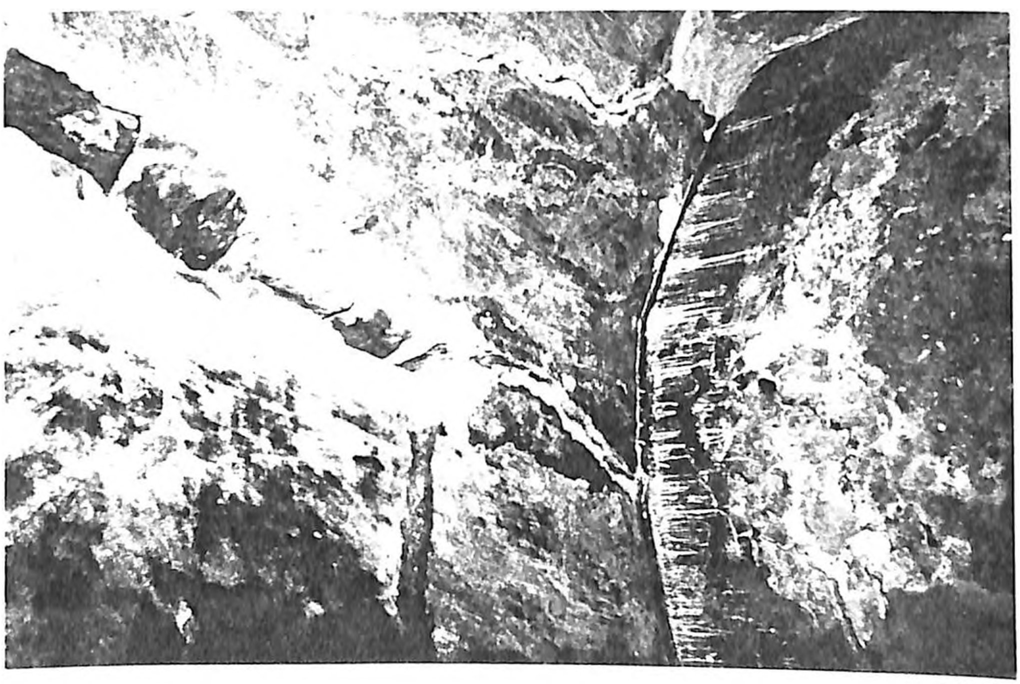

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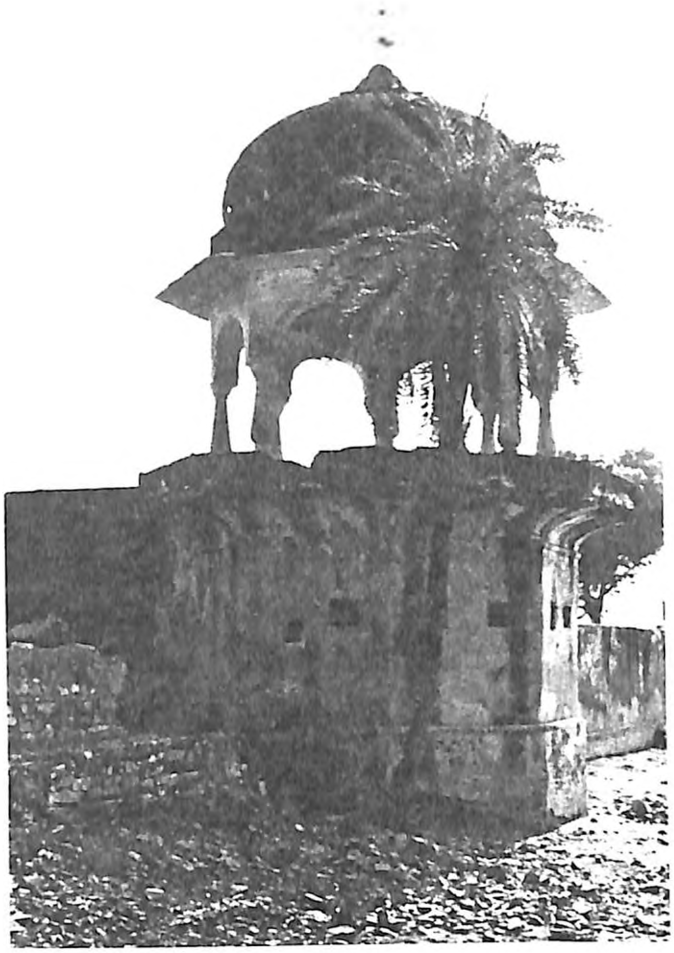

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Insects like termites are deadly harmful to the timber in historical buildings. The following table gives the summary of diagnostic characters of damages caused by the common wood boring insects. The information is based on Fielden (1994).

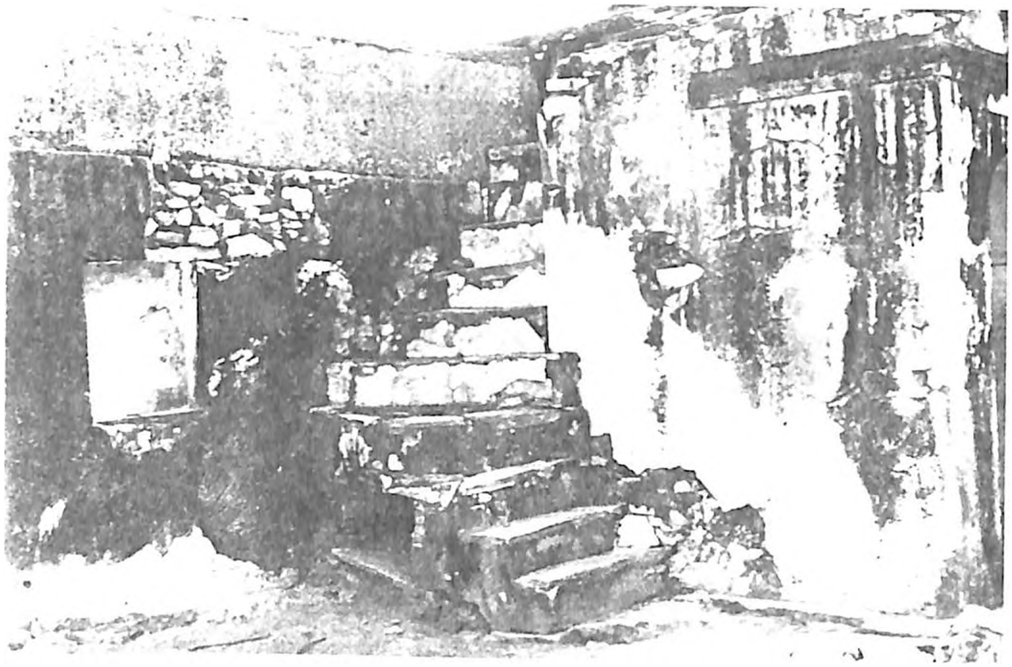
Just like animals, the following plant groups are also injurious to historical buildings. (Plate LXV 128,129)

a) Angiosperms
b) Fungi
c) Algae and
d) Mosses.

The species of Ficus like *Ficus religosa* (Pipal), *Ficus bengalensis* (Bar), *Capparis decidua* (Teent), *Saccharum benghalensis* (Munja) large number of grasses and other herbaceous plants grow in the crevices formed due to cracks. The seeds of the above mentioned species come through the droppings of birds into these crevices, where dust gets deposited in the decayed mortar which also acts as soil for the germination of the seeds. The roots of these plants penetrate into different parts of the historic buildings and cause serious damages.

Different species of fungi particularly moulds attack wood under moist conditions. The mould hyphae release different types of chemicals which disintegrate the food fibers and thereby the wooden components like doors, door frames, lintels, rafters etc. become weak and infested.

Lichens, Mosses and Algae species are other group of plants which grow on the outer surfaces of the buildings by the germination of air borne spores. During rainy season green carpet growth on old buildings is a common sight. They cause great damage to the water surfaces. Disintegration of the plaster mortar also creates conditions for the growth of large plants.



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4.4 NATURAL DISASTERS (Plate LXVI 130,131)

A number of natural factors like earthquakes and floods cause great damage to the old buildings. This area (Rajasthan) is not in the earthquake belt and therefore buildings in this region are not affected. Floods are the other natural factors which cause different types of damages. Normally, Jaipur and nearby areas get limited rains spread over longer period and therefore do not cause much damage but the 1985 heavy rains in a short span of time damaged a number of dams in Aravali and Ambikachal hills flooded number of areas. The Galta Ghati had severe destruction as per the details given in Chapter 3.

4.5 MAN-MADE CAUSES OF DECAY (Plate LXVII 132,133)

Historical buildings are the creation of human species through the ages. We are proud of our heritage and wish to restore the same for the coming generations but at the same time advancement in human society has created more problems for the historical buildings/monuments.

(a) Industry

Industrial development has helped man enormously but the pollutants from the industry are one of the serious causes for the decay/deterioration of the historical buildings. The controversial issue of Agra Industries and Taj Mahal is a known example.

(b) Growth of Population (Plate LXVII 133)

The increase in population leads to the increase demand on land. This leads to the encroachment on vacant land or unauthorized occupations of old buildings. Delhi alone has more than a thousand historical buildings, majority of them are unauthorisedly occupied or in other cases, nearby land of the historical buildings is suffering from encroachment. Man causes more damage to the building by disposing garbage and waste.

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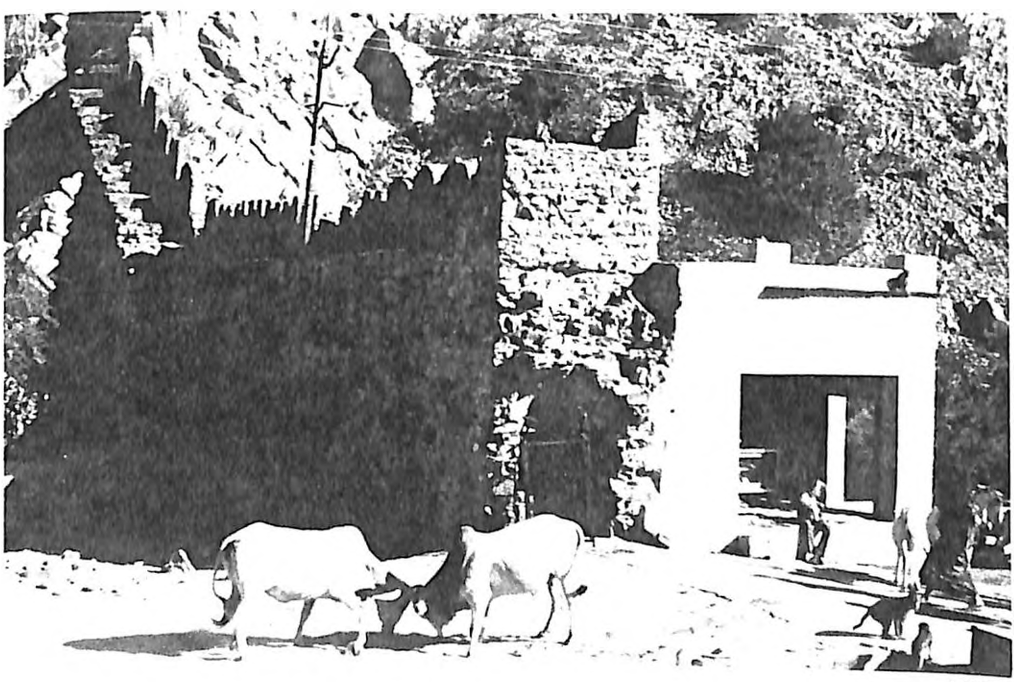

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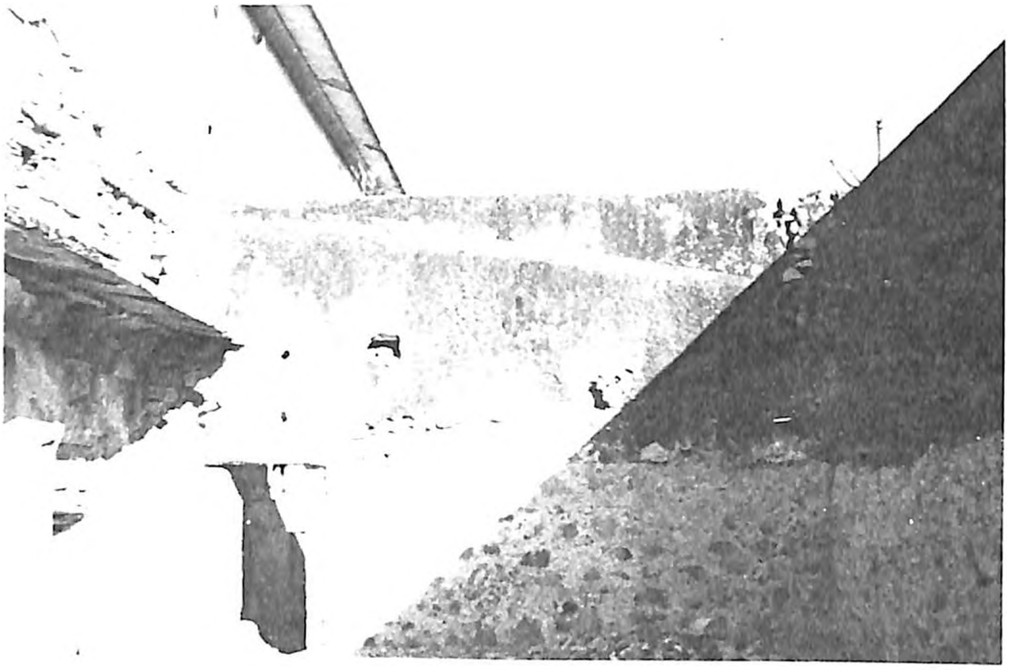

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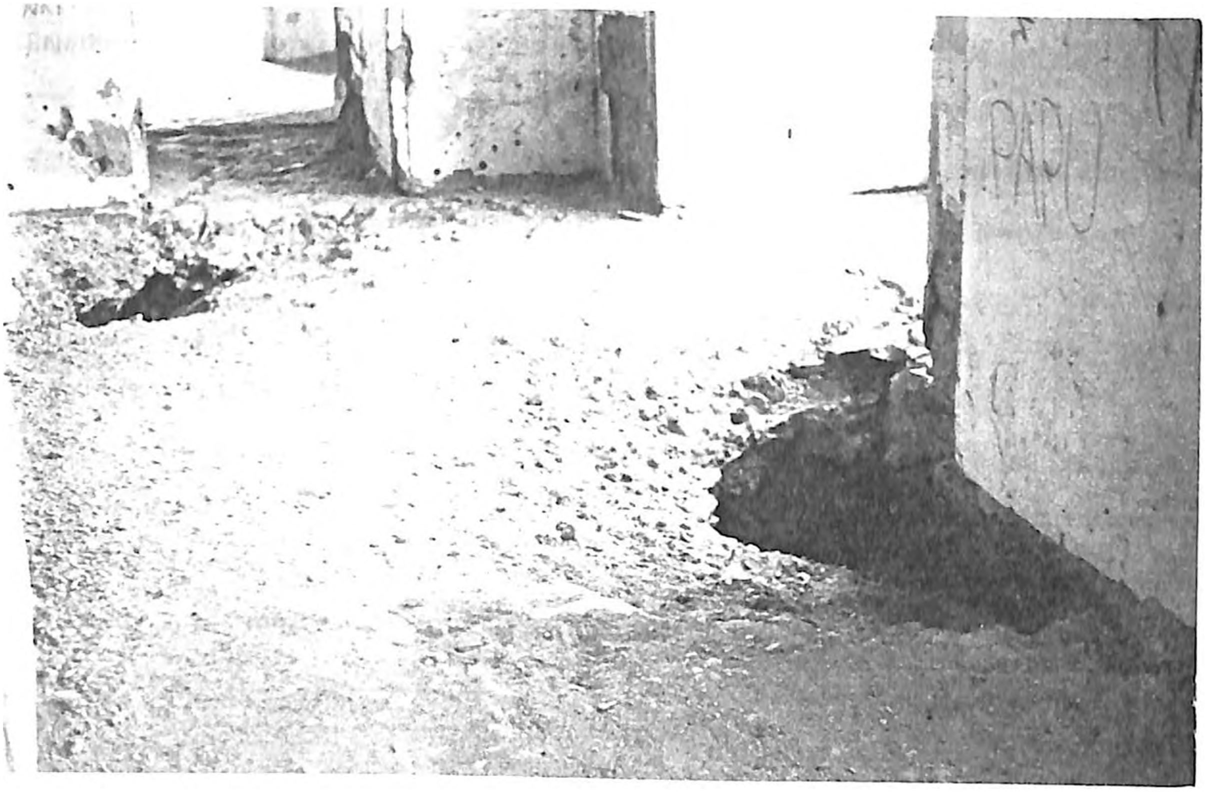

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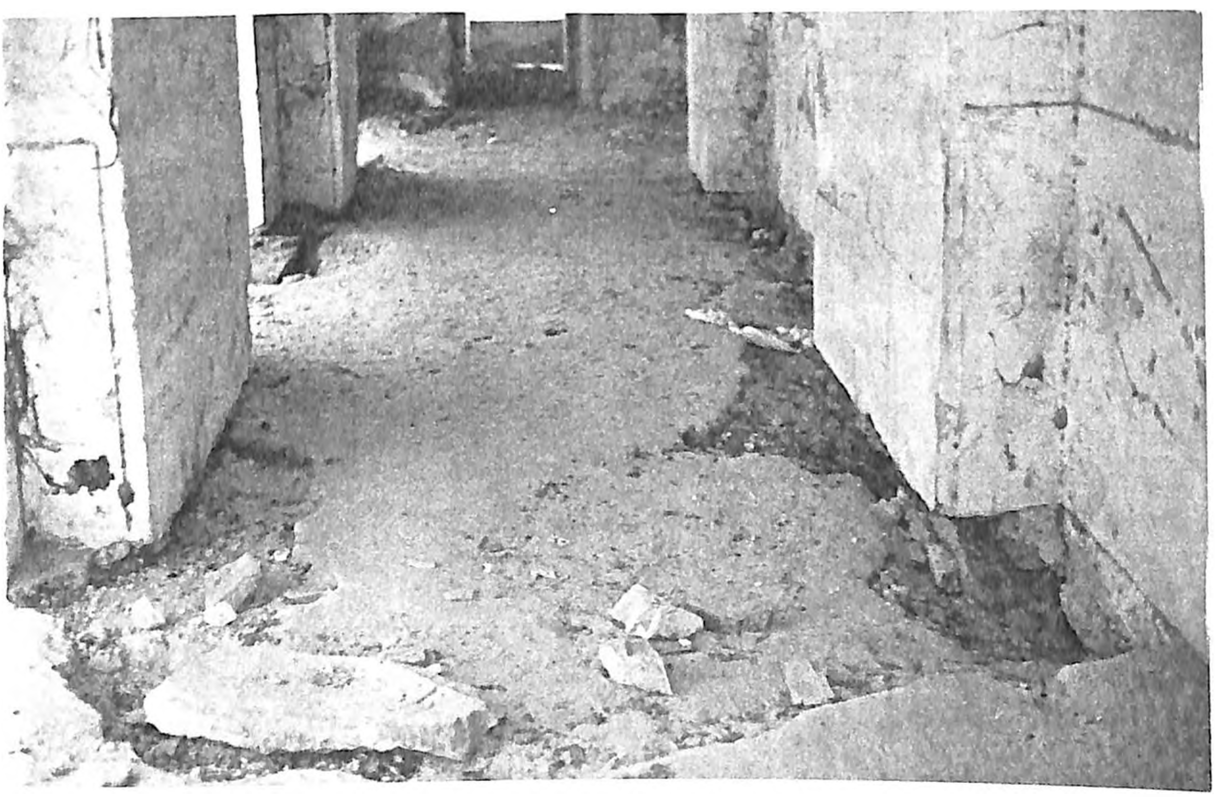

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Kanak Vrindavan Ghati has similarly suffered due to the population growth. The unauthorised constructions on the periphery of Mansagar lake has increased the pollution in the area due to number of factories, sewerage disposal, installation of Carcus plant in the nearby slaughter house, stone cutting and polishing factories, textile and carpet industries etc. Pollution in the lake due to the above, has damaged the water quality. The natural aquatic flora and fauna is tremendously disturbed.

Similar to the water body, buildings also suffered due to the encroachment. The building of Govind Deoji Temple were occupied by a number of families. The walls and floor area was badly damaged due to the cooking and other activities of the inhabitants. The drainage system was choked causing different types of problems. The open area near the buildings was used for defecating by the inhabitants. The domesticated animals causes pollution and deterioration.

CHAPTER 5

ANALYSIS OF ARCHITECTURAL COMPONENTS

Lee H Nelson et.al. (1962) has very rightly explained the relationship of materials and the condition of the structure of historical buildings as: "The function of masonry units such as stone or brick is related to the thickness of a wall, the mortar, the bond and the quality of workmanship. The relationship of all these materials determines the historical building's structural soundness as well as its appearance while the masonry is among the most durable of historical building materials, it is also most susceptible to damage by improper maintenance or repair techniques and harsh or abrasive cleaning methods".

Similar observation have also been recorded in the present study of the historical buildings of Kanak Vrindavan and Galtaji. Based on the detail analysis of the design and the existing condition of the various architectural components and using the appropriate techniques the restoration work was planned and executed.

The causes of decay of the architecture components and the methods adopted for the restoration are the same for all the buildings and therefore, these have been described in comparative manner.

The total components of a building have been divided into two groups consisting of various elements as listed below :

5.1 STRUCTURAL COMPONENTS

5.1.1 Foundation

5.1.2 Walls or supper structure

5.1.3 Roofs and Ceilings

5.1.4 Floors

5.2 ARCHITECTURAL FEATURES

5.2.1 Chatri

5.2.2 Kabani

5.2.3 Arches

5.2.4 Columns and Pillars

5.2.5 Chajja

5.2.6 Jharokha

5.2.7 Brackets (toras)

5.2.8 Parapet and Parkota wall

5.2.9 Railing

5.2.10 Doors

5.2.11 Izzaras

5.1 STRUCTURAL COMPONENTS

Foundation

The foundation and super structure is composed of masonry and plastered surfaces. While the roof has two basic components - ceiling and terrace. The floor makes the designed horizontal surface.

Foundation in all the buildings studied were deep. In Govindeoji Temple, it was 15 feet deep, constructed in a stepwise manner. The lowest step was eight feet wide and three feet in height raised in stepped manner. At the plinth level it was 3 feet 6 inches wide. The foundation was laid in rubble stone masonry in lime mortar. From the exposed part of the foundation it was found that the construction was done in layers, with each layer of 2 feet height (the practice is still followed in Jaipur region). The plinth was about 3 feet above the ground in Govind Deoji and Galta Temples. The plinth of Natwarji Temple was about 7 feet in height. The plinth was covered with *'Dasa'* made-up of 3 feet 6 inches wide, 6-8 feet in length and 4 inches thick in local stone in Natwarji Temple and in other buildings. 'Dasa' was used as D.P.C. (Damp Proof Course) and for the equal distribution of load of the superstructure.

'Dasa' of Natwarji Temple on the upper floor is made of marble stone which has sculptured motifs of petal designs and was found in good condition. The 'Dasa' of other buildings was madeup of plane stone slab. *'Dasa'* at the lower level below the columns and walls were in a few *'Chatris'* and was damaged.

The foundation of Govind Deoji Temple was exposed upto seven feet below the plinth on the south east side due to the soil erosion in a number of places. At few sides the rooms on the plinth were not approachable. The foundation in the north-east corner of Natwarji Temple had settled leading to the collapse of roof and vertical splitting of the wall. Foundation of other buildings was in reasonably good condition.

5.1.2 Super Structure or Walls

The super structure was also constructed in rubble stone masonry in lime mortar. Thickness of the walls of ground floor was three feet while the walls of the first floor were two feet wide. The overall condition of the super structure of the first floor buildings was good but the ground floor structure was damaged in various places north- east wall of Natwarji Temple split vertically and one arch of Govind Deoji Temple had developed vertical crack from the apex till the arch. The plaster of both the sides was found damaged in the ground floor in a number of places. The exposed structures had weak joints, mortar had decayed and was powdery in consistency. At few places the masonry was damaged may be due to the weathering or aging, burrows, or could be due to vandalism. The seepage from the lake side did maximum damage to Govind Deoji Temple and Kanak Bagh.

The exterior walls of Govind Deoji Temple have number of facial arches six inches deep but the openings are rectangular spanned by lintel. For these reasons the rear rooms had no ventilation. The walls of *'junk'* portion of Govind Deoji and Natwarji Temple were intact.

The outside plaster was damaged only at few places but the inside plaster of both these temples was badly damaged. Some portion of cornice ('Gardana') region was intact. Tracery and *'junk'* in an area of 10sq inches was visible in a few places. The damaged inside portion was more due to the leaking of roof and closed environment.

5.1.3 Ceilings

The ground floor of Govind Deoji Temple has 60 rooms and 12 *'Tibaras'* as shown in the plan. While the 'Garbh- griha' of both the temples are square in shape and 15 x 15 feet in size. Roof of all the rooms is corbbled type, laid in circular pattern, locally known as *'junk'*. The construction of this type of roof is based on the technique used in four sided *'Chatri'* or the development of the dome shaped roof. The central portion of the roof, in the corner rooms is covered by four by four feet stone while the central portion of *'junk'* is covered by a number of 10 feet long stone slabs, laid over corbbled corners. This type of construction develops a beautiful pattern in the central portion of the roof.

The Corner portion of the roof with the wall is covered by cornice (*'Gardana'*) in all the rooms but in *'junk'* roof lots of ornamental work was found. The ceiling is also made in Lime-*'Surkhi'* mortar with additives.

Terraces

The terrace of the temples is made up of Dar a particular traditional technique. On its periphery the terrace has a parapet of three feet height with a floral relief work on the wall sometimes a low wall with stone balustrade and tracery work, or the 'Parkota' lime screen wall with pears. The terrace had spouts for drainage. The dar portion was badly damaged. The stone railings were missing and the 'Parkota' wall was also broken at a number of places.

5.1.4 Floors

Flooring of the ground floor rooms and terrace was made-up of dar while the floor of the 'Garbh-griha' and architectural components like, *'junk'*, *'junk'* and *'Tibaras'* were made up of 'Aaraish' Finish. The *'Dar'* in the floor of the rooms was completely damaged and the Aaraish floor was also in weathered condition. The flooring was completely redone as described under restoration.

5.2 ARCHITECTURAL FEATURES

5.2.1 Chatri

In Indian context *'Chatri'* means a parasol that crowns the head and usually it takes the form of an open pavillion with a ribbed dome on the top. *'Chatris'* are one of the most interesting architectural features. They define the building properly by highlighting the corners.

In the plan the chatris are square, hexagonal or octagonal at the base. In Govind Deoji Temple *'Chatris'* directly rest on an octagonal drum like structure called a 'Burj'. The 'Burj' projects out of the main building line and contains a small room at the lower level.

The octagonal *'Chatris'* at Govind Deoji's temple are builtup on the first floor and have the following structure (Plate LXIX, 136). Each face of the octagon measures 5 feet in the plan with 6 feet high pillars, one at each corner. The columns are enclosed by a one feet six inches high railing in pink/red colour Karaoli stone. This open pavillion is crowned by a ribbed domical roof with a finial. The pinnacle or finial is an emblem at the summit of a dome in the form a *'Kalash'*. The shaft or rod of pinnacle pierces through the inverted lotus base at the apex of the 'Chatri' into the ceiling where it supports the hanging pendant. The cupola or dome rests on a 1 foot high octagonal frieze which has foliate decorative designs on relief work. Another such tie band sandwiches the sloping *'Chajja'* and in turn distributes the oncoming load of the dome on to the arches joining the stone pillars below. The multilobed arches have the apex of arch crowned by a lotus flower. The cusped arches are framed by borders.

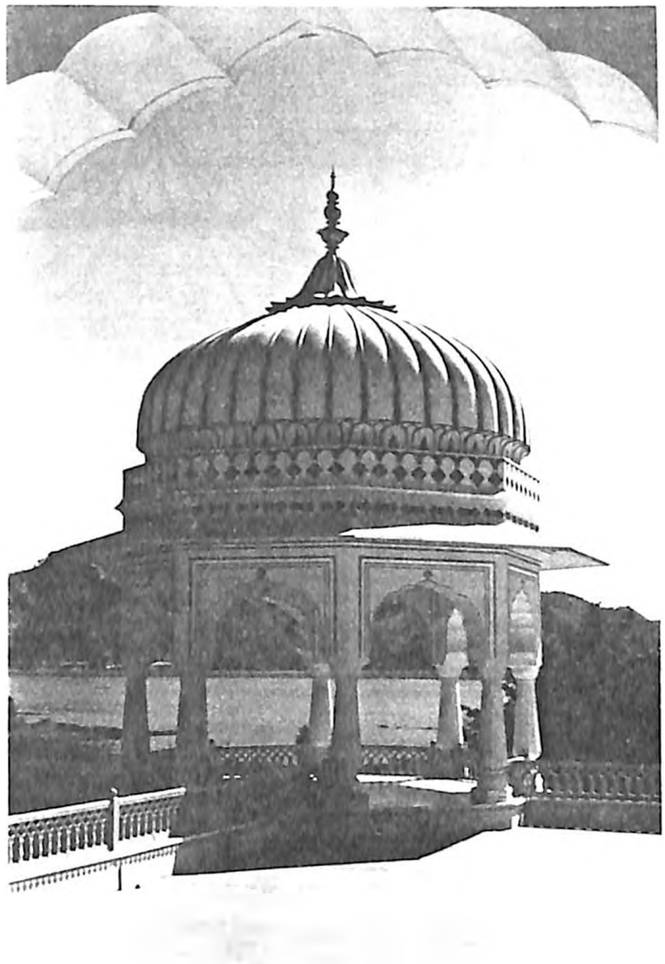
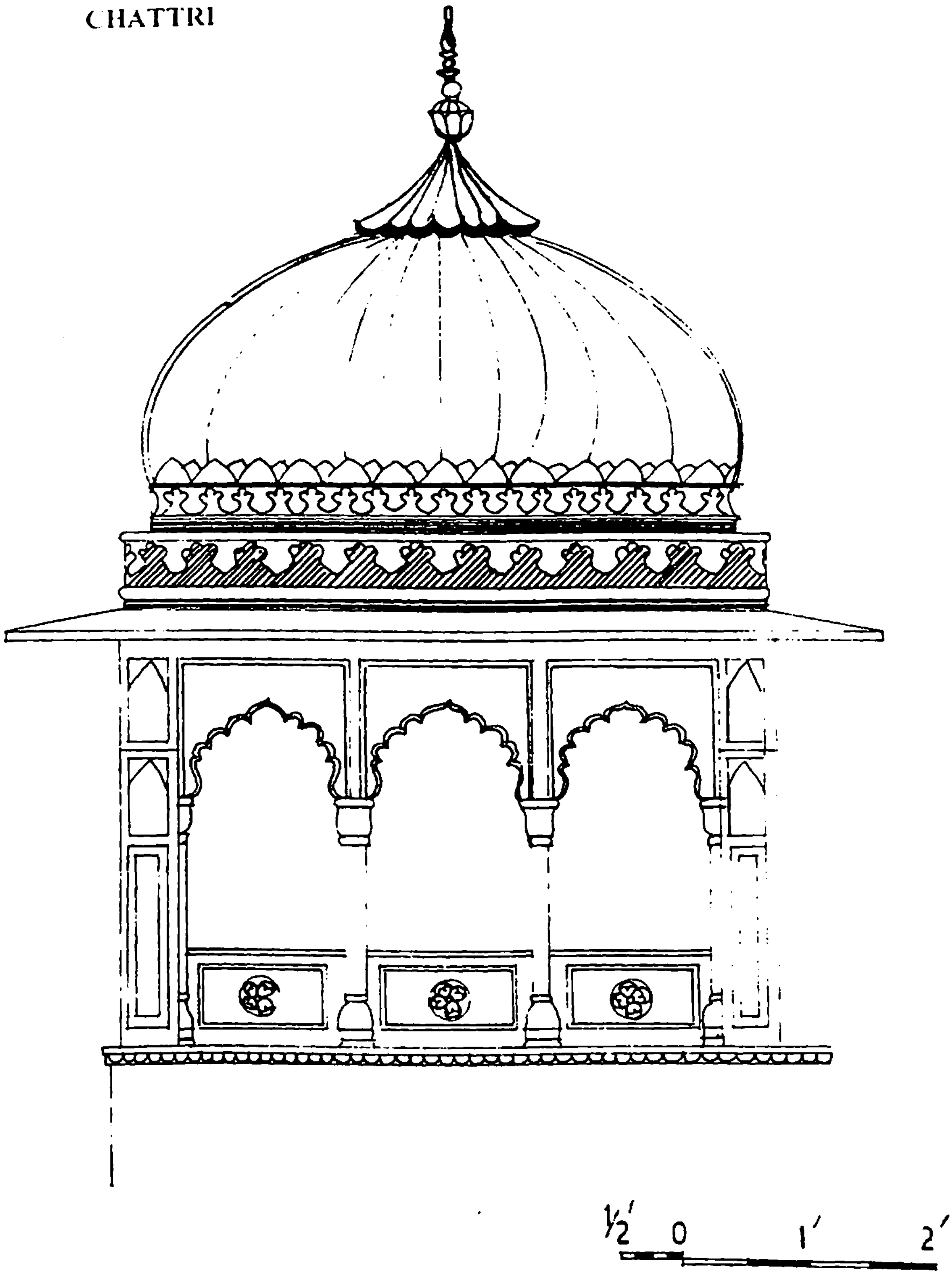


Figure 1

CHATTRI



GALTA GHATI, JAIPUR

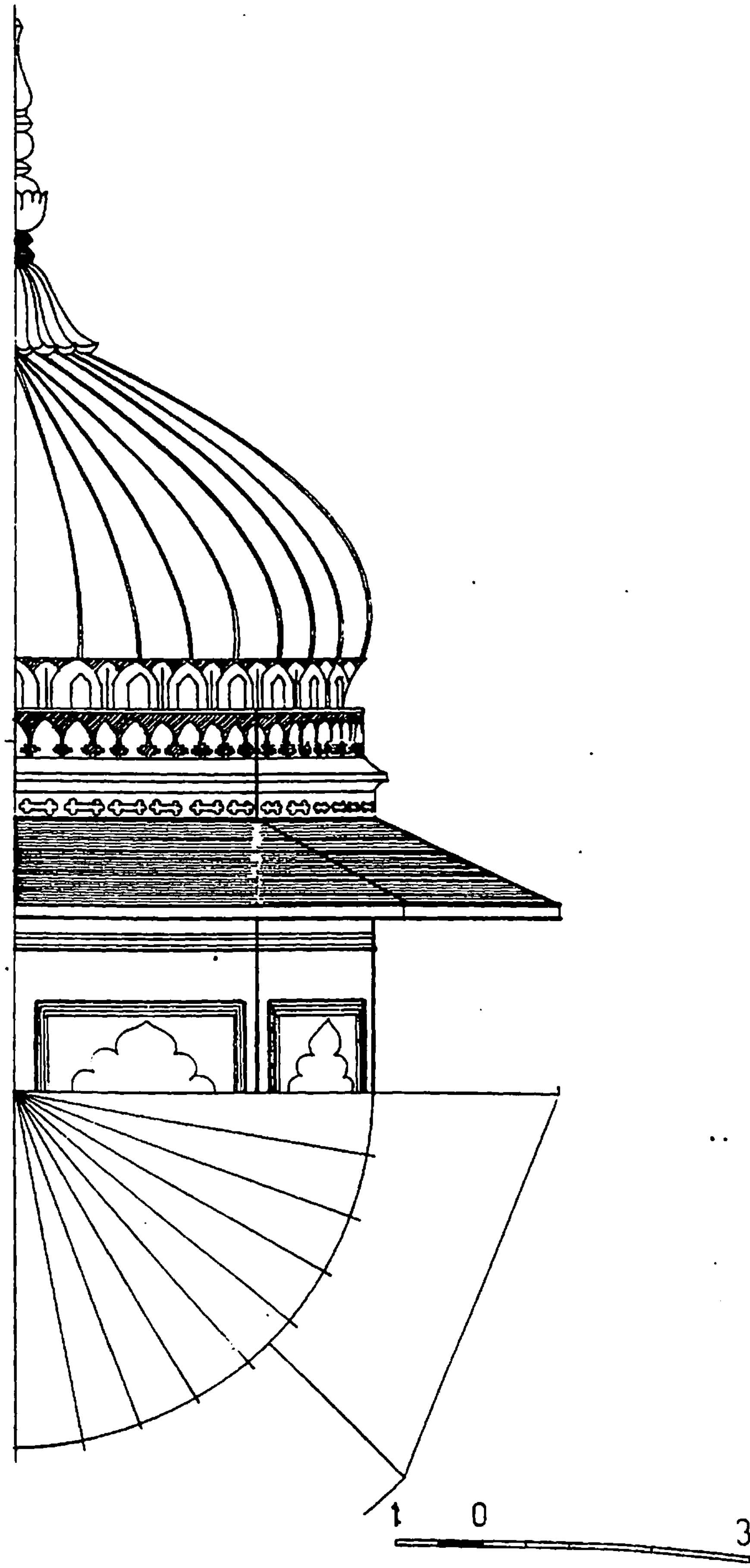
a. Construction

The columns are 6 feet high upto the abacus. The base is one feet three inches high in the shape of an inverted lotus resting on a square base. The base sometimes has carved inverted leaf motifs. The shaft is tapering into 12 sided floral shaped in section. The curved flutes are well rounded. The capital rests on the shaft with a circular ribbed motif and measures approximately 8 inches in height. On the abacus rests the springing arches above and measures 1 inch approximately. Surprisingly, all these three individual parts of a column, i.e. capital, shaft and base are firmly joined, not by any mortar but by means of tongue and groove joints wherein one member protrudes or tongues into the other member tightly.

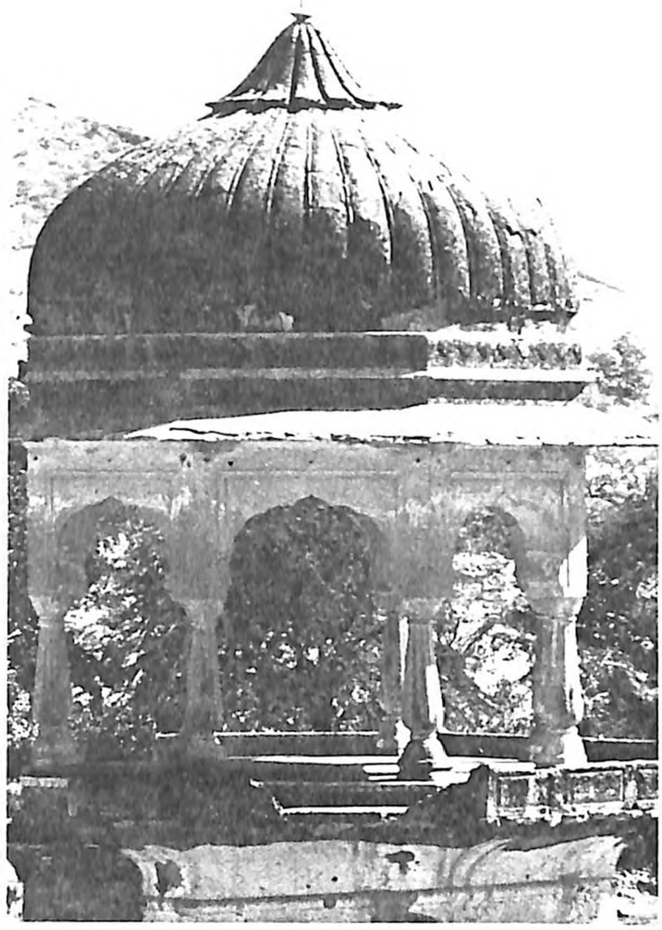
The one feet six inches deep overhanging eave was constructed by laying equally sized stone slabs at an angle with one third of the stone grooved in rich lime mortars. The second means of support were the tapering iron clamps embedded in two consecutive stone slabs in order to hold the joint tight.

By projecting horizontal block or stone course that supported the vertical structure or covered the opening of the entire dome like hemispherical part of '*Chatri*' was created by corbelled stone courses laid in lime mortar.

The flooring is in smooth white '*Aaraish*' with red/pink Karaoli stone raising all around. Sometimes the railing is laid in carved lime '*Jalees*' also. The '*Chatris*' are seen richly adorned with ornamentations in stone relief work over the capitals bases and shafts of the columns. The arches were rendered in smooth '*Aaraish*' borders in different colours of brown, green, yellow, etc. The friezes on top of overhanging eaves were painted in brown floral motifs and the ribs of the '*Chatri*' were also painted. The '*Chatris*' at Galtaji and Jal Mahal are completely finished in a smooth lusturous '*Aaraish*'. At Galtaji, the rectangular borders above the arches have finely painted panels depicting scenes from the life of Lord Rama, Krishna and the rulers of Amber at that time. The pinnacles are either in brass or stone.



GALTA GHATI, JAIPUR



b. Existing Condition (Plate LXX, 137)

The decay in most of the *'Chatris'* was due to the aging and human factor. In a few cases at Galtaji, damage was caused due to the 1981 floods.

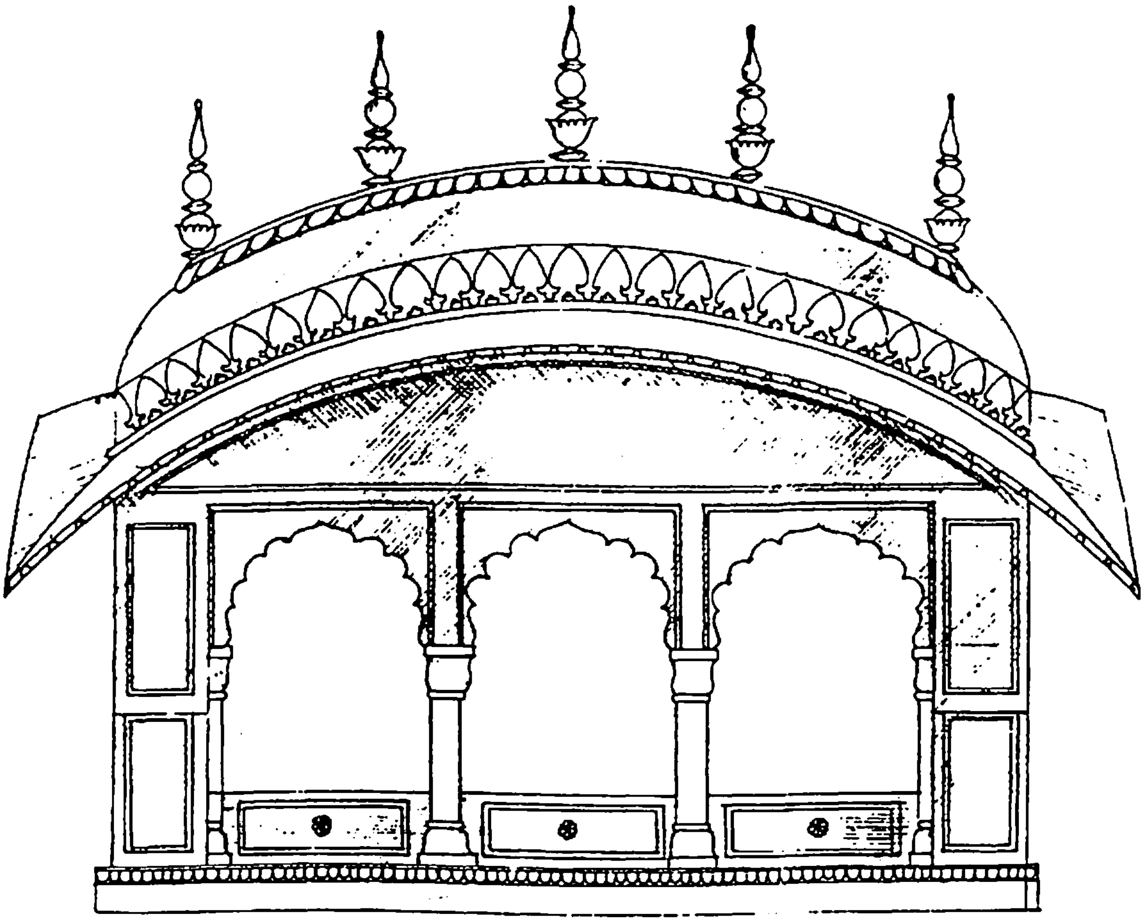
The pinnacle portion of many Chatris was broken and only the rod portion was found embeded. The outer plaster of the dome was mostly covered with the dry algal growth (Plate LXV, 108) the plaster was damaged due to weathering. In a few cases the *'junk'* had also developed. The *'Chajja'* portion was damaged in a number of Chatris particularly at Galtaji due to the jumping movement of monkeys.

In some *'Chatris'* the horizontal cracks had developed and the corner portion was damaged. The marble columns were white washed and these marble columns had started chipping at a number of places.

The railing portion of a number of Chatris were missing and only the square fixing groves were left. Dasa was also broken, in a number of places the *'Aaraish'* had developed cracks in most of the *'Chatris'* and the dar flooring was exposed in a few cases.

5.2.2 Kabani

The term *'Kabani'* has its origin due to its shape of a Bow (*'Kaman'*). It is most widely seen in Rajputana architecture. The uniqueness of the style is that of the functional forms, which reduces to symbolic architecture and outline those forms which would most create it. Even the cusps of the arches are a profile; on most of the arches only the outer faces are cusped and the main structure is a smooth curve. The symmetry of plane massing is the dominant feature and thus special architectural features such as *'Chatris'* and *'Kabanis'* play an integral part of the structural composition.



GALTA GHATI, JAIPUR

a. Architectural Description

The '*Kabani*' is normally located between two '*Chatris*'. It is rectangular in plan - with its width greater than the depth. The size is 30' x 10' and is spanned by a curvilinear roof which rises at the centre and the steep sloping sides arch downwards forming a junction at the overhanging '*Chajja*' in an arched form making the corners pointed. The central rib along the curved roof has five brass tapering pinnacles equally spaced. The entire load of roof is transferred on the side piers and two central columns on the longitudinal side. The shorter sides are spanned by single arch. The filler wall is depicted with a false geometry in '*Khamira*' giving the impression of a '*Jali*' pattern with a railing and small windows of size 1-6 x 1 feet located at the top of the railing (Plate LXXI, 138).

The two central load bearing columns end at the lintel level from where the arch with eleven equal divisions begin. The central arch has the wooden door opening of 3 x 6.5 feet and the sides of the rooms have two similar wooden doors. The flooring is in a smooth white '*Aaraish*'.

b. Existing Condition of 'Kabani'

Over the centuries the plaster got eroded and the exposed plaster gave way to cracks. The stone slabs of '*Chajja*' in a number of '*Kabanis*' were broken at places and the joints had become weak. The brass pinnacles were damaged or missing and only the embedded rod could be seen. The tapering brass knobs of the pinnacles were also missing. The corners of the sloping curvilinear roof 'Chajjas' were broken.

The ornamentation on the '*Kabanis*' and facades got weathered due to harsh environmental conditions. There were cracks in the piers. The impressions of the floral motifs were traced for record and restoration.

PLATE LXXI

138

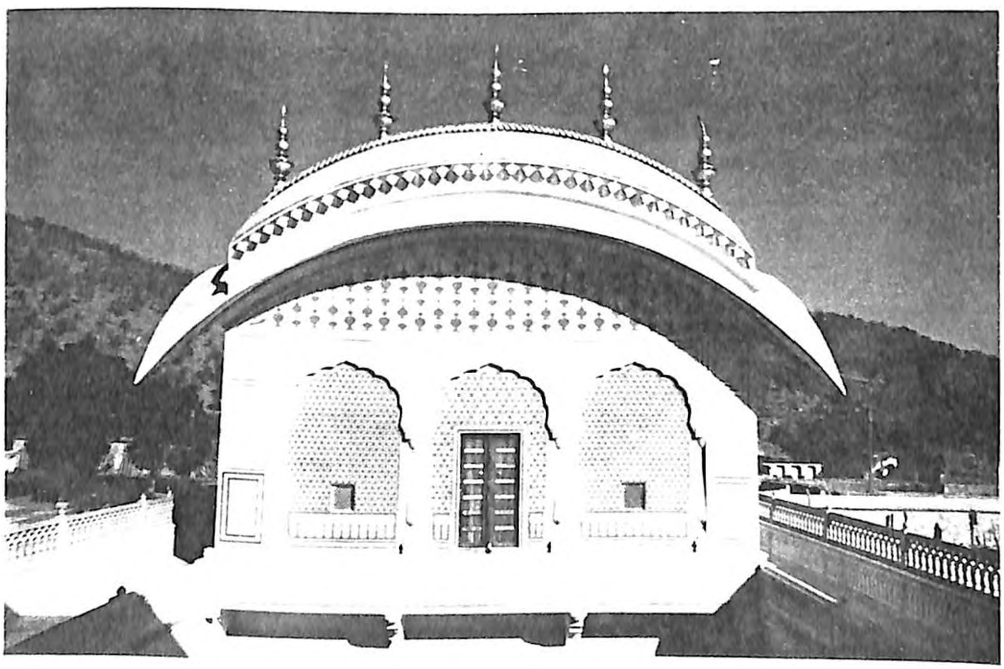


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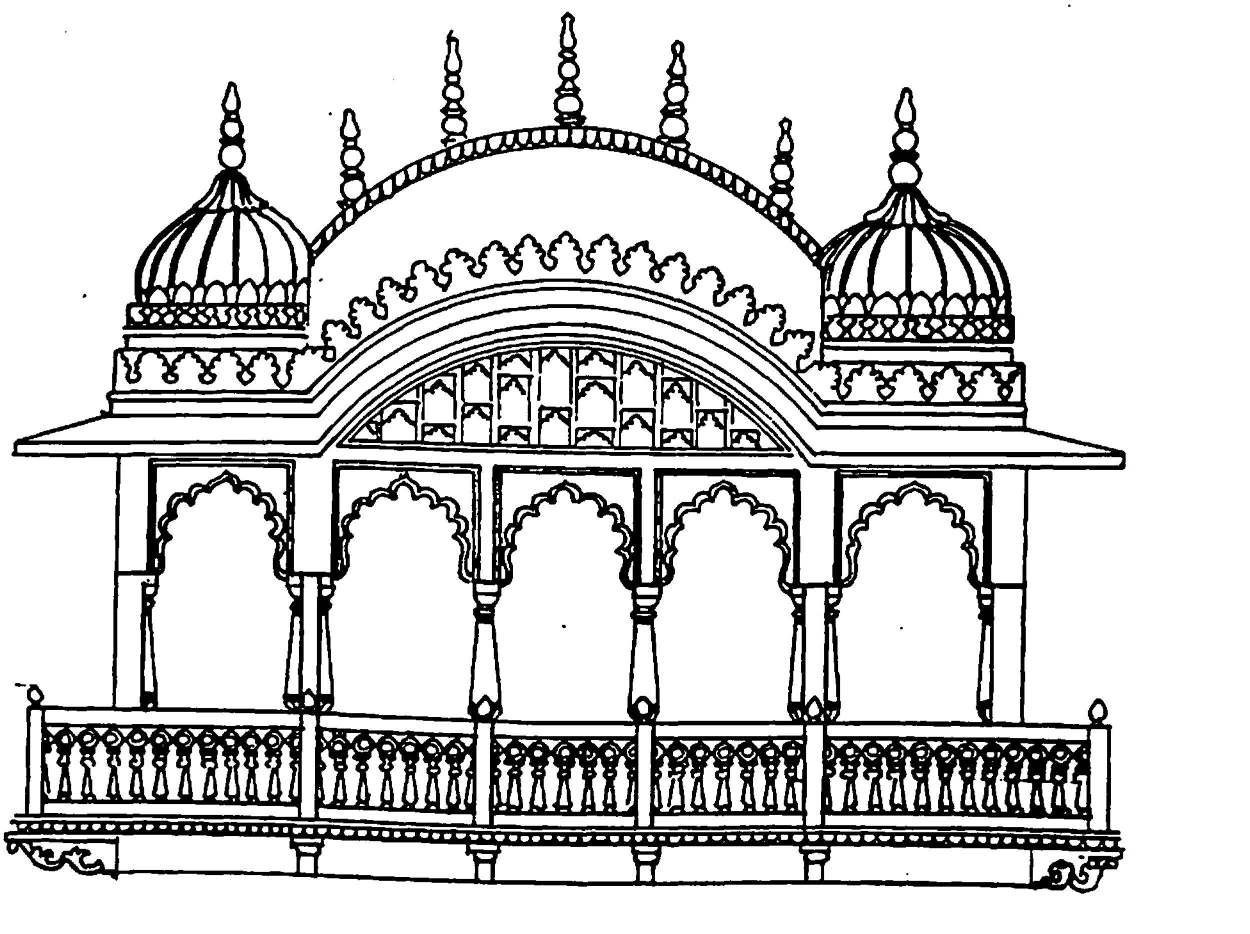
Figure 4

KABANI



GALTA GHATI, JAIPUR

The wooden doors decayed leaving behind traces of broken planks, metal strips bracing and holes due to termite decay.

c. Restored Ornamentation

Normally the exterior ornamentation has Jaipur yellow at the base and burnt sienna for the patterns. The line work defines the structure and the edges as richly adorned. The buttresses are subdivided by false niches and *'Izzard' is a continuous feature upto 3'* height with brown double border. The area below the 'Chajja' and the curve of the arch is usually painted with floral bottle shaped geometry and peacocks at the corners.

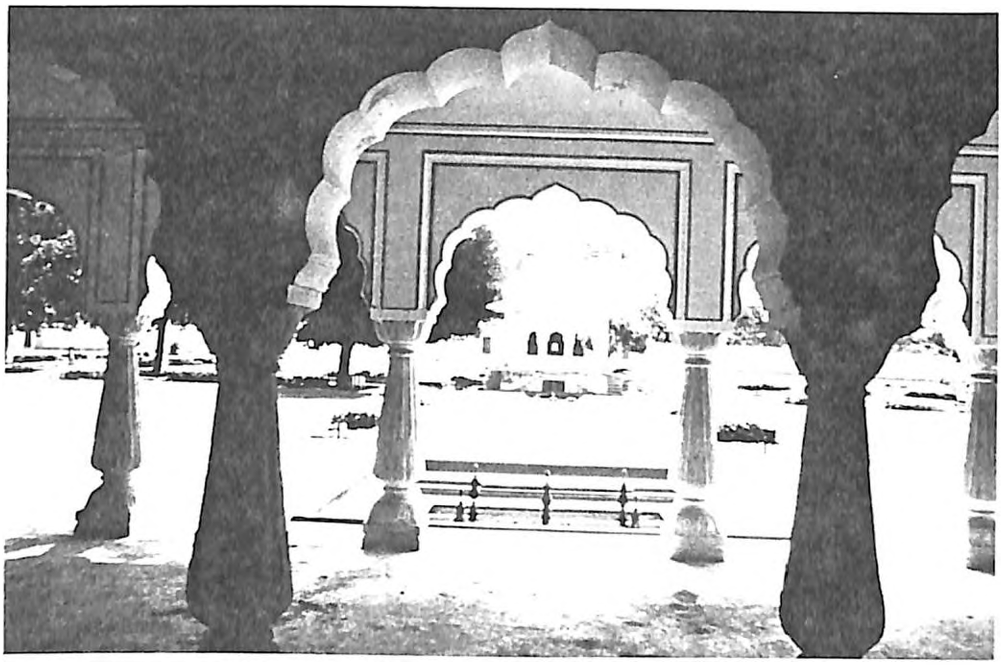
The *'Kabanai'* is kept plain with leaf shaped central rib and repetitive floral pattern on the border.

The restoration of Chatris was similar to which has been described for *'Kabani'* (Plate LXXI, 138).

5.2.3 Arches

Arches are an inevitable part of architecture both as a structural component and as an aesthetic element. The basic arches were blended with distinguished regional styles such as the multilobed arches are extensively used in the door ways, entrance gates, jharokhas, niches, blind windows, inlay panels, etc. The cusped arch is traditionally called *'Bangri'*. The use of arches differ at the various places in the same building.

At Govind Deoji temple the east entrance gate is the basic four-centred arch with *'bangri'* ornamentation. Similarly, the arches in the pavillion, on the terrace, Parikrama and Tibara vary in the number of cusped divisions. In the lower floor interiors the arches are again four- centered rising from solid rectangular piers of size 2-6 x 2 feet. Usually all these arches are framed by rectangular borders either in relief work or in *'Aaraish'*. The Kanak Vrindavan temples have a lotus motif ornamentation at the apex of the arch.



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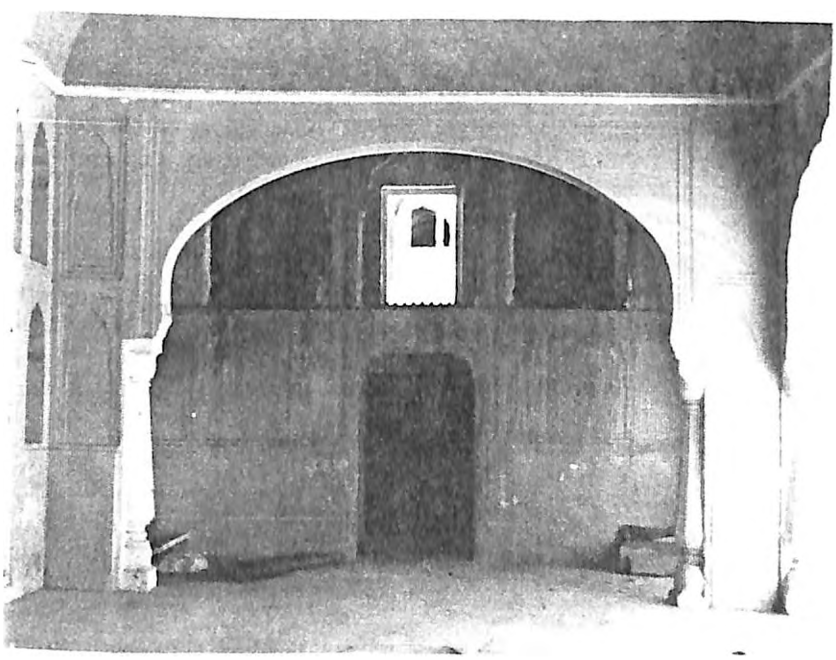

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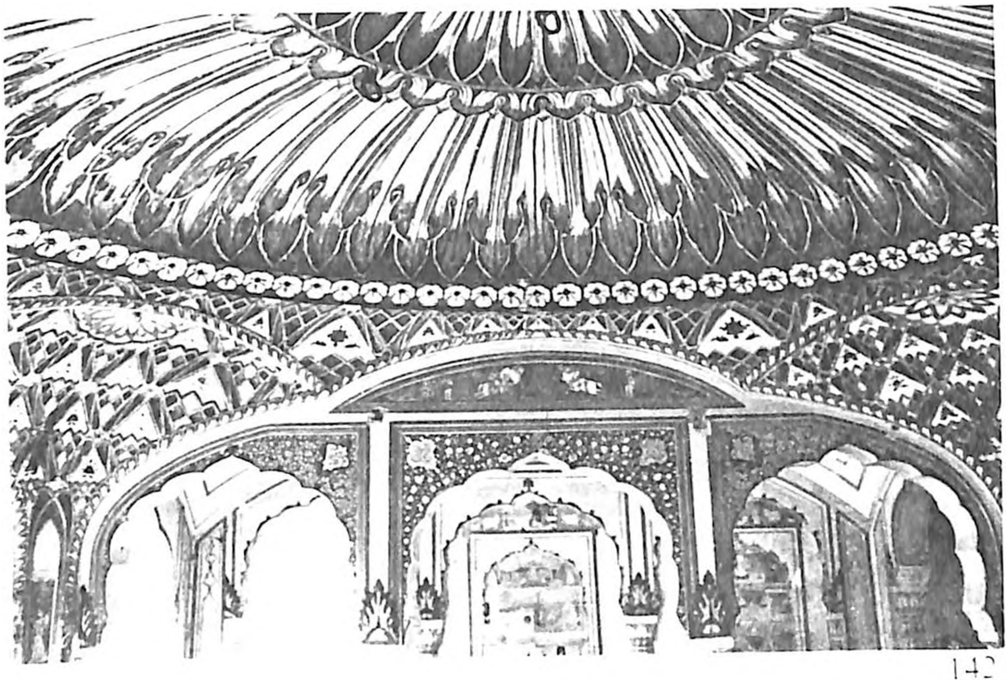
PLATE LXXIII



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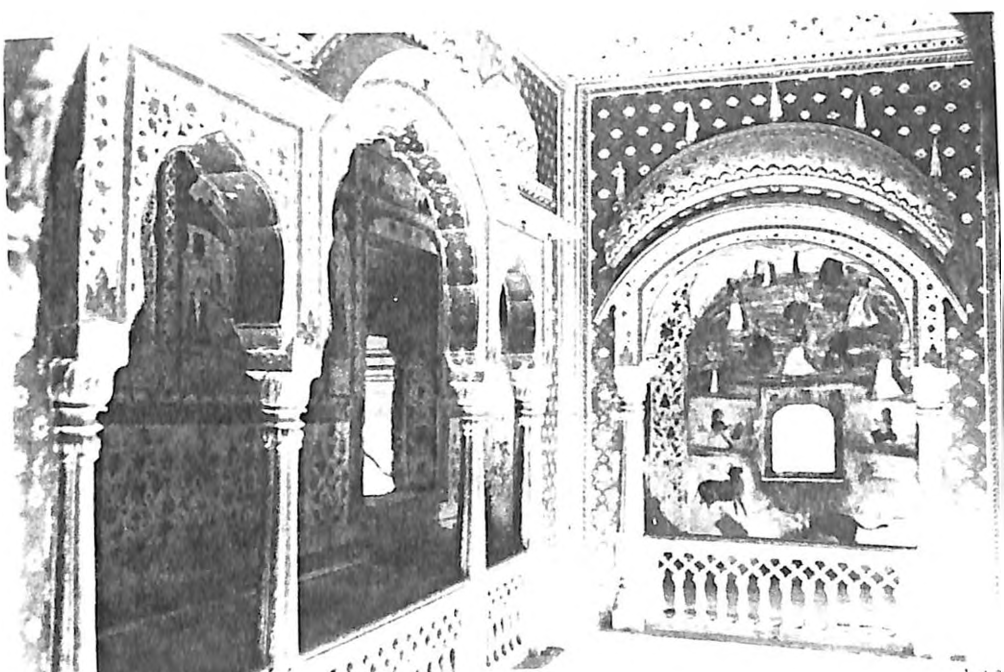

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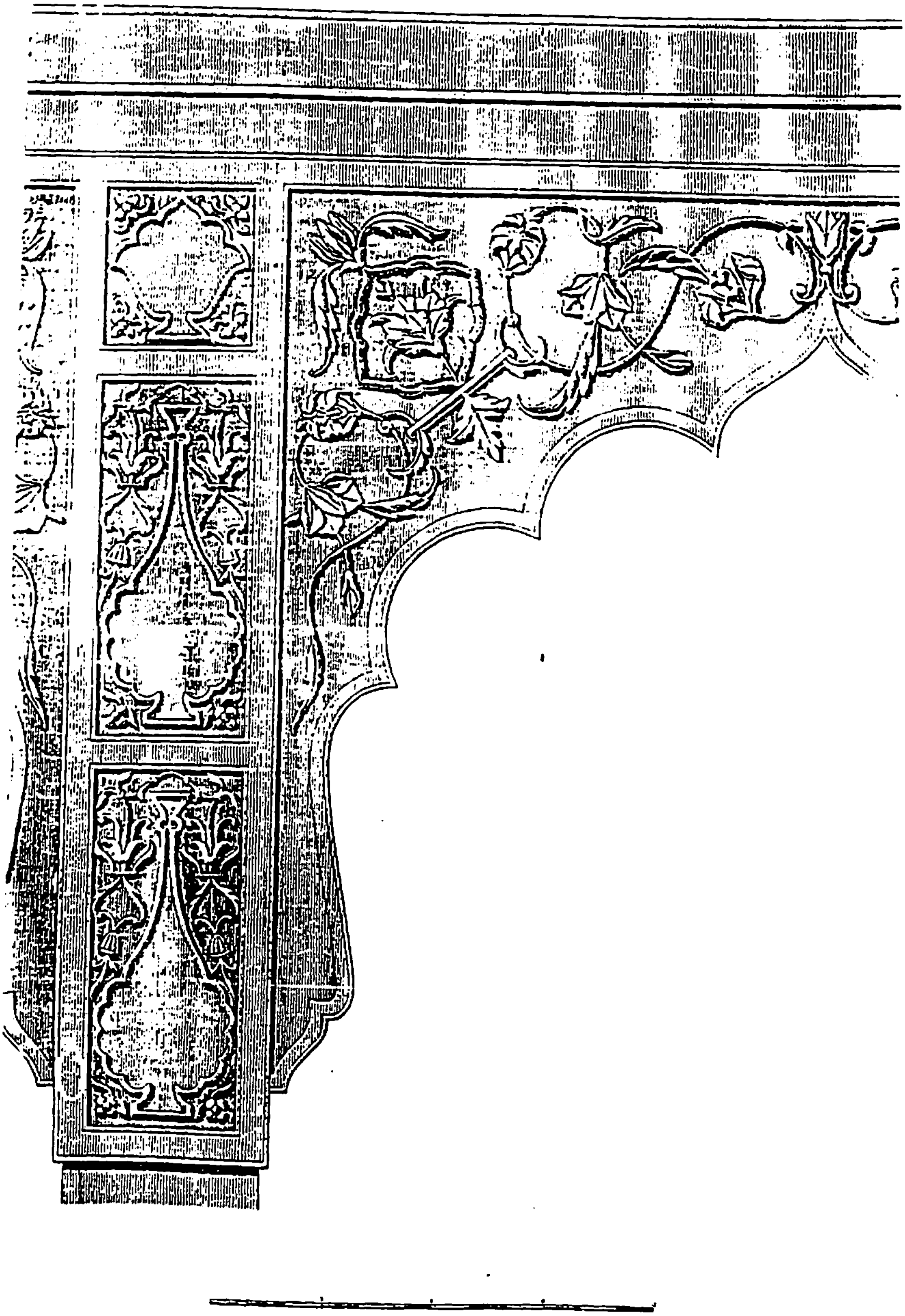
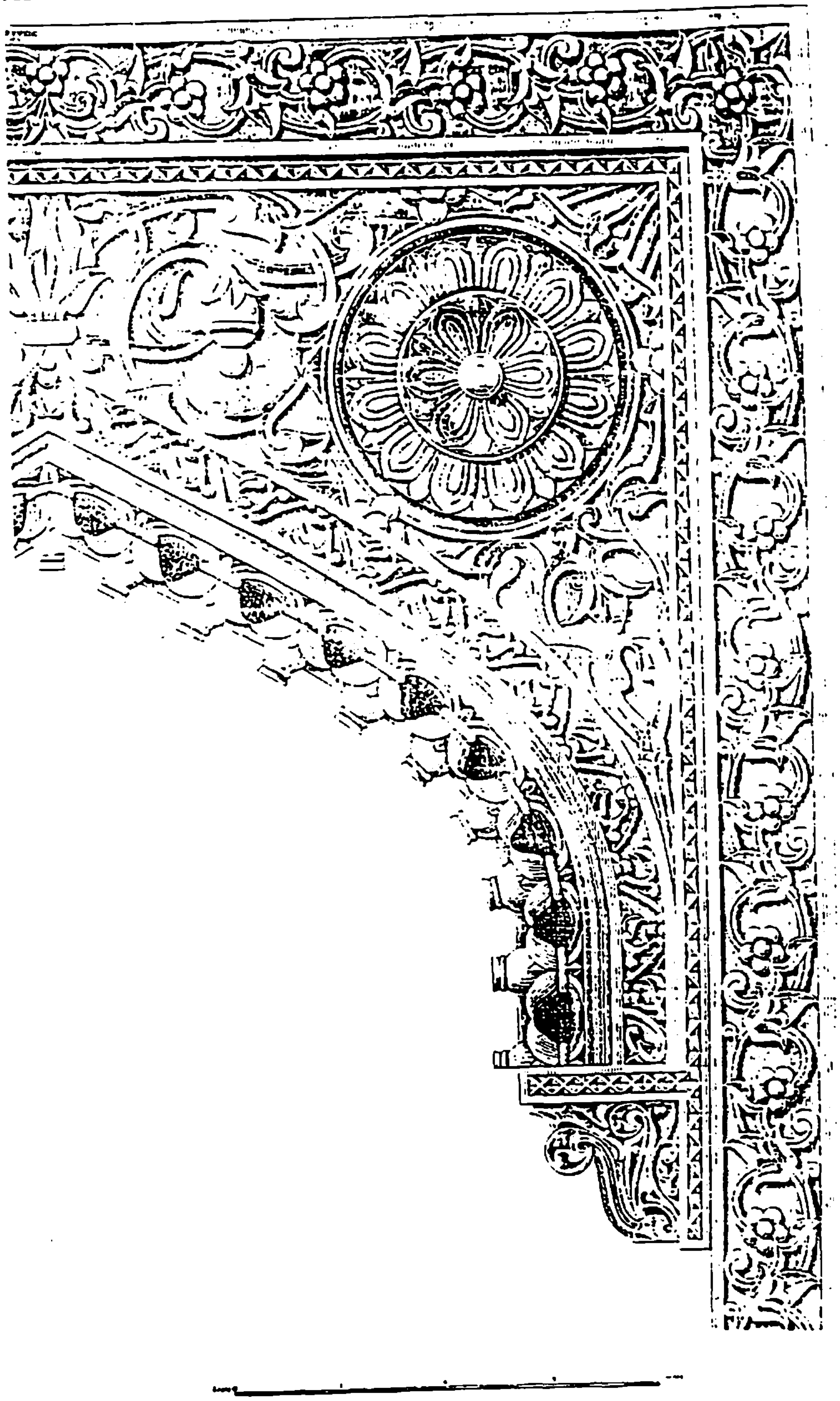
Figure 5

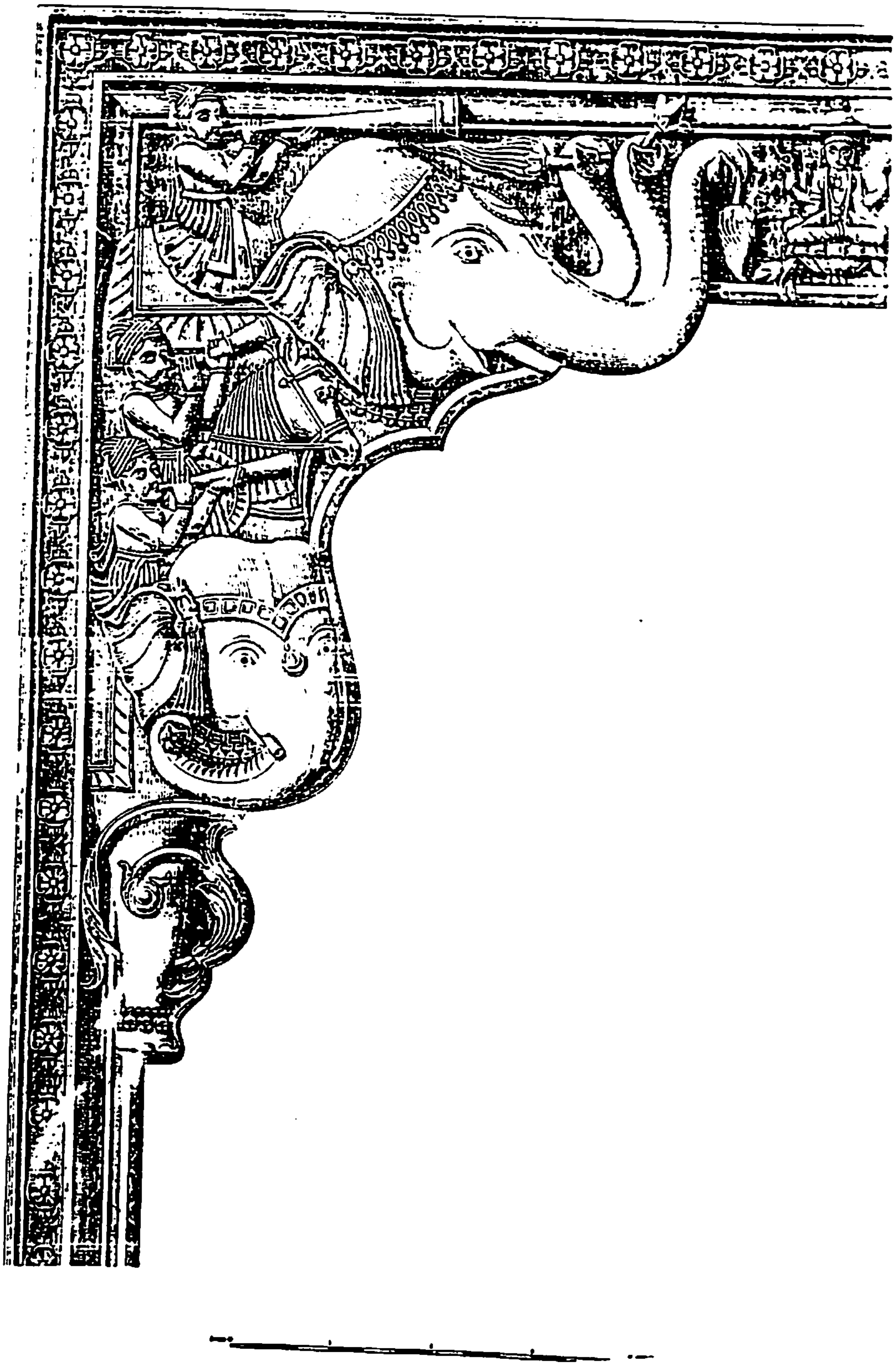


SOHAG MANDIR, AMBER

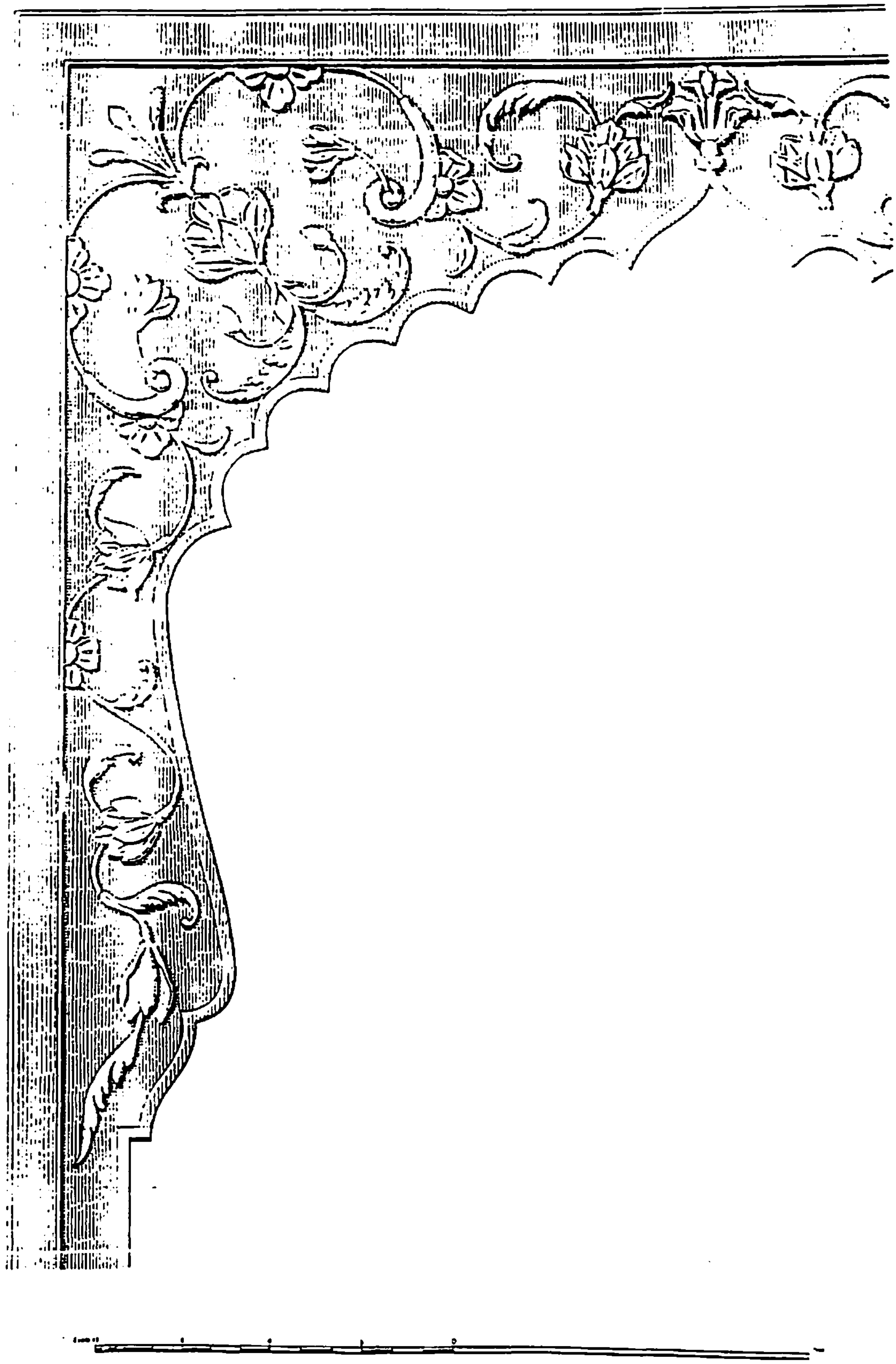


JAGATSARWANJI TEMPLE, AMBER

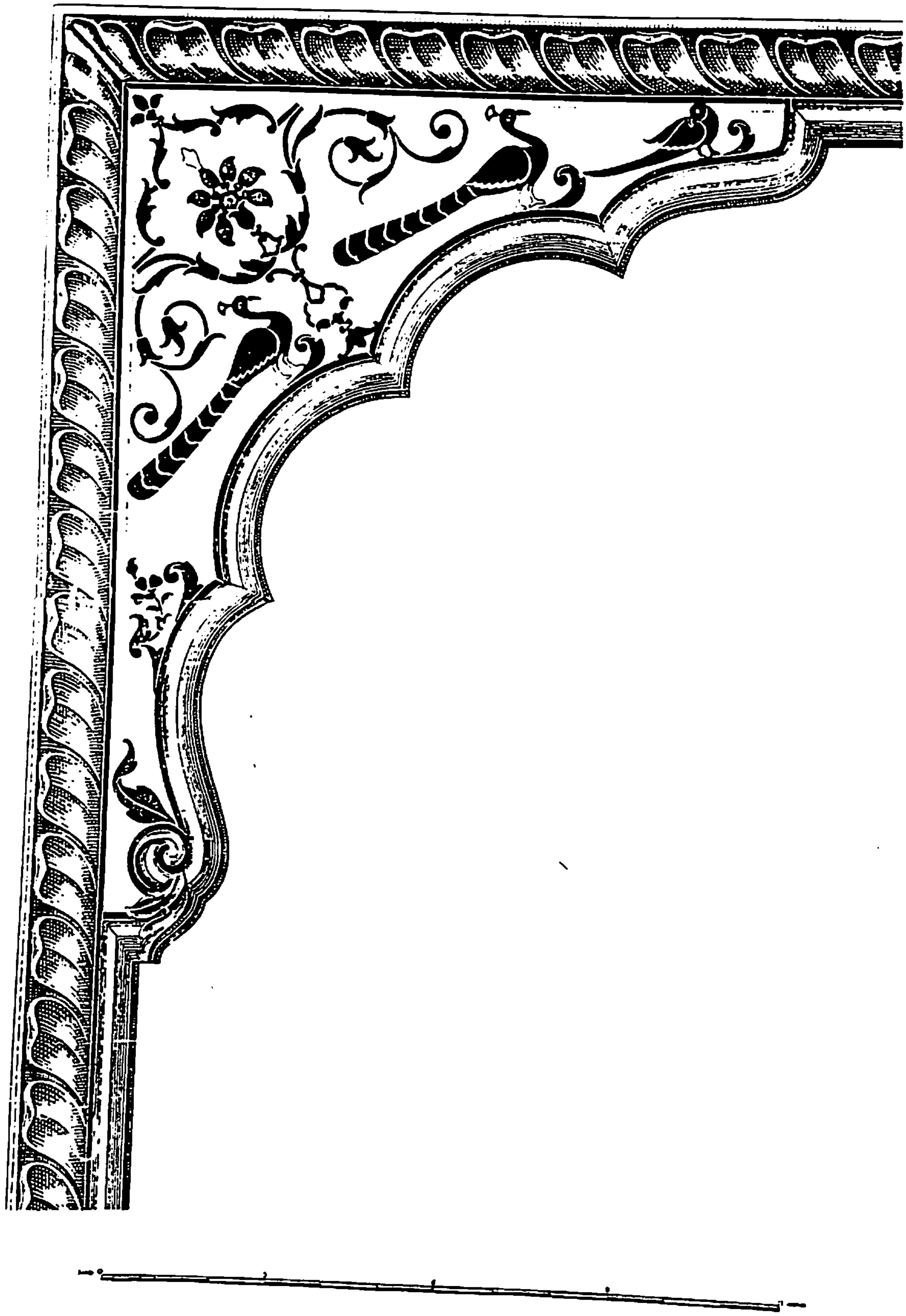
ARCHES



JAIPUR PALACE

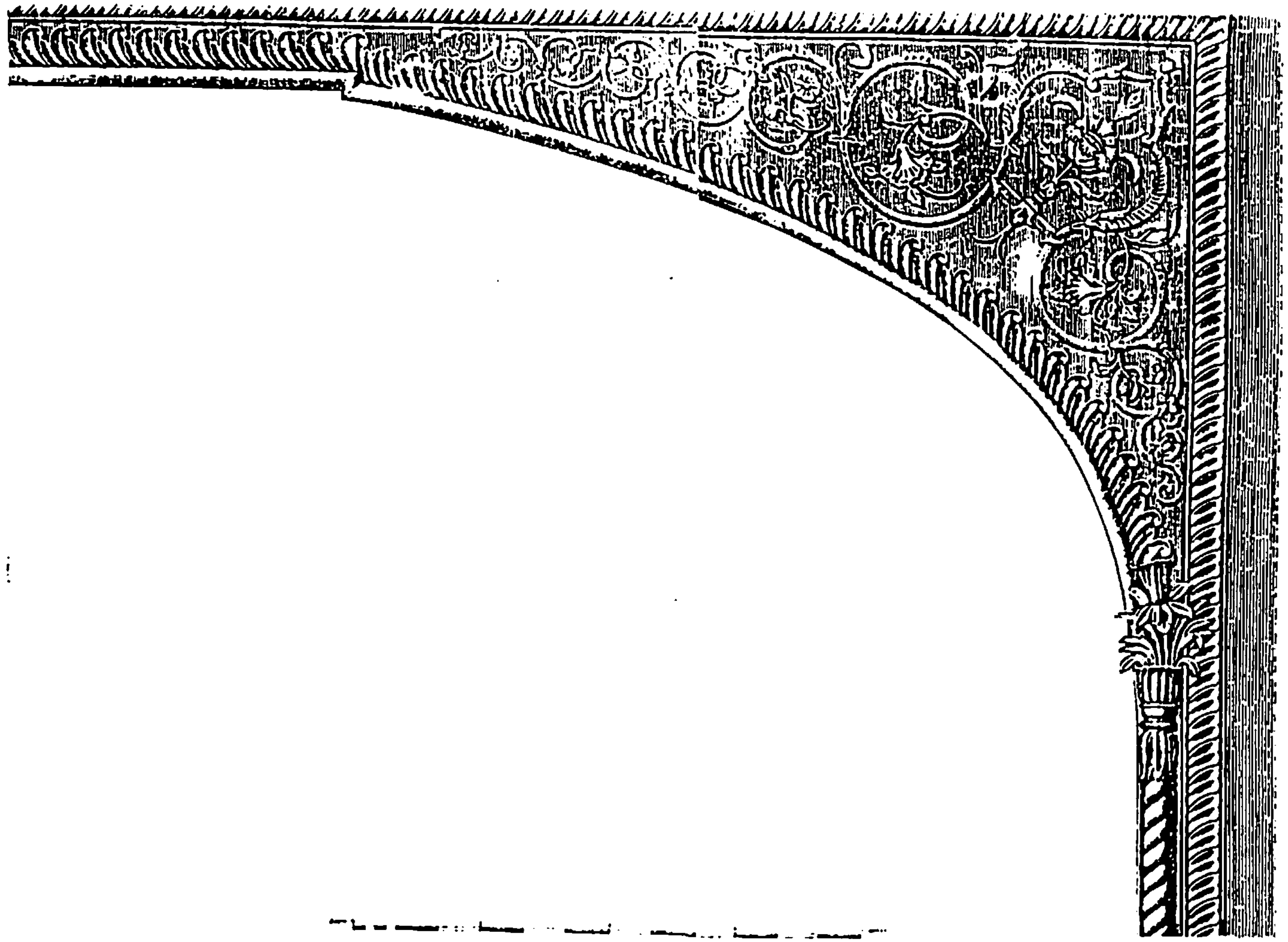


SUKH MANDIR, AMBER



GODHA MANDIR AT GHAT CHANKRI JAIPUR

Figure 19



At the '*Parikrama*' in Natwarji temple the twin columns spring up to constitute a double cusped arch or '*Bangri*' with 1 feet depth. The apex is again adorned with lotus relief work. The remaining space between the cusps of the arch and the rectangular borders has intricate carvings, marble relief work, like stucco etc.

The '*junk*' at Govind Deoji temple and Natwarji temple are cusped, whereas the '*junk*' inlay doors on the side rooms at Natwarji are in shouldered arch form.

Since Jal Mahal structure was a solely functional building the load bearing element of an arch was utilised to its maximum and all the four-centred and drop arches were plain plastered without any '*Bangri*' ornamentation, relief or painting.

Galta temple complex has a variety of arch types including the unique three centered arch blended with a '*Bangaldhar*' arch (Plate LXXIII, 142). This arch spans ten feet wide room at Ram Kunwar Mahal at Galta. All the Jharokhas are divided into three arched division filled by screens of lime 'Jalees'.

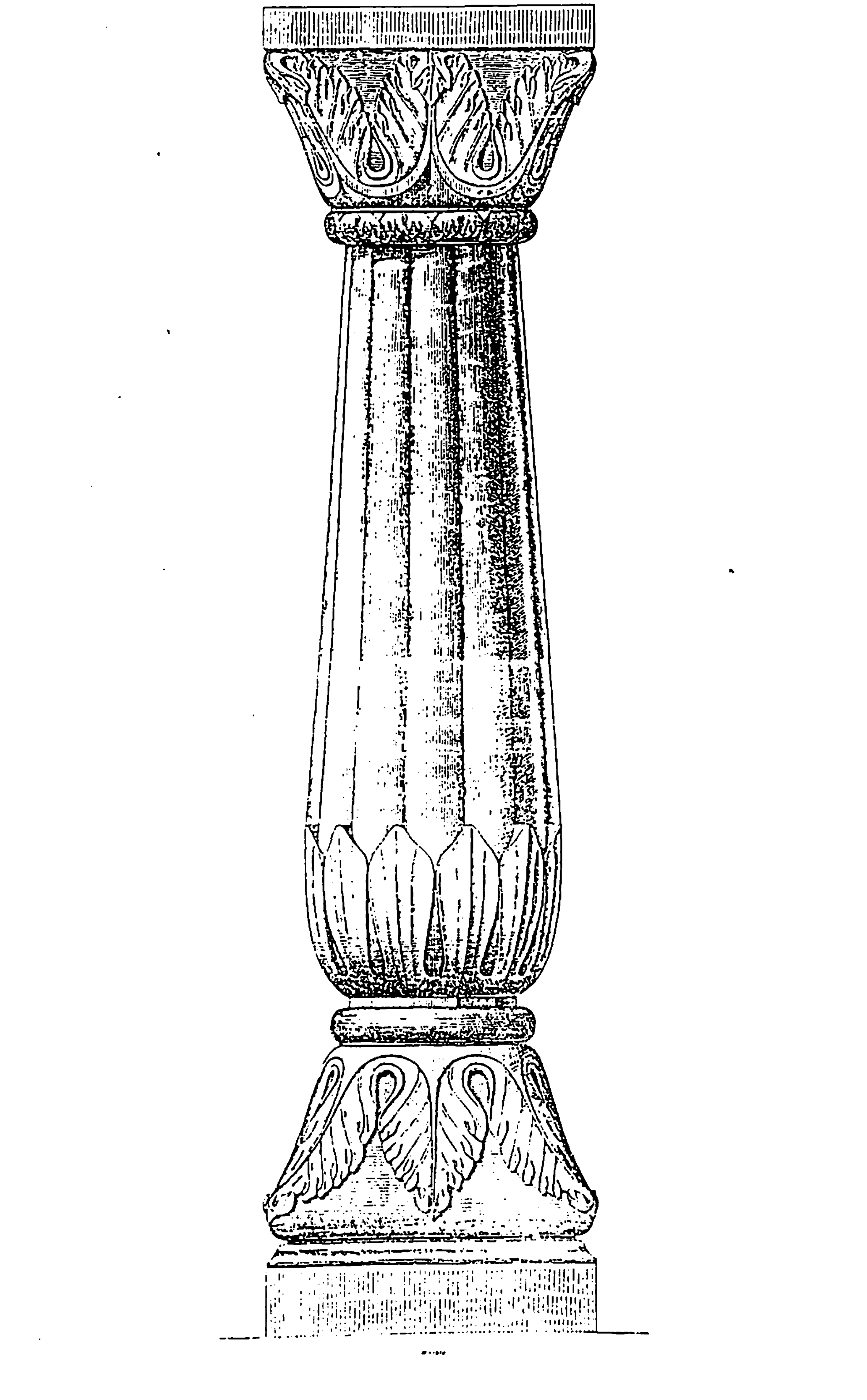
Niches in the walls are mainly of drop arch type, varying in sizes. Blind windows in decorative wall panels also employ different arch types.

Various other styles of arches at Amber and Jaipur were studied for shape and geometry (Figure 5 to 10).

5.2.4 Columns

Column is an important structural component of the super structure in Rajputana architecture. Traditionally it is called '*Khamba*'. The '*Padmaka*' and '*junk*' kinds of '*Khamba*'are more widely used. The chief distinguishing features of these two are that though both resemble

Figure 11



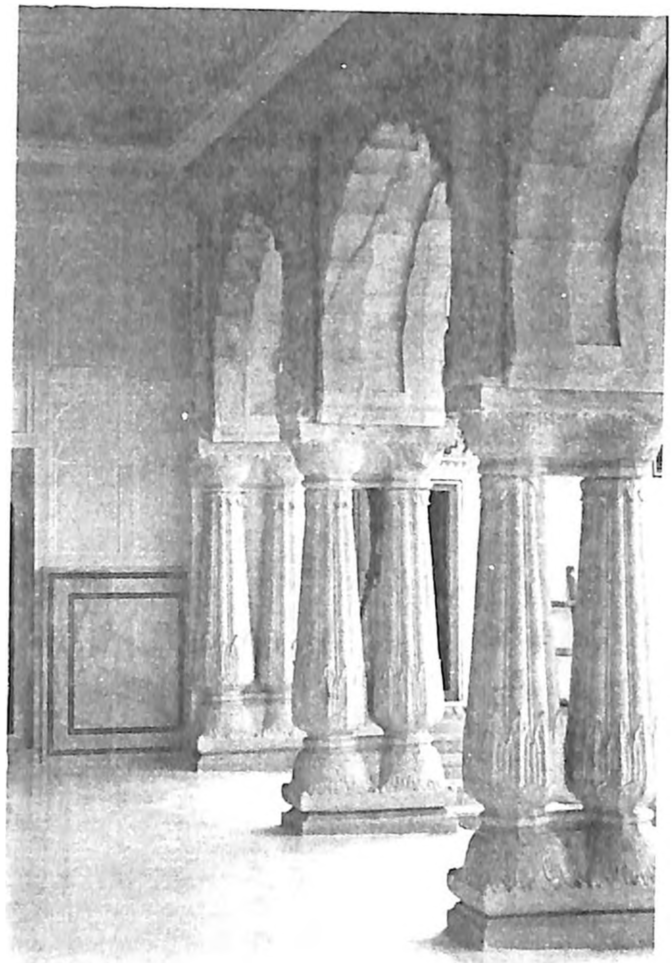
in shape, they take different motifs; the former of a lotus and the latter of the leaves and garlands and other foliage motifs.

It is important to briefly differentiate between a pier, pilaster and column. A pier is a short wall or masonary mass shaped into different elements, whereas the pilaster is an ornamental small column, complete with capital and bracket, usually forming part of the wall construction.

While the columns have different component parts which are broadly classified into 4 parts. They are the base, entablatures, shaft, capital and abacus. As regards the relative dimensions of the component parts and mouldings of the pillar as well as the various allied structures - the entablatures, the projections, side decorations, etc. dimensions should conform to the volume and the width of the entrance, i.e. approximately it should be maximum a quarter of it. Proportionately the other parts are designed. They are used extensively in all components of the Kanak Vrindavan temple complex, Galtaji Temple complex and Jal Mahal.

Ornamental marble columns adorn and support '*Chatris*', '*junk*', '*junk*', etc. The other widely used construction material is lime concrete plastered by smooth loi or Aarish finish and at the pavillion in Govind Deoji's temple the twin columns are in grey Ambargarh quartzite.

At Natwarji Temple the 'Parikrama' has twin marble columns (figure 13); 6 feet 6 inches in neight. The 1 inch thick rectangular base measures 1 feet by 2 feet. The entablature is an inverted lotus with carved petals. A circular ribbed 12 sided motif joins the base to the shaft. The shaft shoots up in 12 sided fluted floral in section, and carved ornamentation of foliage adorns the shaft upto 10 - 12 inches. Similarly the capital joins the shaft with the same 12 sided ribbed motif. The capital bears the maximum ornamentations, richly carved with scroll work and the abacus finally tops the column.



PILLARS / COLUMNS

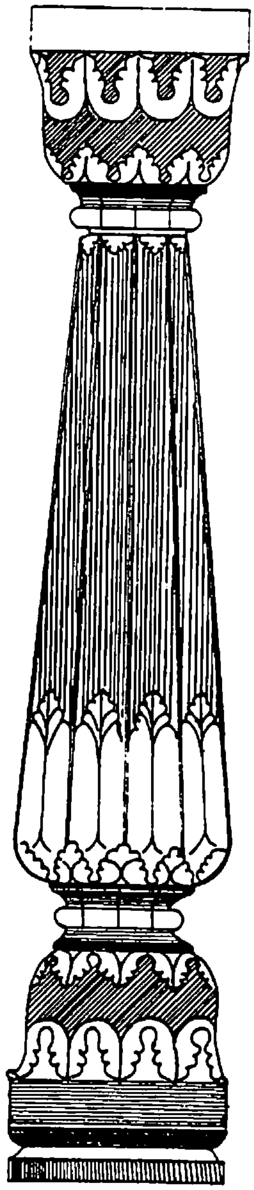


Figure 12

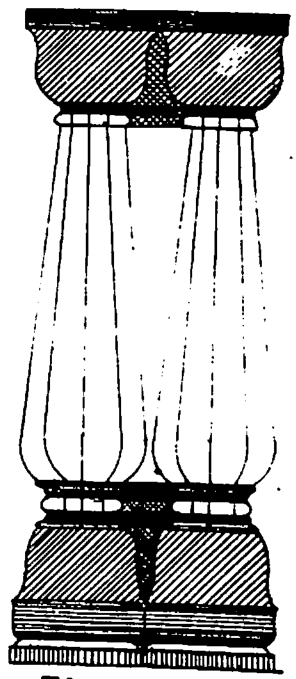
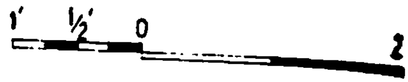


Figure 13



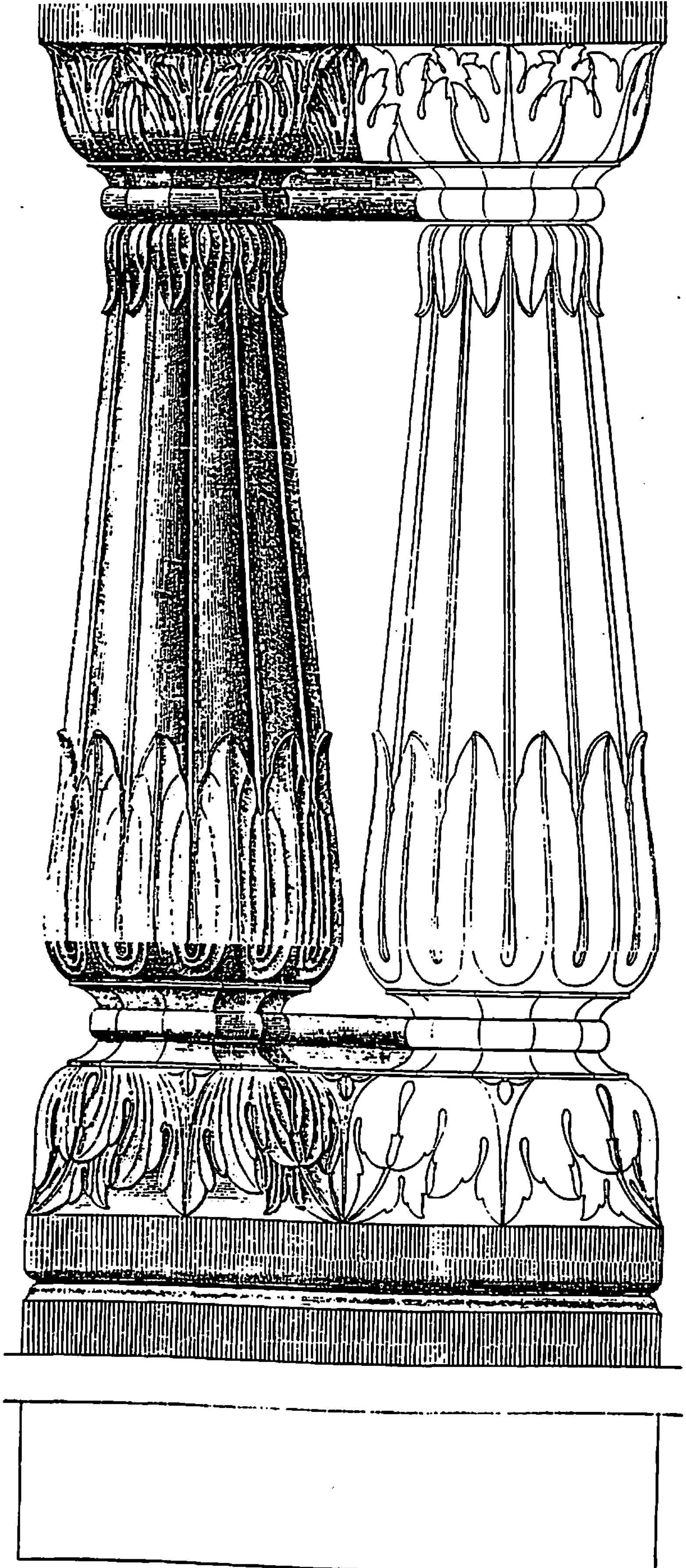


Figure 14

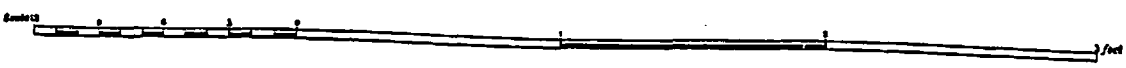
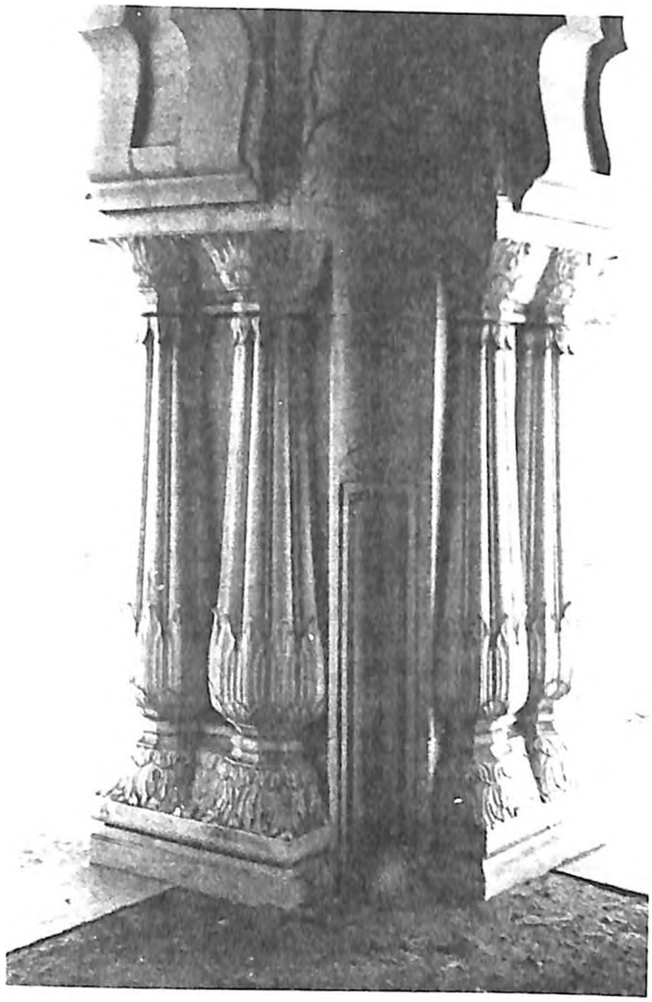


PLATE LXXV



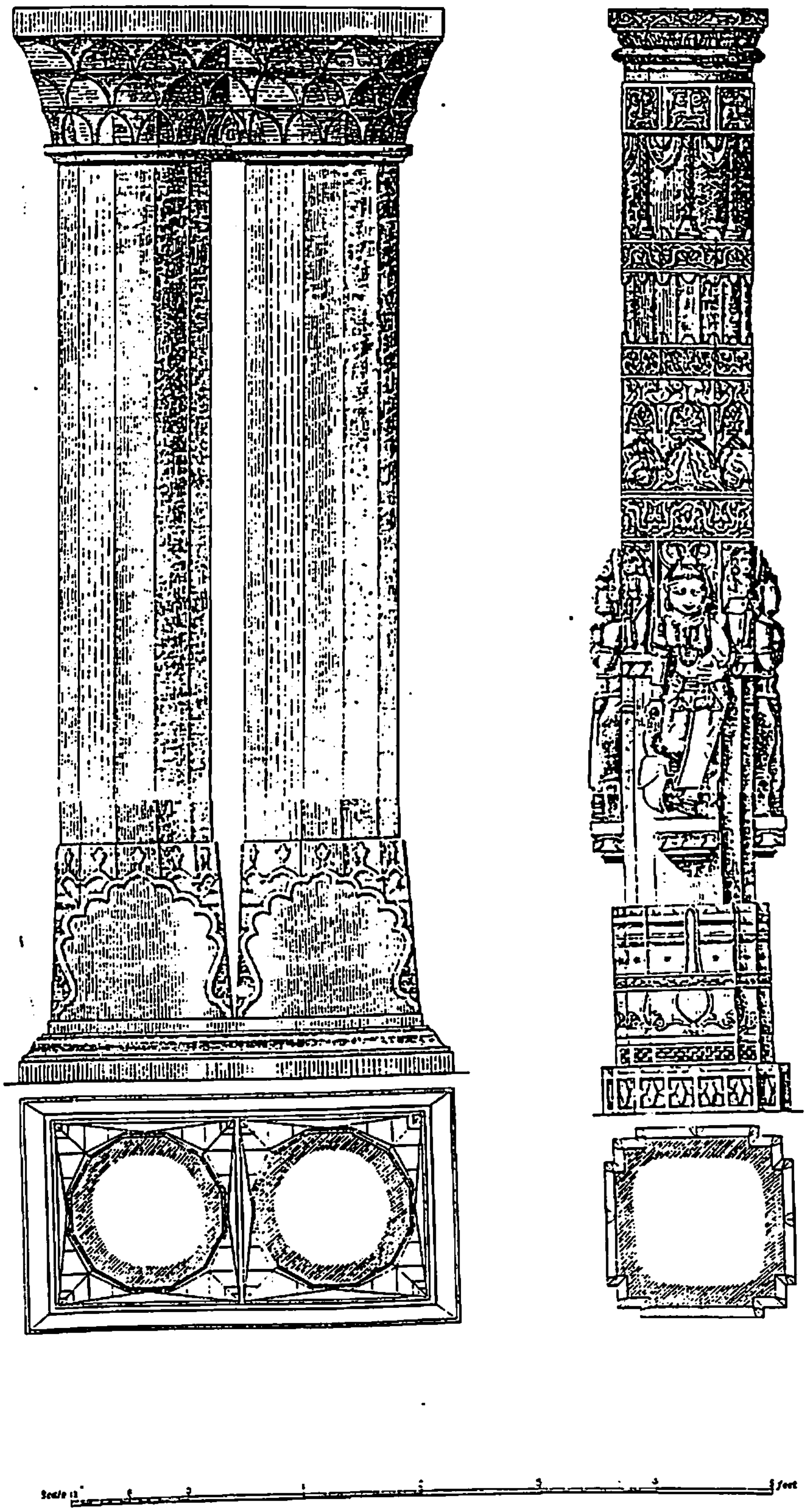
- The columns at Govind Deoji's temple complex are the major components of the structure which also are ornamental features. They are employed for both beauty as well as load bearing components.

- The pavillion had rectangular piers at the four corners with twin half columns ornamental type.
- In the pavillion the twin columns are of green sedimentary Ambargarh mine stone. They are 7'0" high with a common rectangular base topped with two separate inverted bowl shaped bases. The shaft is tapering and floral in section (12 sided). The capital is again bowl shaped which takes the load of the arches.
- The ground floor columns are plain stone without ornamentation and rectangular 1 x 3 feet which act as piers. There is no distinct division of shaft base and capital and are employed to take the load of the arch above, which in turn undertake the load of the roof.
- The columns in *'junk'* are 8 in number, one each at the octagonalbase and have single arches above. The column in the *'junk'* divide the longitudinal side into 3 divisions. The half column at the ends transfer the load of the curvilinear 'Kabani' to the piers underneath. The ornamentation is mainly on the capitals and bases in the shape of leaf and petals.

- The difference in the style of rectangular piers reveal that they were later additions and encroachments to the original complex. The base and capital have bands.
- The columns in 'Parikrama' are highly ornamented in relief work above the capital in petal shape. The lotus base also has floral patterns.

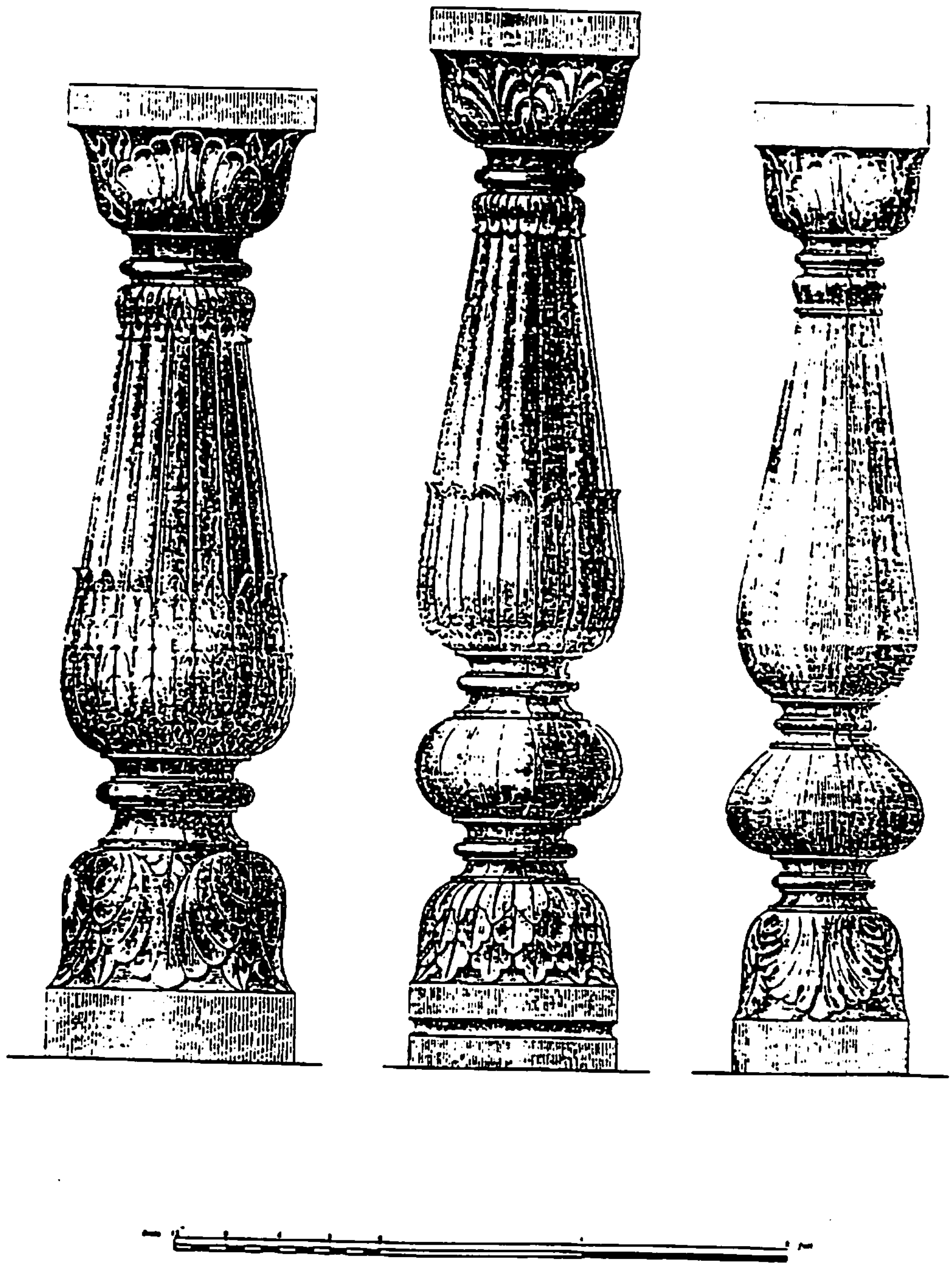
The diverse pillar - architecture all over the State of Rajasthan vary in proportions, degree of ornamentations and in the building material used. A variety of columns at Amber are identical in ornamentation and divisions of components. At Jal Mahal the rectangular masonary columns are plain plastered and lack ornamented, presumably because the columns act solely as a structural load bearing element in the structure surrounded by water.

Figure 15



PILLARS / COLUMNS

Figure 16



JAIPUR

5.2.5 Chajja

Chajja or an eave is an overhang that shelters a porch, verandaah or any plain exterior wall surface from rain water and acts as a sunshade etc. It varies from 1'-6" upto 3 feet depth, on all sides of a building. The *'Chajja'* is sloped downward to drip away water. Stone slabs are cut to equal sizes and are embedded one third into the roof at a suitable angle by rich live mortar. The joints are clamped by iron clamps. The surface is then smoothly plastered by lime mortar finish. This was the widely employed technique in all the historical buildings.

The *'Chajjas'* at Govind Deoji Temple are in stone with three feet projection and supported by 'gardana' cornice. Very often these stone chajjas are in turn supported by toras or brackets; single or in pair as seen at Natwarji's Temple. To tie two slabs of chajjas together, iron hooks six inches long are used and inserted from the top.

In the sloping curvilinear *'bangaldhar'* roofs of 'Kabani' these eaves steeply slope in the same curvilinear manner as the roof and form pointed corners at the ends like that of an archer's bow.

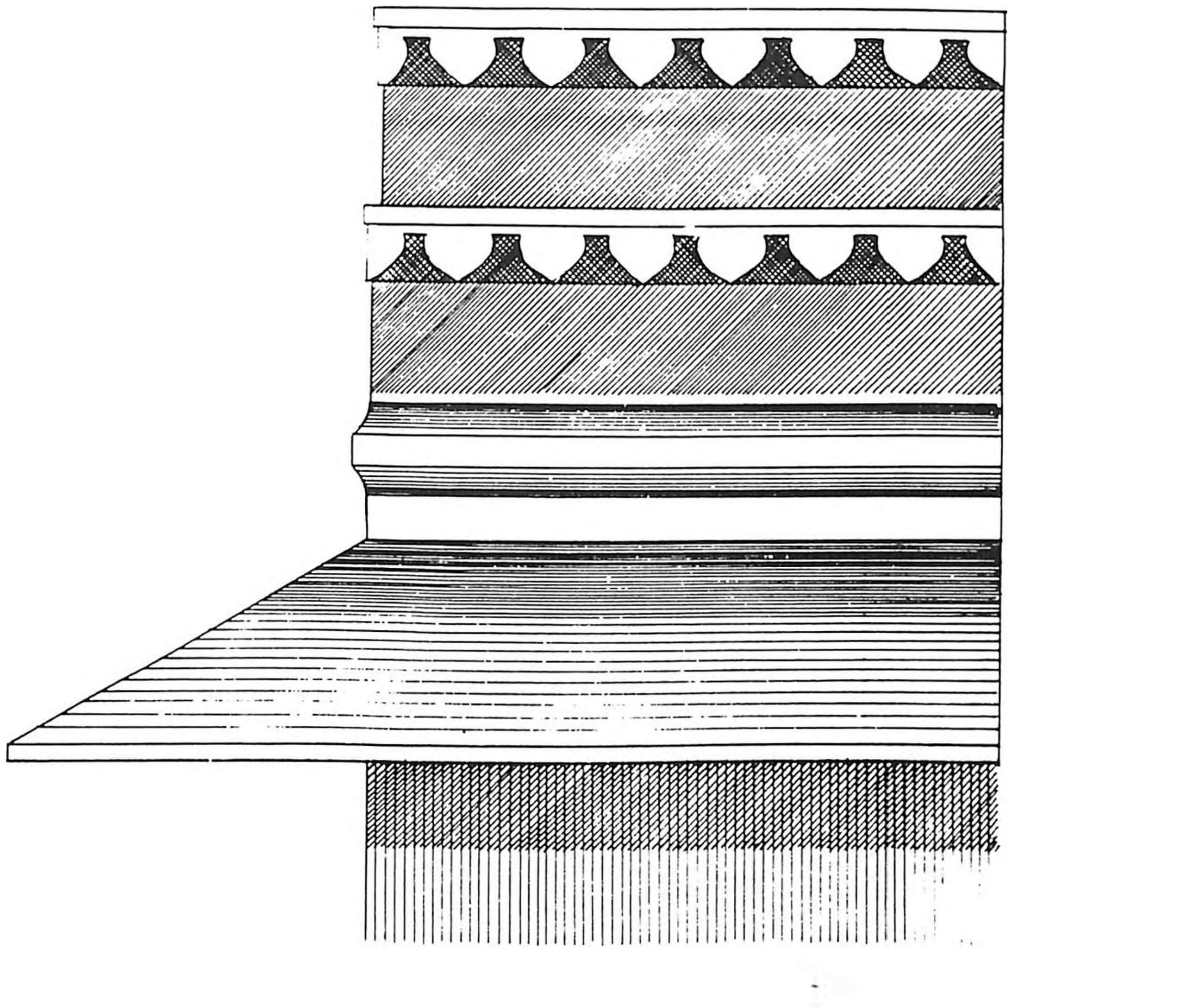
Illustrative Example at Ghan Bhamji, Jodhpur.

5.2.6 Jharokha

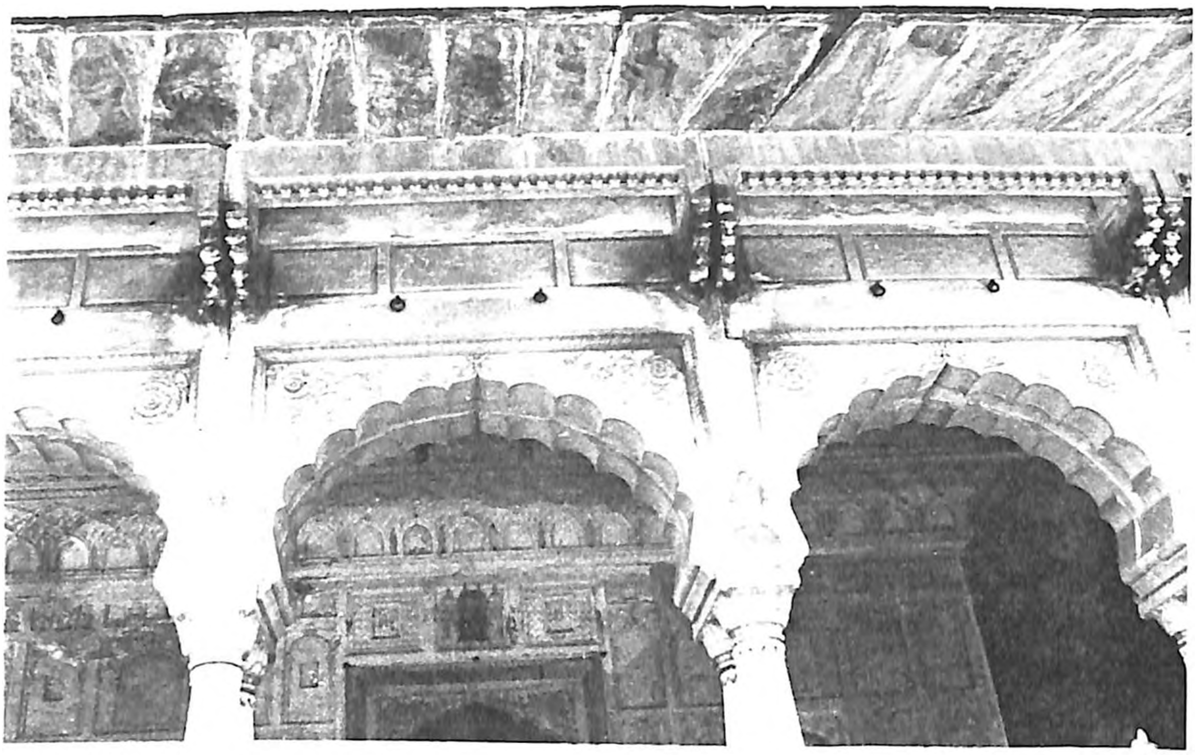
The term *'Jharokha'* explains a projecting balcony out of the building façade supported on toras or brackets. These brackets as explained above vary in ornamentations. The Jharokha were a vital part of the *'Zenana'* portion of all havelis, palaces, etc. The women's quarters - the Zenana consisted of even ranges around a regularly formed chowk and the disposition of the apartments within those ranges were symmetrical.

Figure 17

PARAPETS



GOVIND DEOJI TEMPLE



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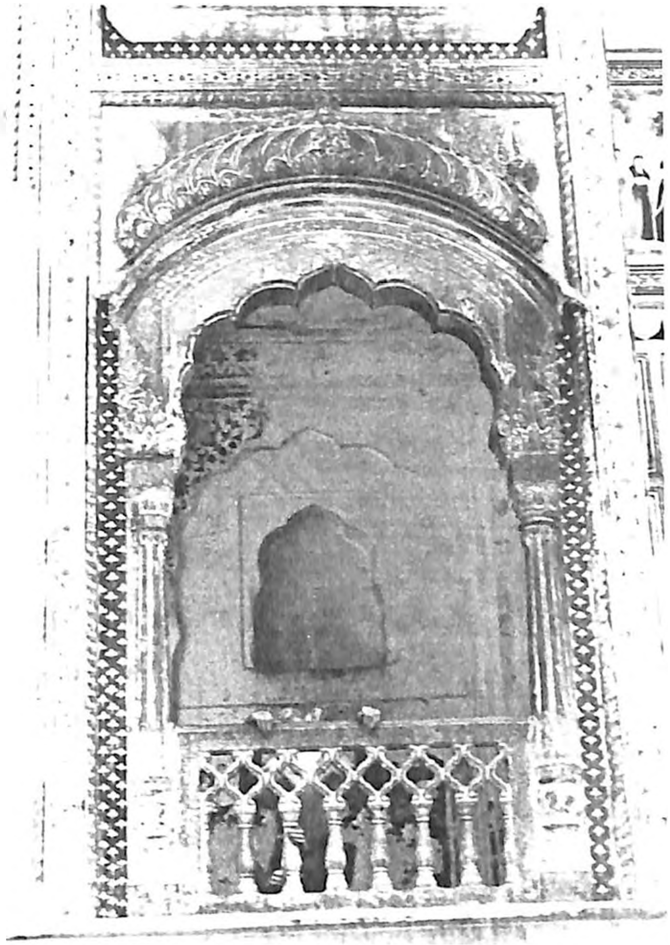

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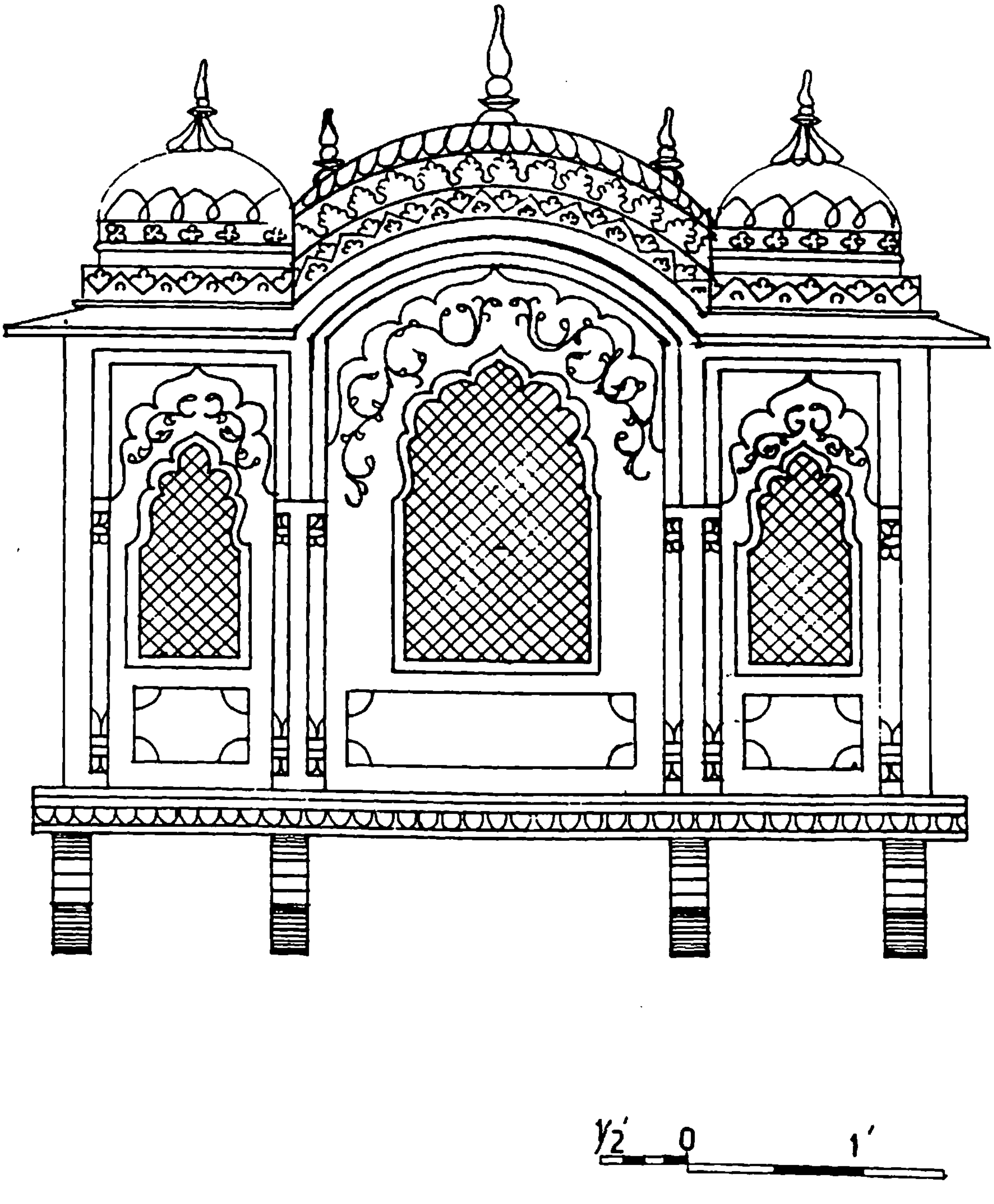
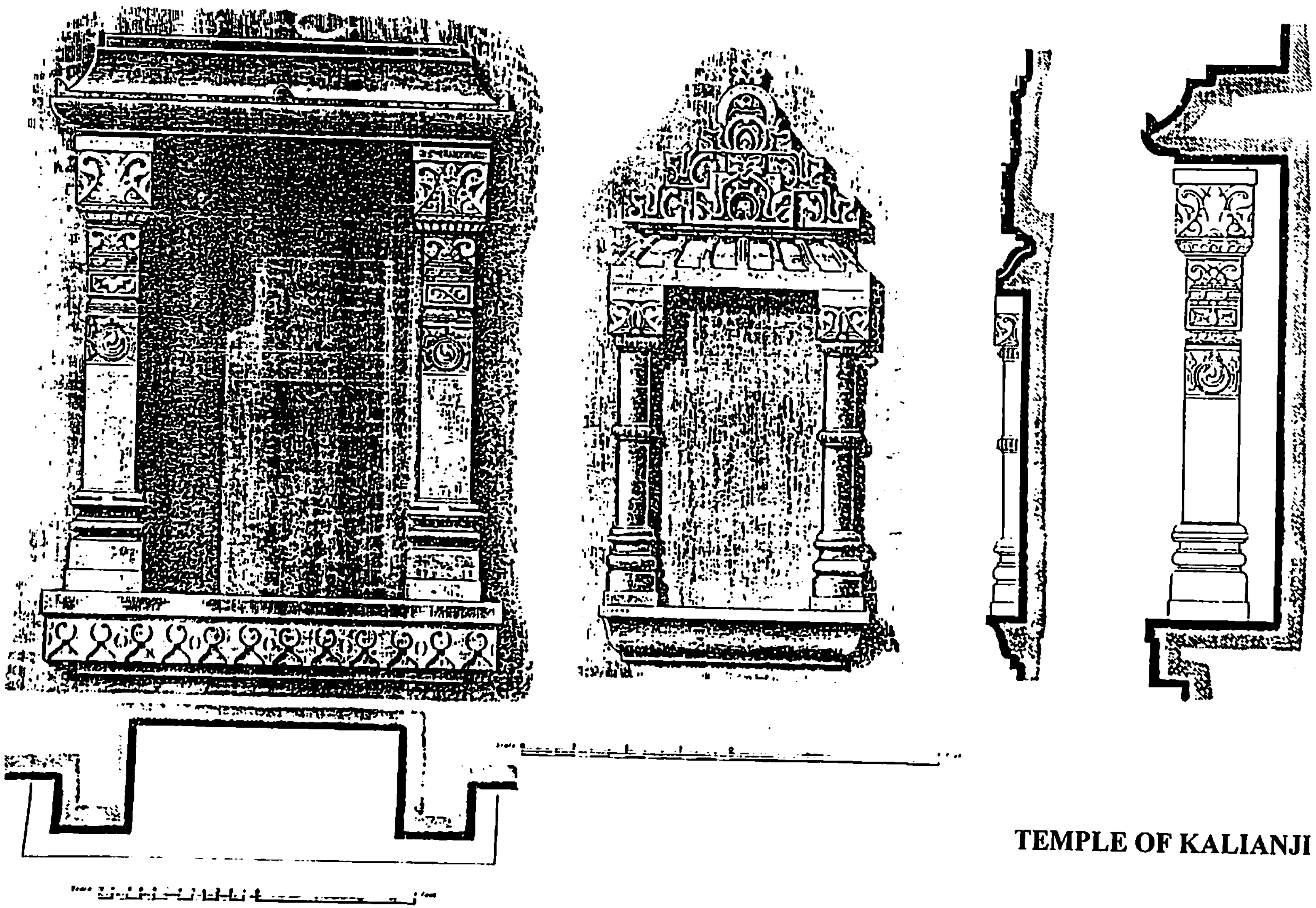
Figure 18

JHAROKAS



GALTA GHATI, JAIPUR

JHAROKAS



TEMPLE OF KALIANJI AMBER

Figure 20

The function of *'Jharokhas'* was to provide accommodation for women to view outside away from the public gaze - because of the presence of jali screens across the windows. This area is not self-contained but it is open to the rest of the palace. This architectural feature is widely seen at Galtaji at Sitaramji temple and Gyan Gopalji temple which were considered the palaces of Lord Krishna his consorts and Lord Rama. At Sita Ramji temple, the Zenana Mahal has richly ornamented frescoes over the *'Jharokhas'*, with stone railings and pierced lime *'Jalee'* screens.

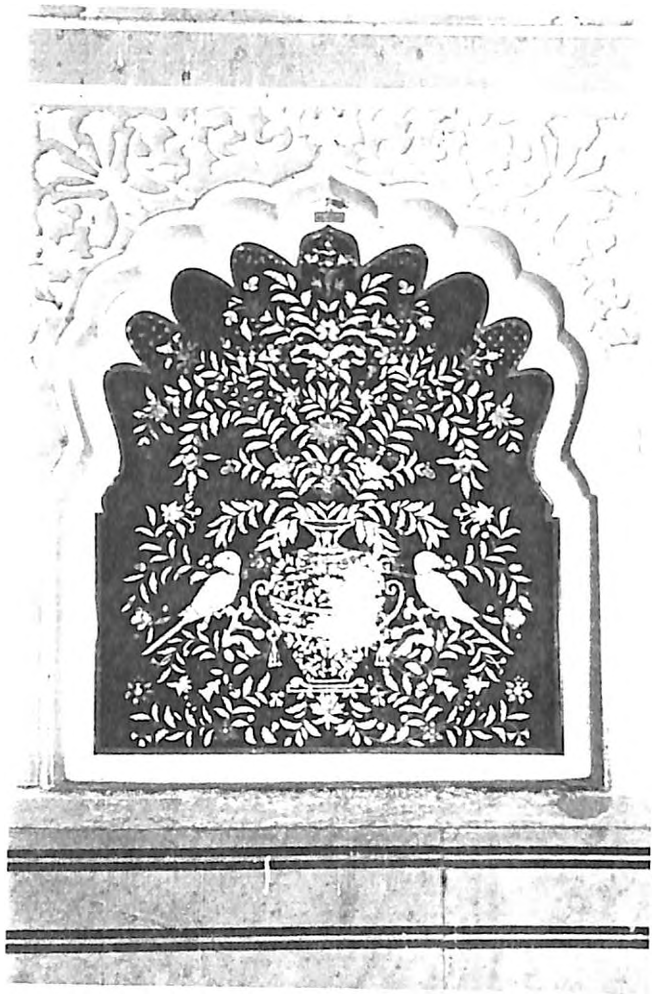
The roof of these balcony Jharokhas are false impressions of the curvilinear Bangaldhar 'Kabani'. At temple of Kalyanji, Amber we find *'Jharokhas'* in the form of recesses in a wall. The projected roof rests upon rectangular pillars placed 3 inches away from the wall. Another blind or false 'Jharokha' in the same temple has dummy decorative columns adjacent to the wall. Since these two Jharokhas are examples of blind windows, they are not supported on brackets and measure 4 feet and 3 x 1 feet approximately.

Niches

'Niches' are the most widely employed wall ornamentation in form of blind windows.

The 'Niches' in the wall are recesses upto depth of 9 inches to 12 inches with cusped, drop arch, bangri, bangaldhar arch or mehrab shape arch exist. The niche is usually made as an ornamental feature of wall and therefore located in every place at 3 to 3-6 feet height. Small 'Niches' are sometime located at the capital level of pillars to be used for candle or diya as seen at *'Parikrama'* of Govind Deoji's temple.

The ornamentation around niche is intricate and usually carried out in manovat relief work in floral motifs. All historical buildings have niches as a visual feature at human eye level and therefore they are treated with rich motifs. At *'Galtaji'* niches are highly ornate with frescoes carving themes of Lord Krishna, sceneries or floral motifs.



NICHES

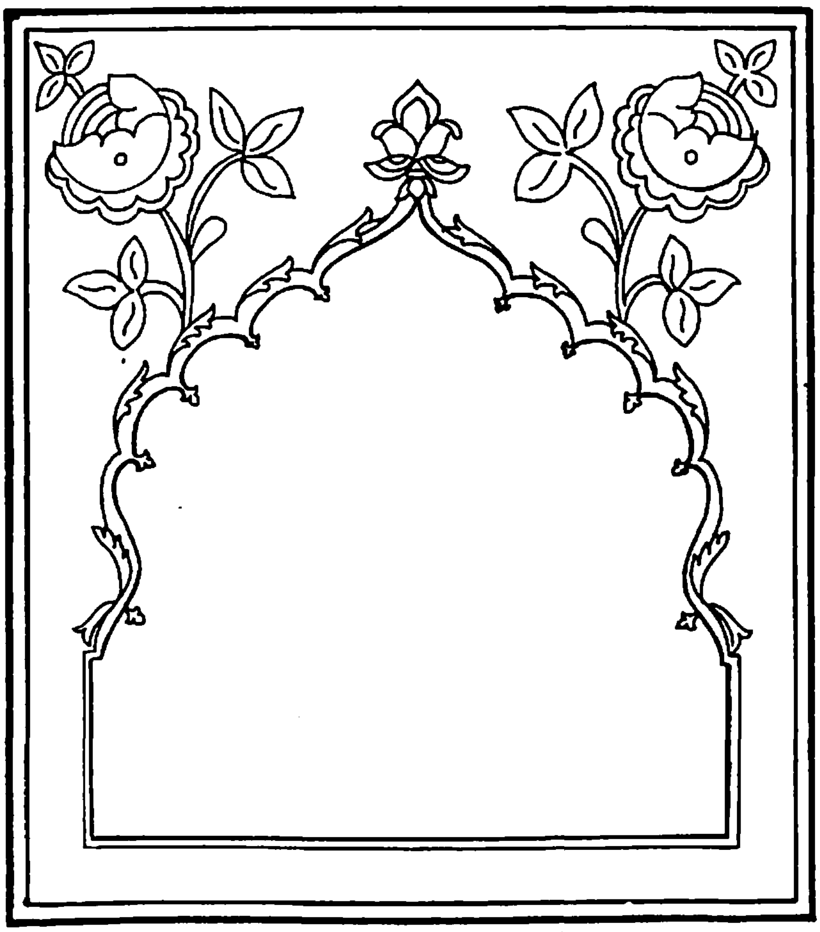


Figure 21

GALTA GHATI, JAIPU

5.2.7 Toras (Brackets)

Toras or brackets are load bearing elements employed as a projecting support to assist in holding up the lintel roof, a balcony, overhanging eaves, etc. They are very often highly ornamental, richly carved and painted and are employed for purely aesthetic beauty.

The sizes vary depending upon the use of the area and load. For maximum structural safety these toras are installed at corners in a triad that supports the corner of the '*Chajja*' or the balcony above.

The toras at Sitaramji temple - Galta support the eaves in the chowk (courtyard) and are of marble and sand stone with aaraish finish. The brackets supporting Jharokhas employ hanging motifs, depicted upside down as a pendant. These pendants are usually lotus shaped. At Govind Deoji's temple such pendant shaped '*toras*' are rendered in '*Kara*' finish. Very often a column takes the load by increasing its surface area in contact with the roof above by branching into brackets on all sides of the column.

The brackets at temples and palaces differ in the choice of material and the rendered finish. Lime '*stucco*' relief work is the most prevalent work at Govind Deoji's temple 'Parikrama'. At '*junk's*' east entrance, stone carved toras are employed. At Parikrama twin toras are employed to take the oncoming load of the 'Chajja'. Particular style of material and rendering finish in toras; characterises the building as a whole.

A wide variety of '*toras*' are employed at Amber, Shekhawati and Udaipur regions etc. and a few of them are enlisted below. The inspiring motifs broadened the scope of restoration work since one particular type of motif and geometry could be replicated, simplified or made richer in the different building materials.

BRACKETS.

Figure 22

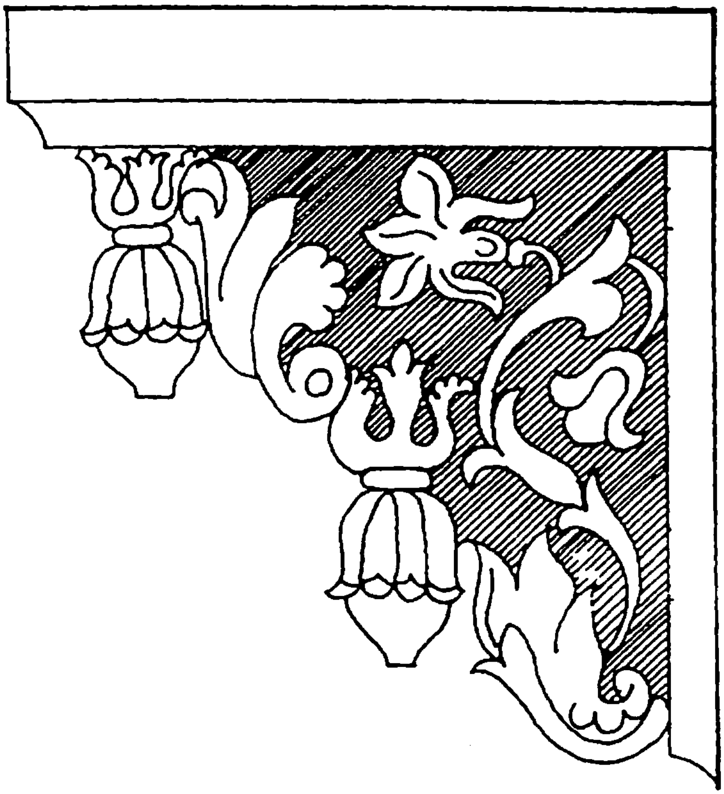
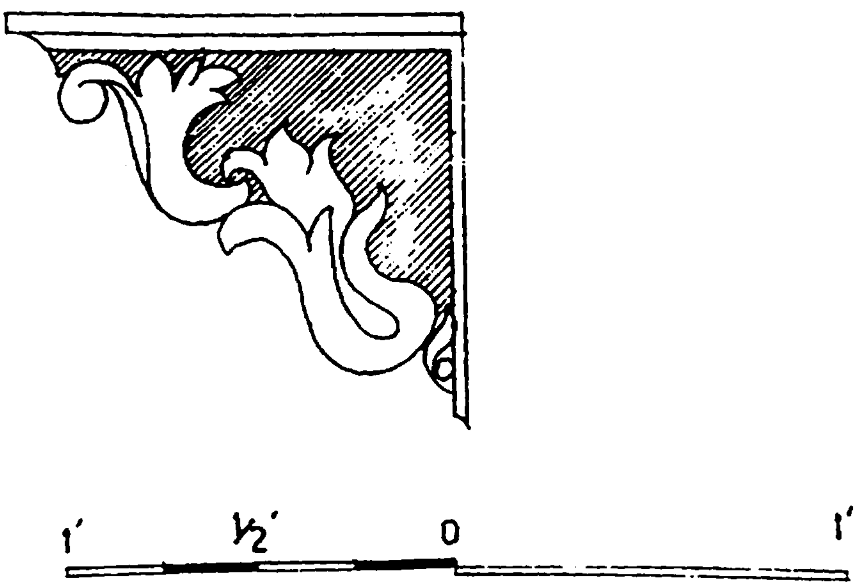


Figure 23



NATWAR JI TEMPLE

JAIPUR

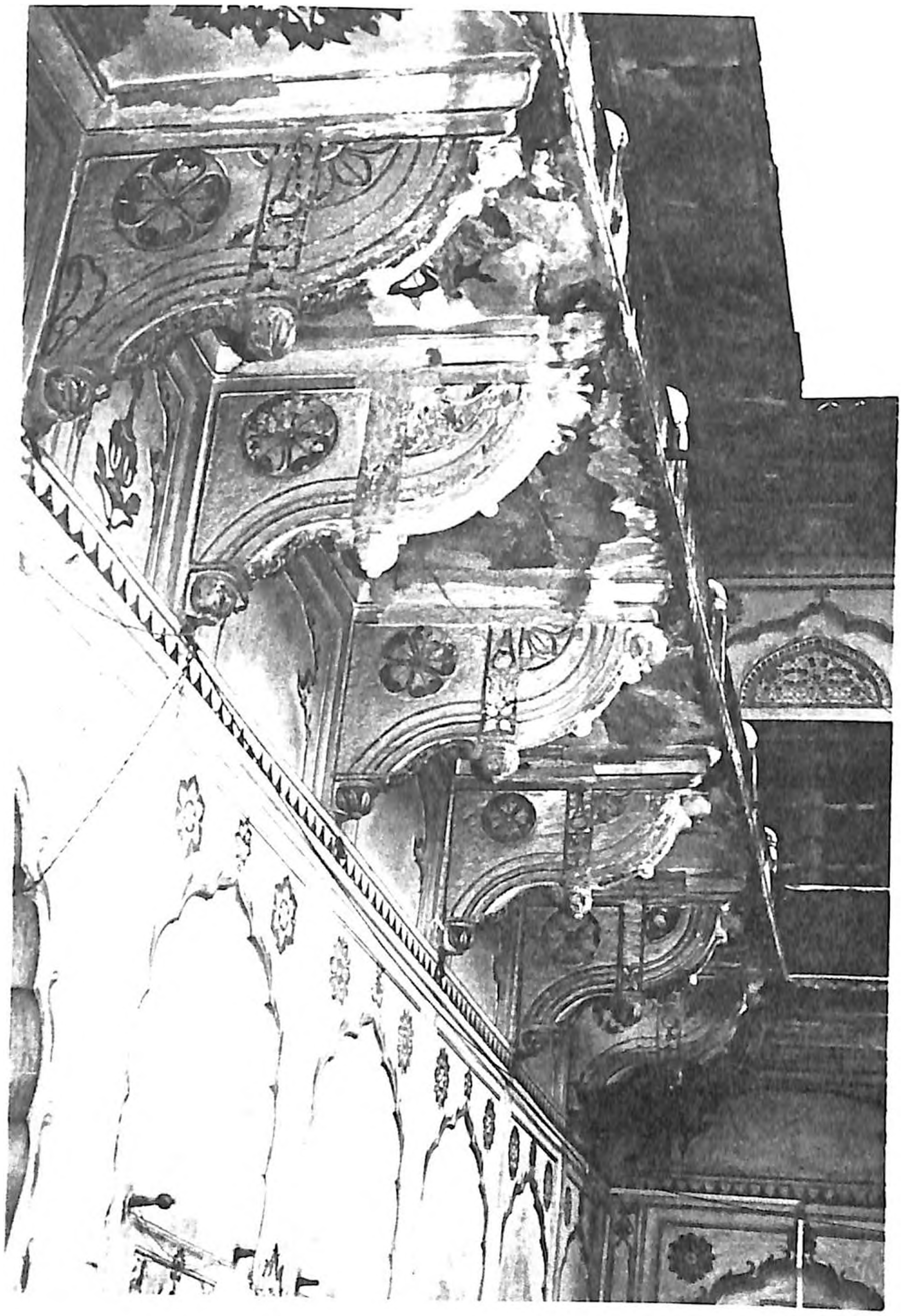
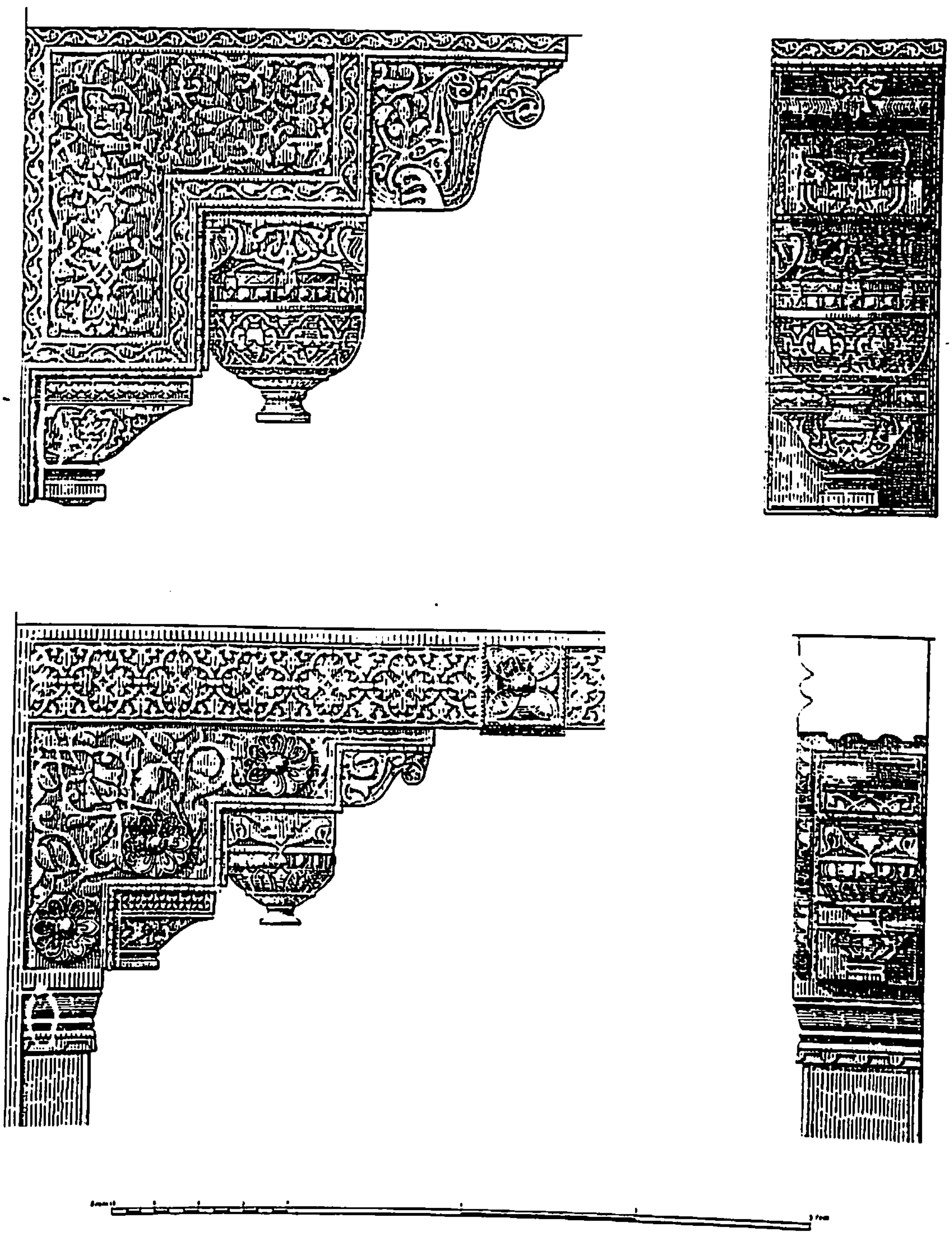


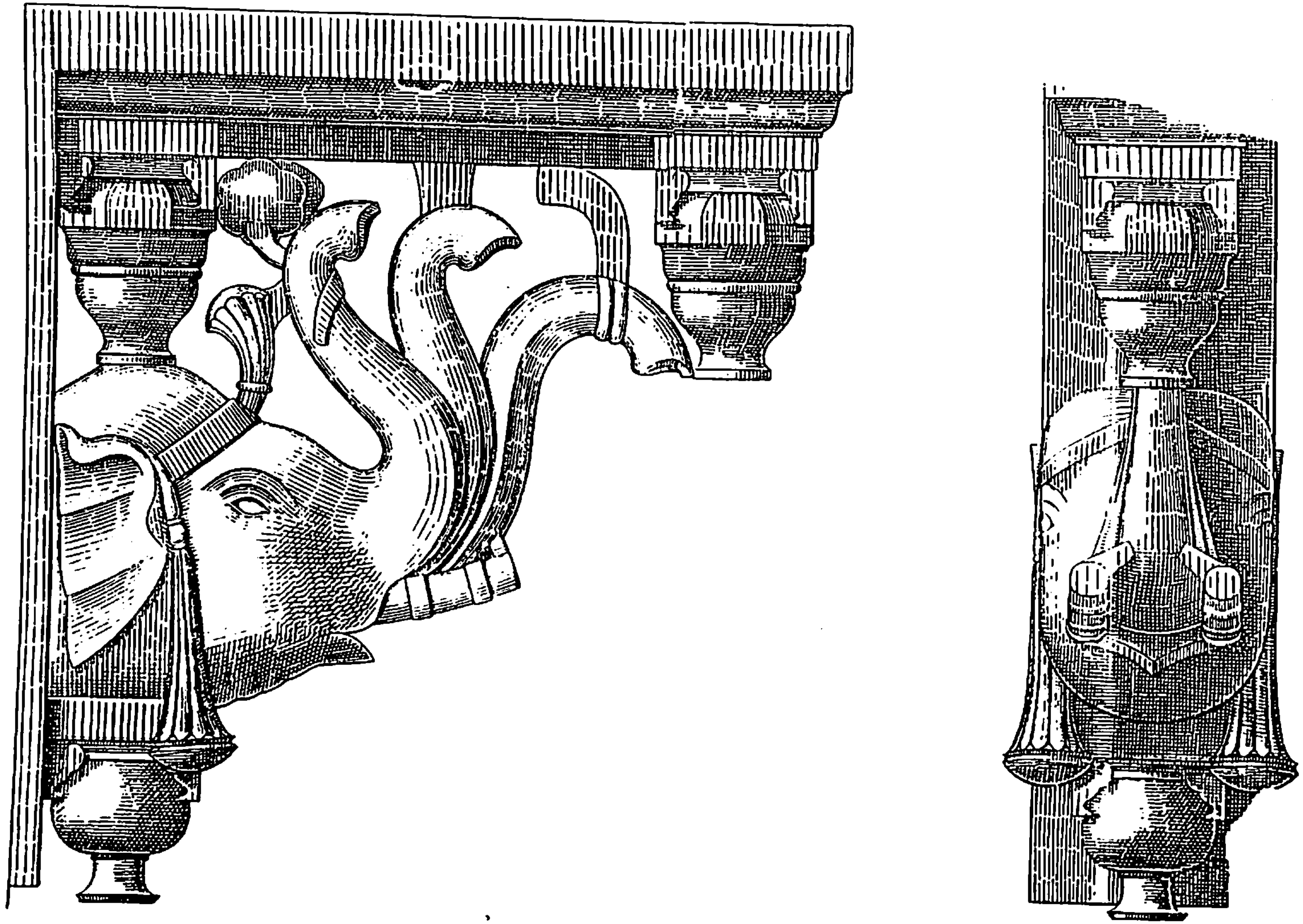
Figure 24

BRACKETS,



JAGATSARWANJI TEMPLE, AMBER

Figure 25



PATODIAN MUNDID JAIPUR

BRACKETS,

Figure 26

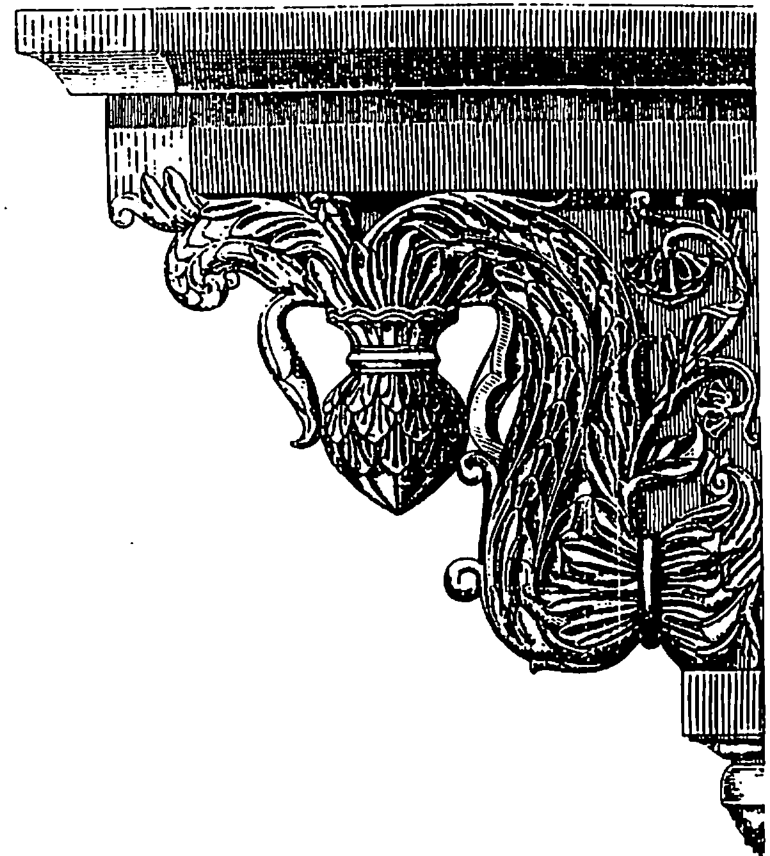


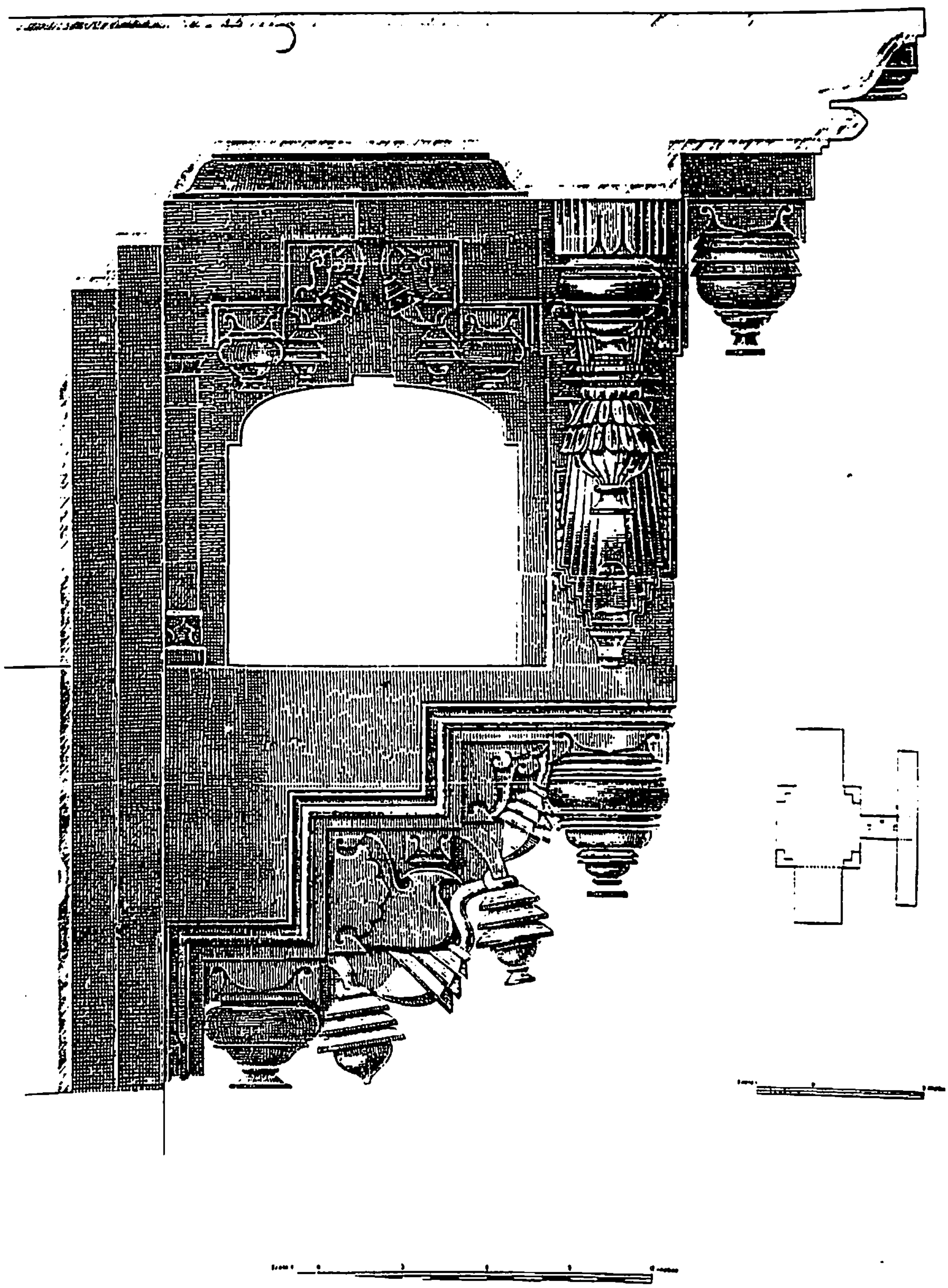
Figure 27

GATORE JAIPUR

Figure 28

MUNDER

GOBIND DEOJI BINDRABUND



The creativity of the traditional master craftsmen extended beyond the regular motifs and the '*toras*' took the shapes of elephant head, a duck, a horse and sometimes peacocks. The ratio of width is greater to the length and the maximum angle is 45°.

Brackets at Ganesh pol, Amber are carved in sandstone bearing the shape of a small duck sitting on a projected platform. The bracket measures 3'-6" in length and 2'-6" in width. In the front view the tora has many divisions but the entire bracket is chiselled monolithically and then inserted to the wall.

5.2.8 Parapets and Parkota Walls

Parapet is a wall extending above the roof, often elaborately treated with ornamental relief forms. The characteristic ornamentation of the parapet decoration in the historical buildings was the architectural accomplishment of a very high order. The 'Parapets' above the Garbha-griha at Govind Deoji and Natawarji temple are 1 feet 3 inches high with a foliated meshed frieze in lime plaster.

The pattern is derived from the kind of battlement or parapet decoration which is a common feature of Rajputana buildings. Traditionally the battlements are known as '*Kangooras*'. As a dominant element of the frieze the stone corresponds to the recessive element of the battlement - the empty space or brown. Dominant and recessive elements are thus reversed through the pattern and the colour schemes are constant. The top part of the design is itself a schematic and sculptural representation in miniature of a row of arches, and so it too is a negative of its original design, since the parapet is solid precisely where as an arcade is open, and where an arcade is open it is solid.

The parapet at Jas Mandir, Amber is the embellishment of foliated frieze but varies in its material. The parapet is marble in laid. Various floral motifs are striking and imposing horizontal bands running continuously at Godikon- ka-Mandir, Sanganer, Jaipur. Lotus flower

PARAPET

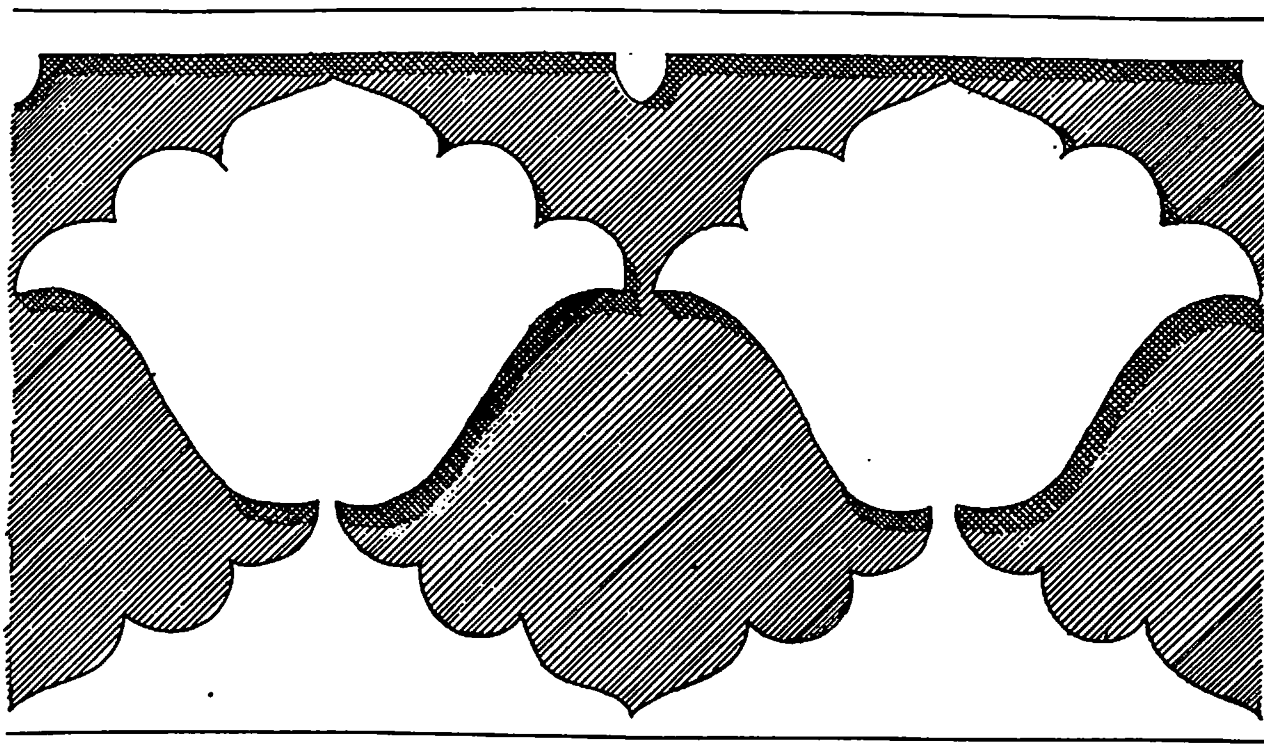


Figure 29

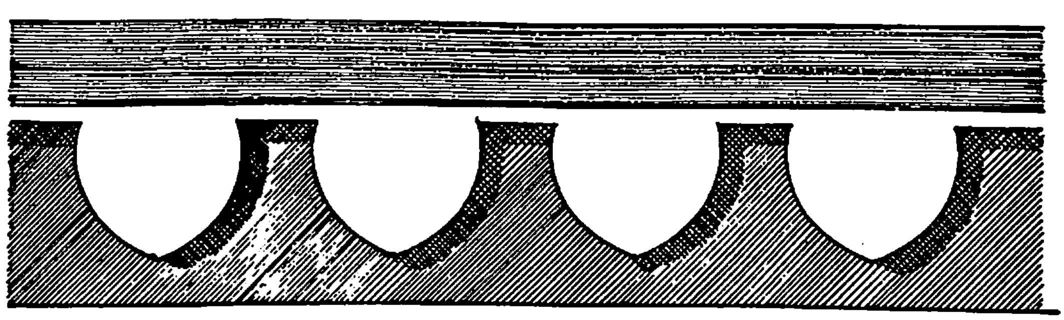
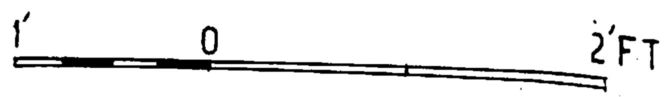
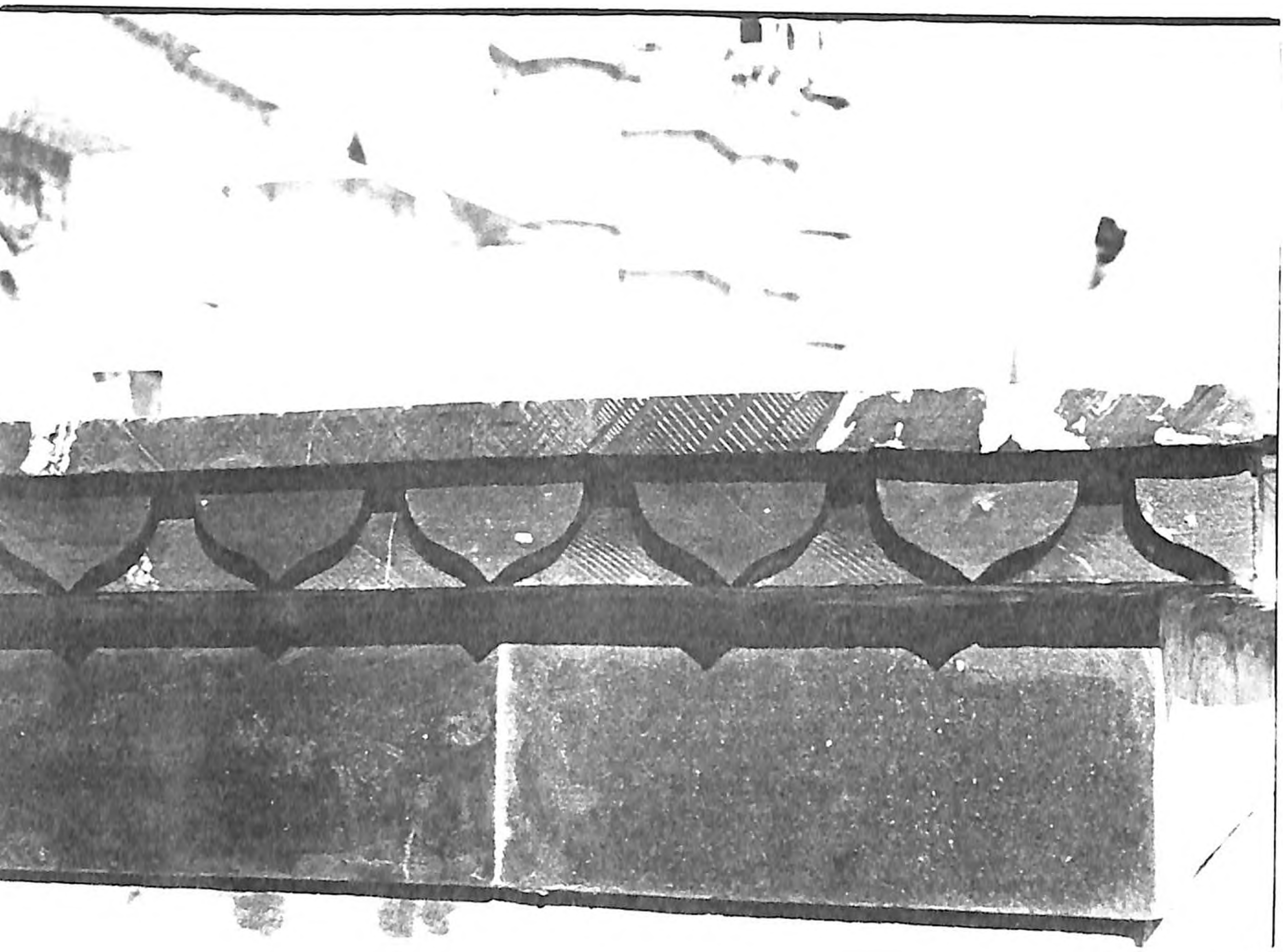


Figure 30



GOVIND DEOJI TEMPLE

JAIPUR



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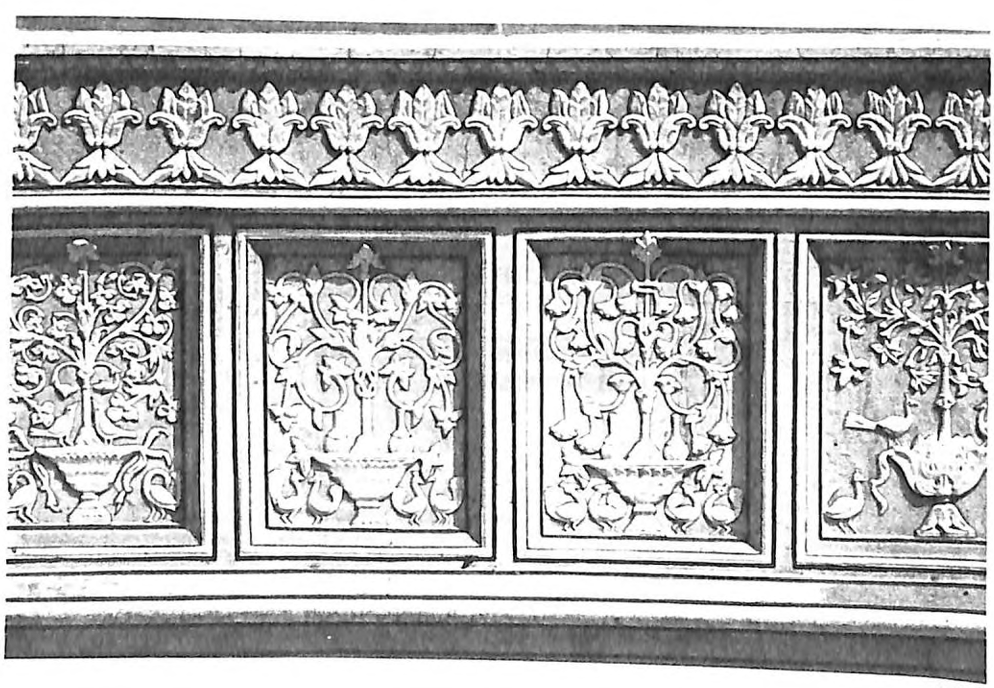

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PARAPETS

UDAI RAM, KISHANPOLE BAZAR, JAIPUR

FIG. 1. FROM THE CHAMBO OF UDAI RAM, KISHANPOLE BAZAR, JEYPORE.

Figure 31

FIG. 2. FROM THE GANGA LALL BAISTIA, KISHANPOLE BAZAR, JEYPORE.

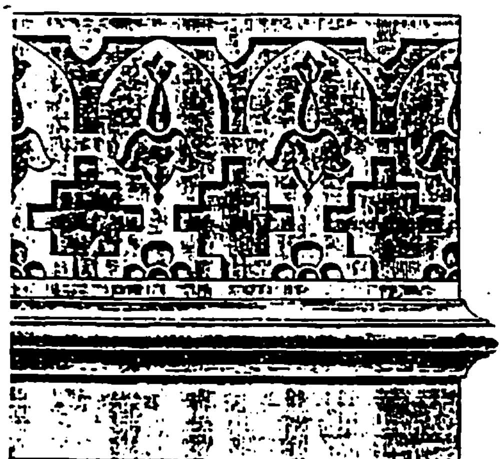


Figure 32

FIG. 3. FROM THE GOOKOO-KA-MANDIR, SANGANER, JEYPORE.

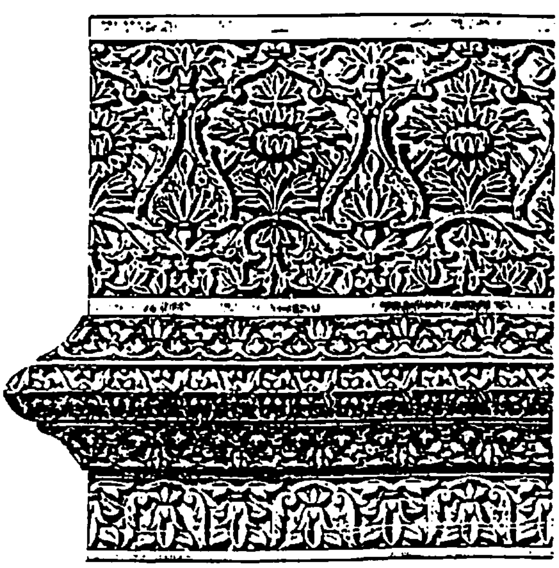


Figure 33

SITA RAMJI MANDIR, JAIPUR

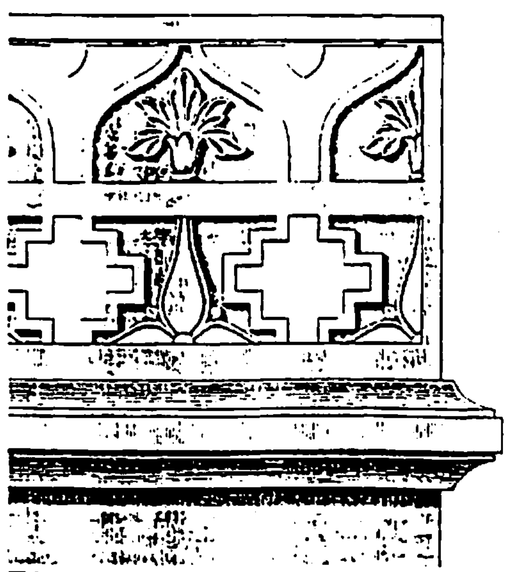


Figure 34

PARAPETS

BADHI CHAND'S NASIAN, AMBER

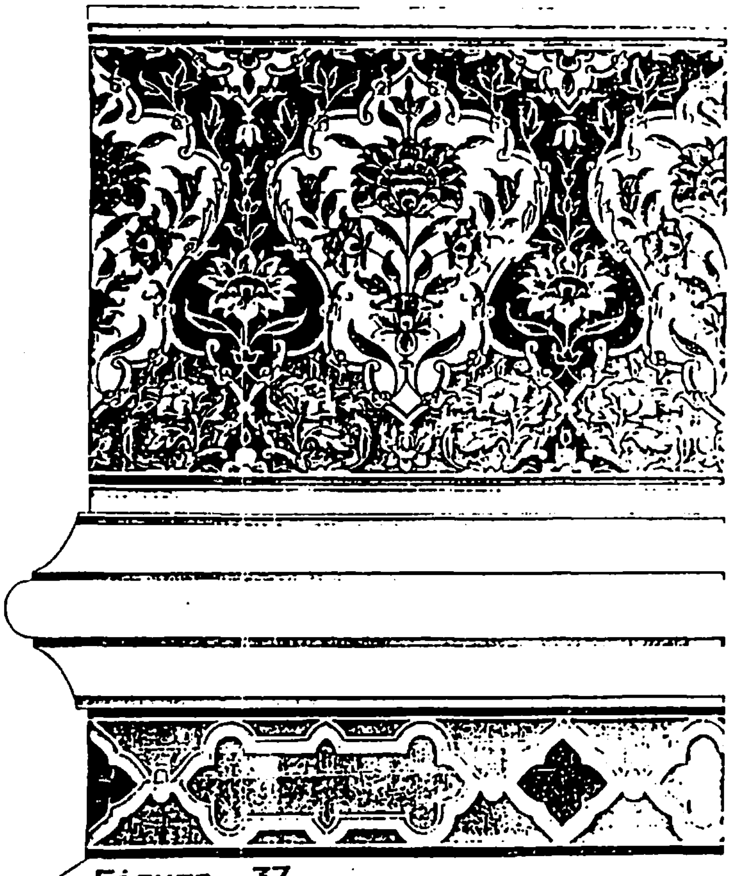


Figure 37

OSWALON-KA-MANDIR AMBER

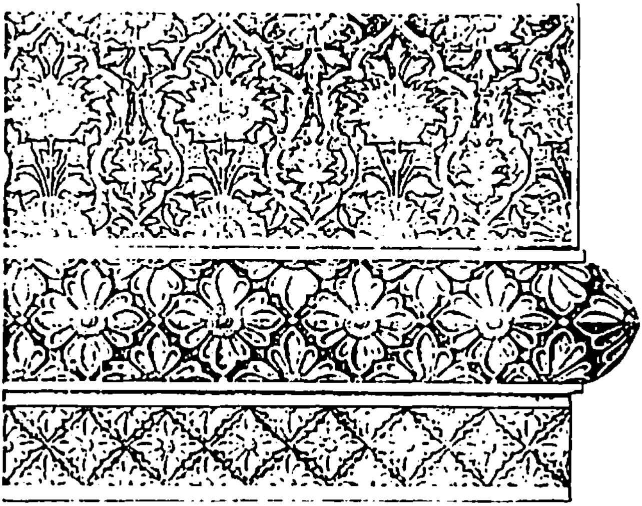


Figure 35

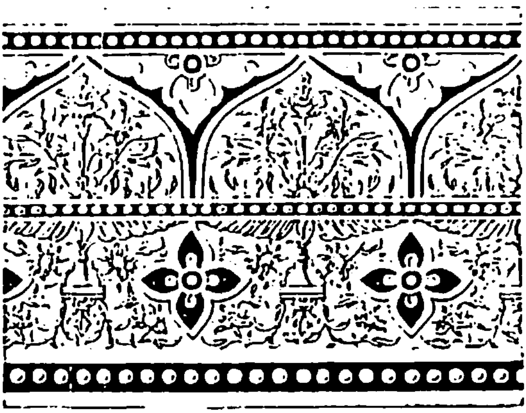
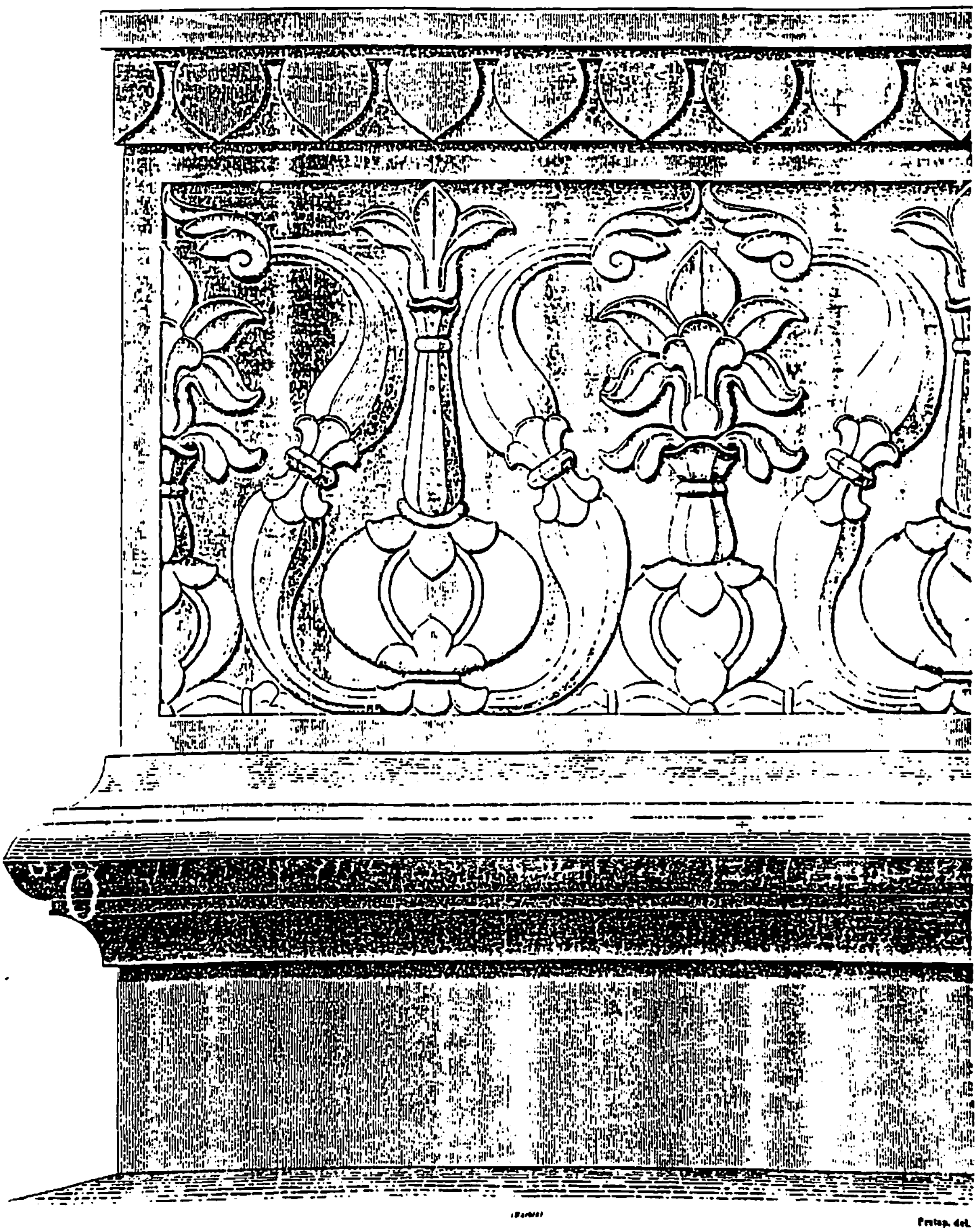


Figure 36

Figure 38

PARAPETS

FROM THE GODHA MANDIR AT GHAT CHAUKRI.



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GODHA MANDIR AT GHAT CHAUKRI JAIPUR

PARAPETS

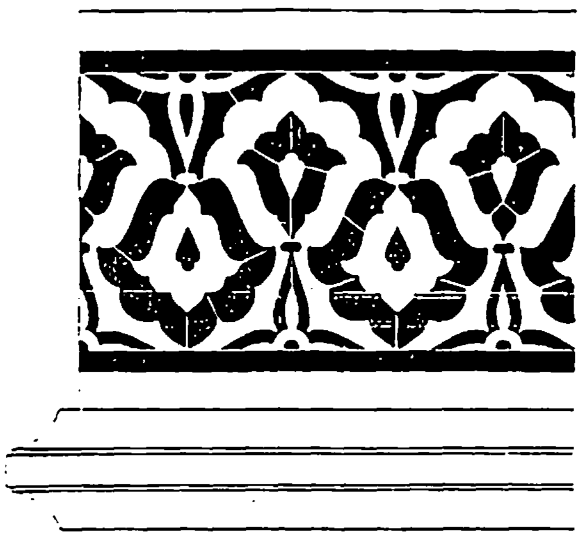


Figure 39

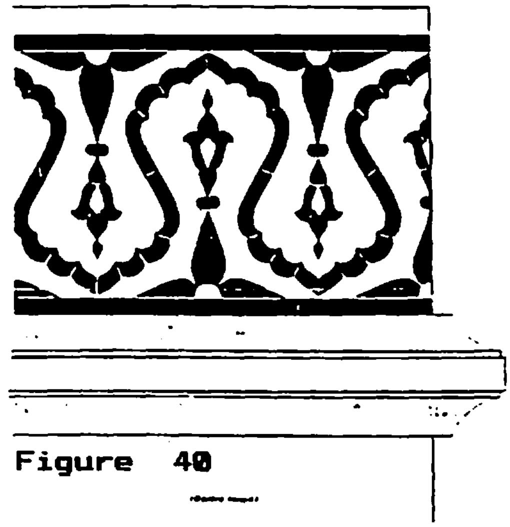


Figure 40

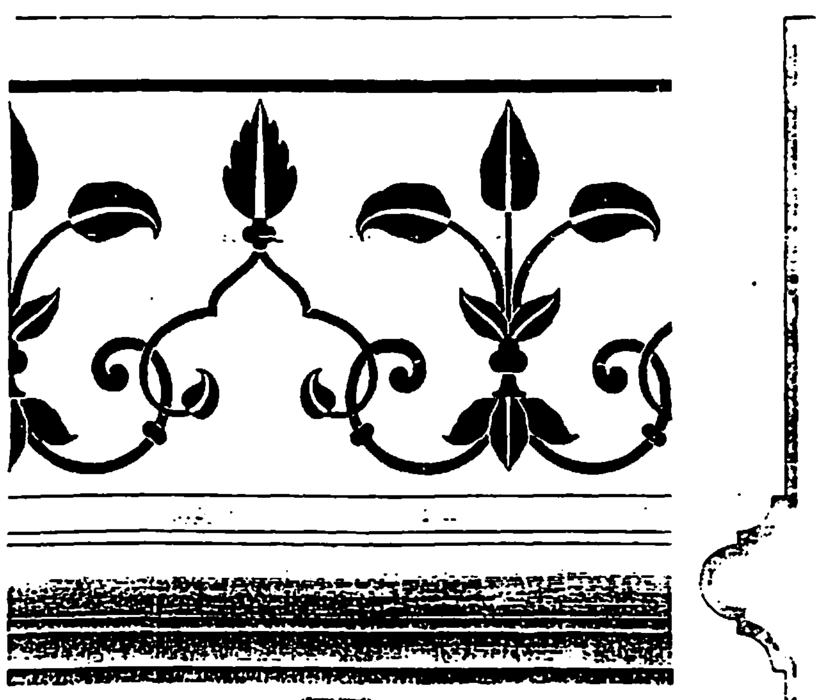
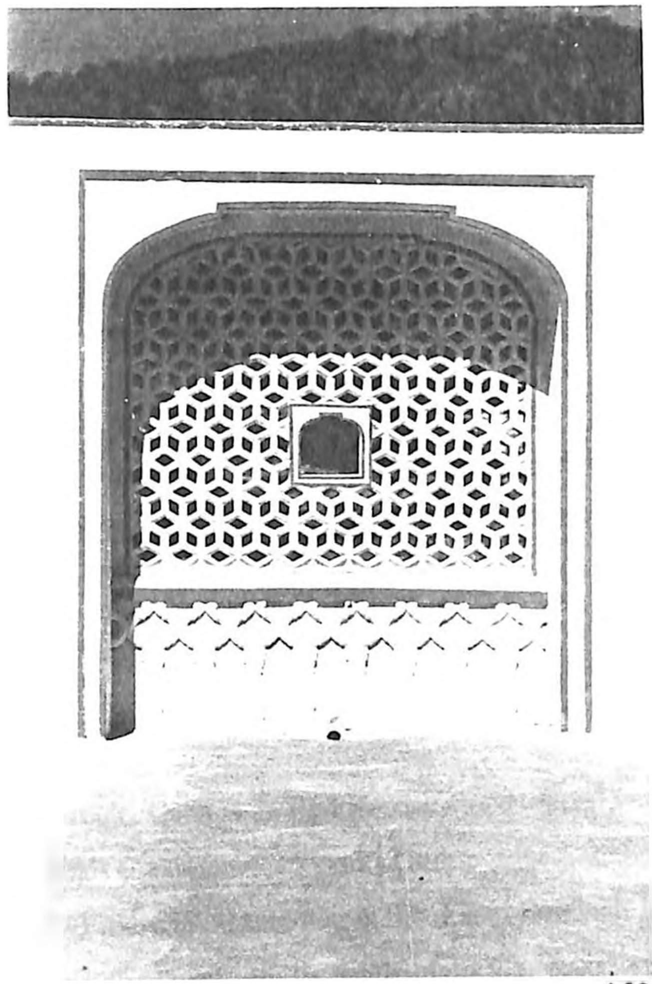


Figure 41

JAS MANDIR, AMBER

PLATE LXXXII



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and sun flower being the dominant relief features in the parapet. The fine detailing in marble carving being the measure of architectural perfection.

'Parkota' walls around building complexes are divided into regular portions called crenellations or *'Kangooras'* which crown the wall. In forts and palaces these *'Kangooras'* were suitable for archers and gunners to use as a cover.

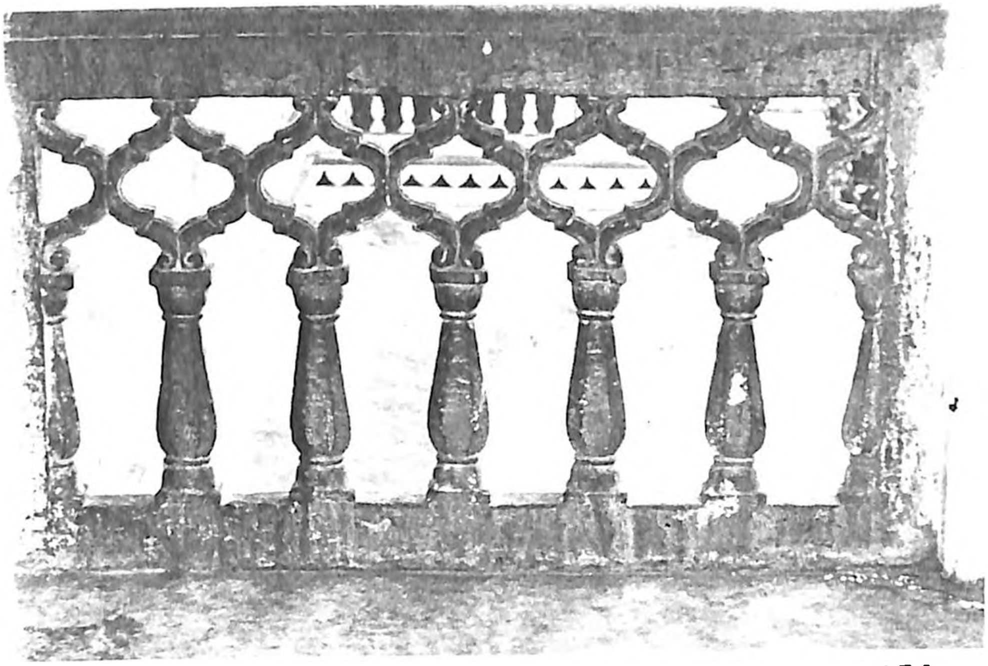
5.2.9 Railings

Railings are upright lattice work in stone or lime with solid intermediate posts called *'Thamis'* which forms a boundary of a balcony, terrace, *'Chatri'*, *'junk'*, courtyard, etc. It usually measures 1'-6" in height. At places where the height is required to be increased, additional stone or lime bracing is provided to strengthen the lattice work. One such example is the railing at the City Palace.

At Sitaramji temple and Gyan Gopalji temple, Galta is in Red Karoali stone topped with a semi-circular round or aquare stone which binds the different screens of stone jalee together. It may be called as a coping stone on the top. At more important places the railings are built in marble stone. The typical stone railing commonly employed can be divided into four parts. The inverted bow shaped base with a polygonal bud shaped shaft topped with an upright capital. The capital further extends into a oogee shaped decorative design. Upon this, the coping stone or balustrade is kept. At the base of railings are floral dasa stone joined by iron dowel. The dasa is usually 2 feet 3 inches thick.

Lime *'Jalee'* railings in parkota wall on the north side at Govind Deoji temple has a diagonal geometry acting as a screen. The lime 'Jalees' are carved out from solid three feet four inches thick lime mortar with specialised tools and are reinforced by rope fibres to avoid cracking on the top coat, and it is also strengthened by lime mortar posts.

PLATE LXXXIII



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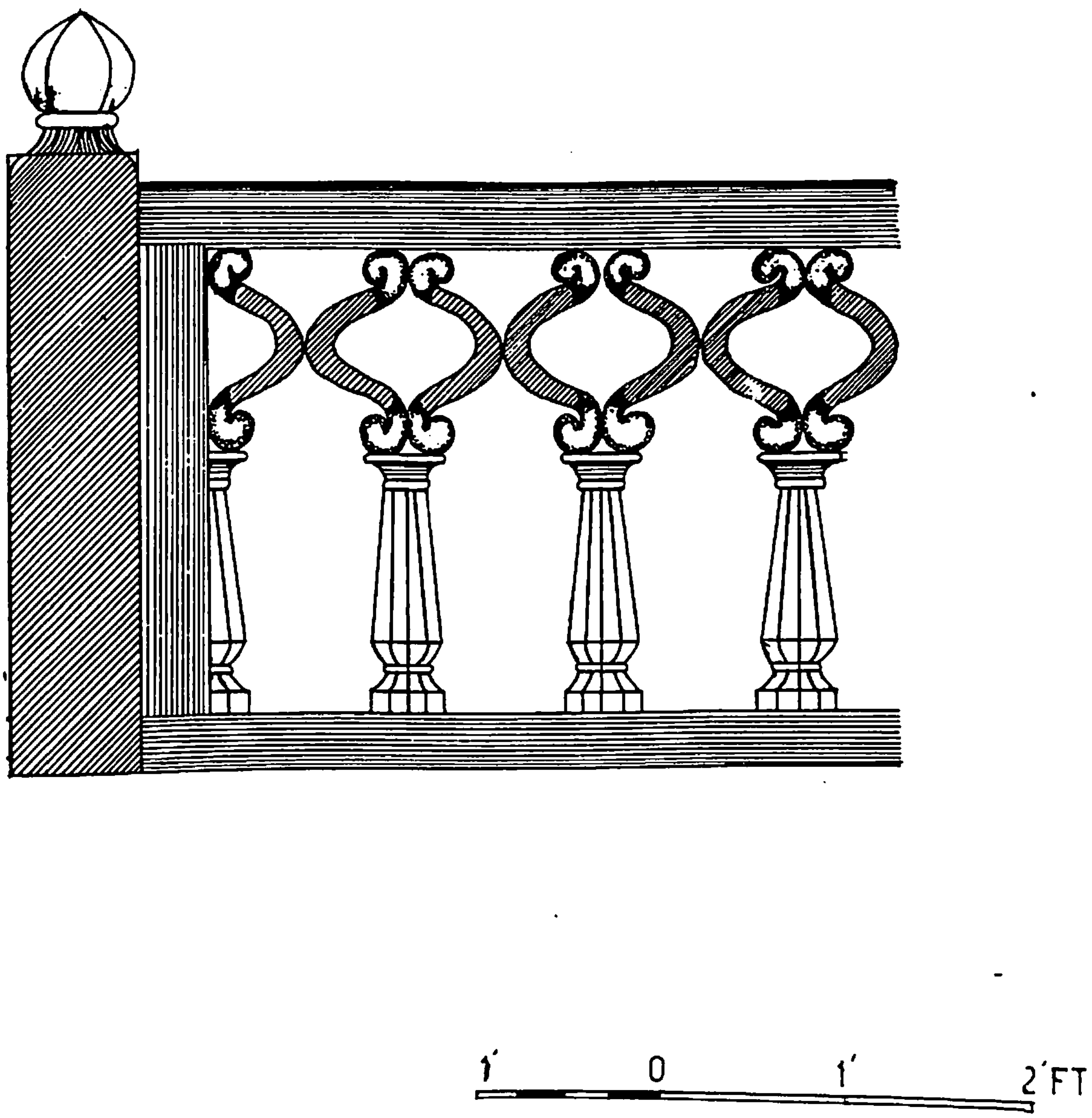
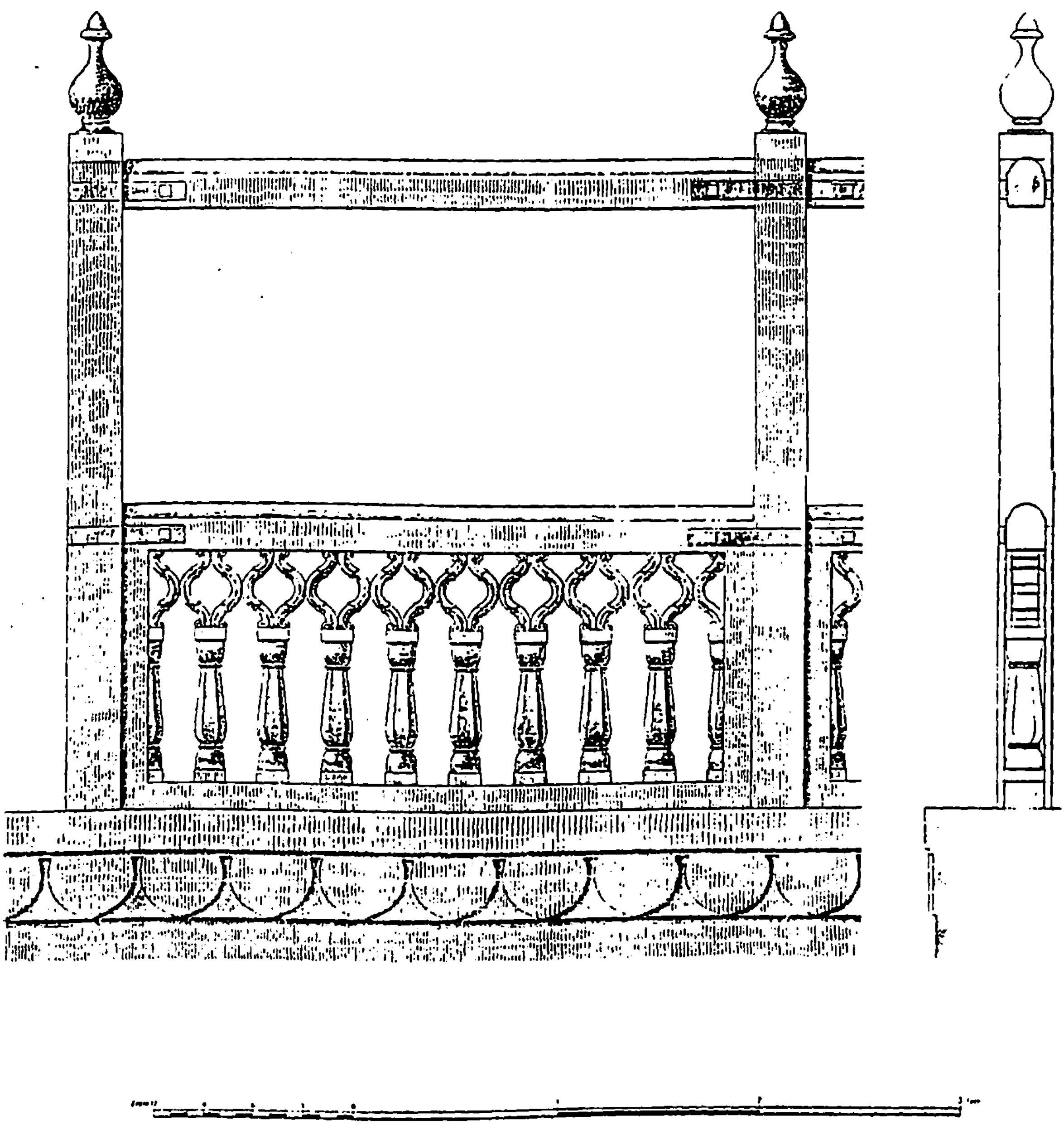
RAILING

Figure 42



GALTA GHATI, JAIPUR

BALUSTRADES



AMBER PALACE

BALUSTRDER'S AND TRACERY

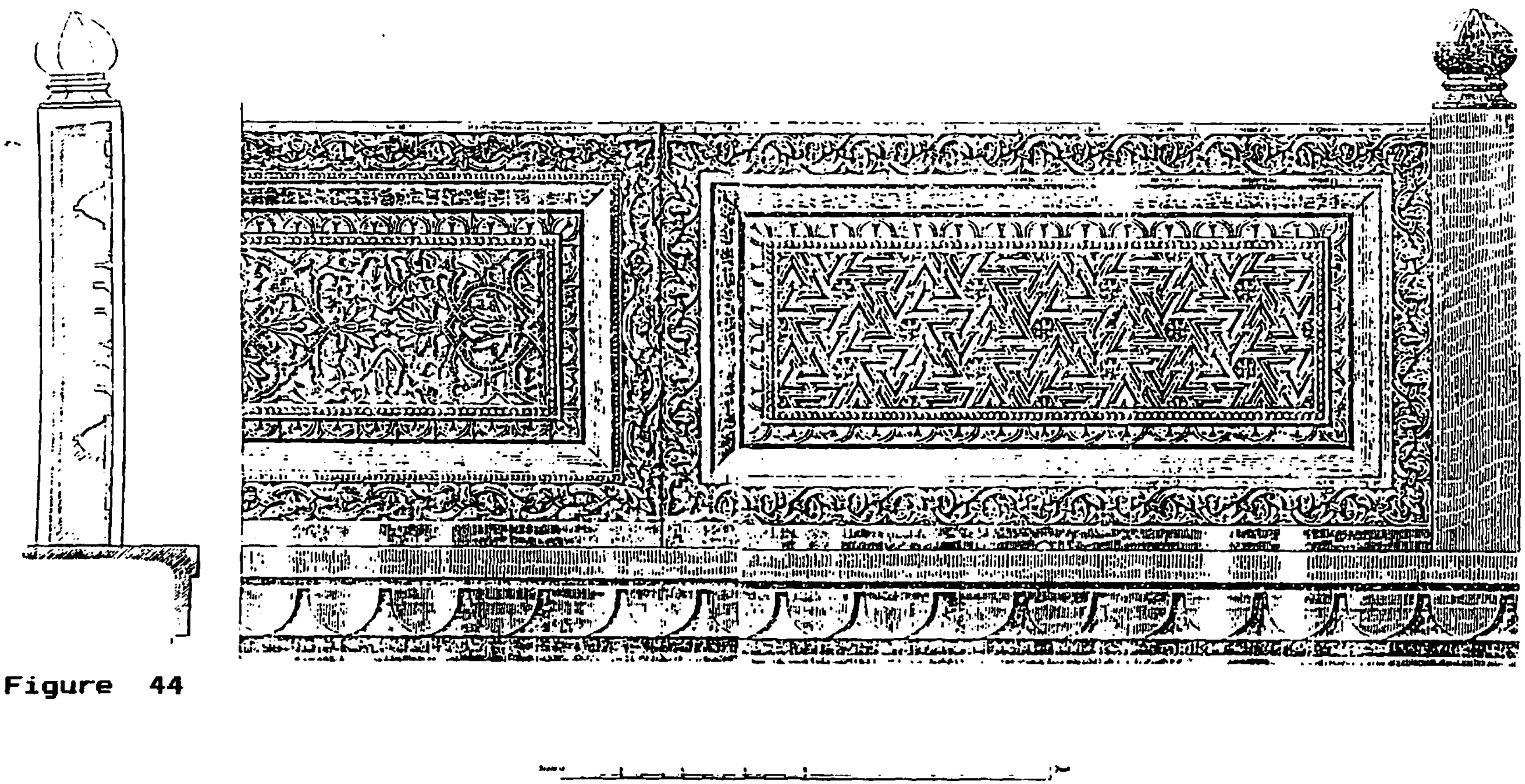


Figure 44

JAGATSARWANJI TEMPLE, AMBER

In components such as '*Kabanis*' use of lime '*Jalee*' relief work ornamentation is to give a false impression of a railing to the longitudinal front face of a '*Kabani*'. All the railings have intermediate upright posts and a petal shaped dasa underneath.

The delicately proportioned geometrics of lime and stone '*Jalee*' existing in other historical buildings of the same period formed a base for the replication and restoration of all railings and parapet walls.

5.2.10 Doors

Introduction

Rajputana architecture is very exhaustive on door and door ornamentations. The first point to note is the different limbs of the door space. The door called '*junk*', '*junk*', etc. is constituted of '*Bai*' - the lintel under which the door is placed, this lintel and the space between the two walls or the entrance is traditionally called '*Paitam*', the vertical side frames are called 'Utranga' and together the process of erecting a door is termed as 'Bai Varana'. The door panels called '*Kapata*', or 'Varana', were mostly made up of Mango wood and the ornamentations. Mouldings were carried at in Shisham wood. The two-fold door panels are called '*Kaptana Yugala*'. The door-belt called '*Kunda*', is for the purpose of bolting them together. If the door is of a big size, it is called '*Pol*'. The other elements of the door, though ornamental, are niches, 'Bangri' arches and mouldings.

The doors are placed on the different cardinal points, and their different varieties are the result of the variations in their positions. As the town entrances were fortified by parkota walls, they were called Pol.

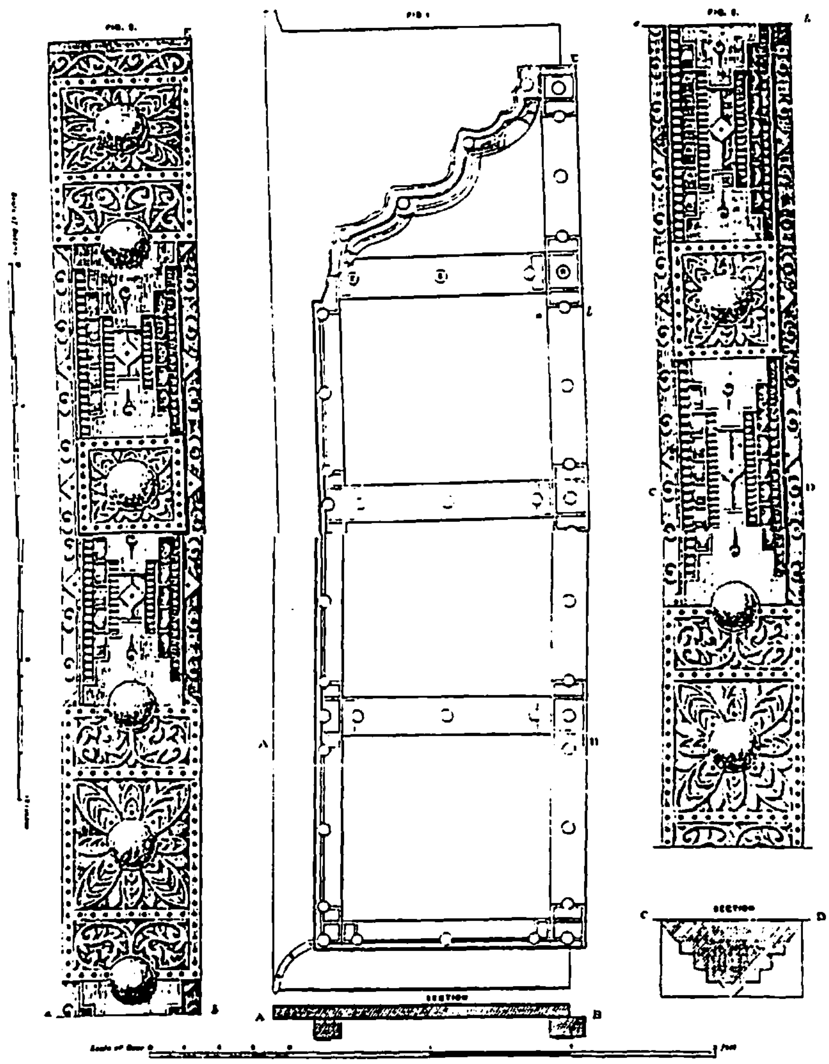
Construction

Regarding the dimension, the general rule is that the height of the door should be twice the width, but deviations from this rule are seen at places.

The panel is usually 1 1/2 inches thick and the *'Pustivan'* a metal strip bracing is secured by iron nails. These bracings divide the door into 3,5 or more divisions depending upon the size of the door. The door is hinged to the stone frame, at the top and bottom by means of 'Adab datari' measuring 6" high and 2" diameter. This formed metal strip is 5 cms thick at the bottom of the door and much thinner at the head of the door because the bottom has to undertake greater load. It is housed in either an iron cover or a stone hemispherical bowl, the latter is used for large heavy entrance gates.

The locking system from inside of a door is by means of sliding a wooden patten 1 1/2 inches thick 10-12 inches long into metal hooks or *'Kunda'*. Together the lock is called a *'Karnala'*. The front face of the door has brass or iron 'Kadas' in circular or oval shape of approximately 5 mm thickness. The *'Kada'* is secured to the *'palla'* by means of a metal plate fixed by bolt. One panel overlaps the other interlocking the two panels together without showing the groove in between. This vertical wooden strip adorned by alternate octagonal and starshaped panels adorned by silver, brass, iron or inlay *'Knobs'* called *'Phooljharis'*. This vertical member is traditionally called *'junk'*. *'Gotam'* actually refers to the mouldings in the cusped arch, about 2" thick 'Beni' refers to the wooden moulding steeped in section. *'junk'* may be hexagonal circular or pentagonal in section. A chain attached to an iron hook embedded in the *'Paitam'* locks the door from front. This locking system is called *'Saankal'*. The door frames were of sandstone or marble. The panels were of Mango wood and 'Keekar' for economy, Shisham was used for all ornamentation, grafting work and inlay work on doors.

CARVED DOOR



AMBER PALACE

INLAID IVORY DOOR

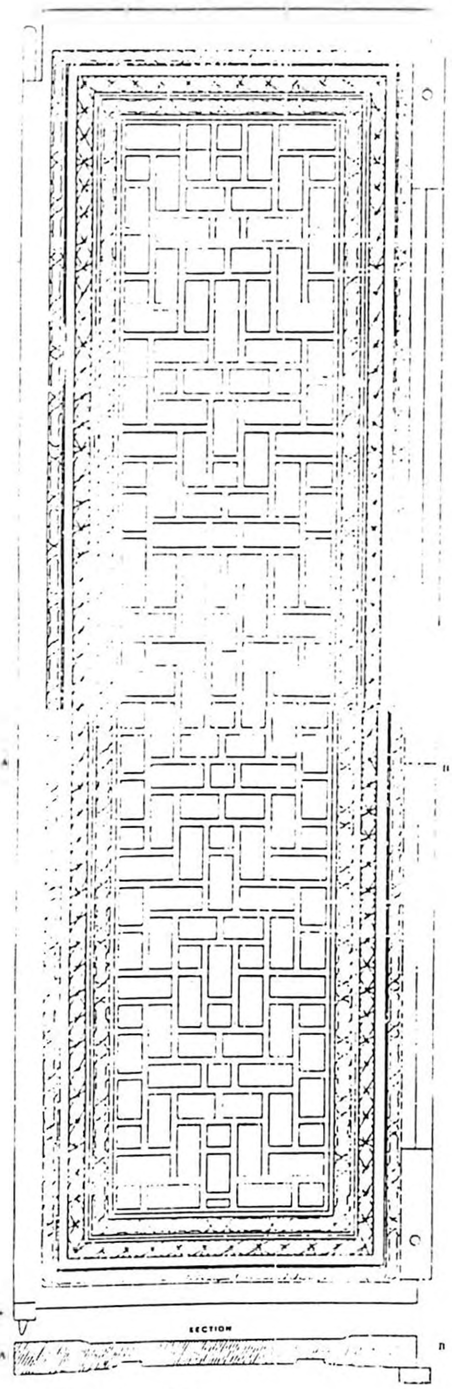


Figure 46

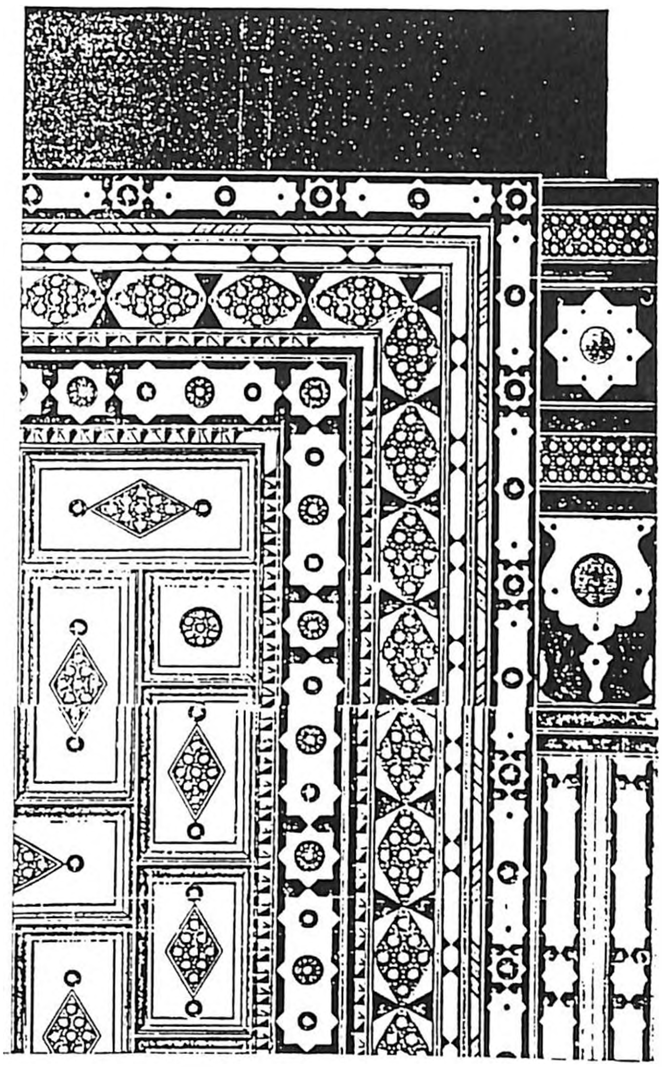
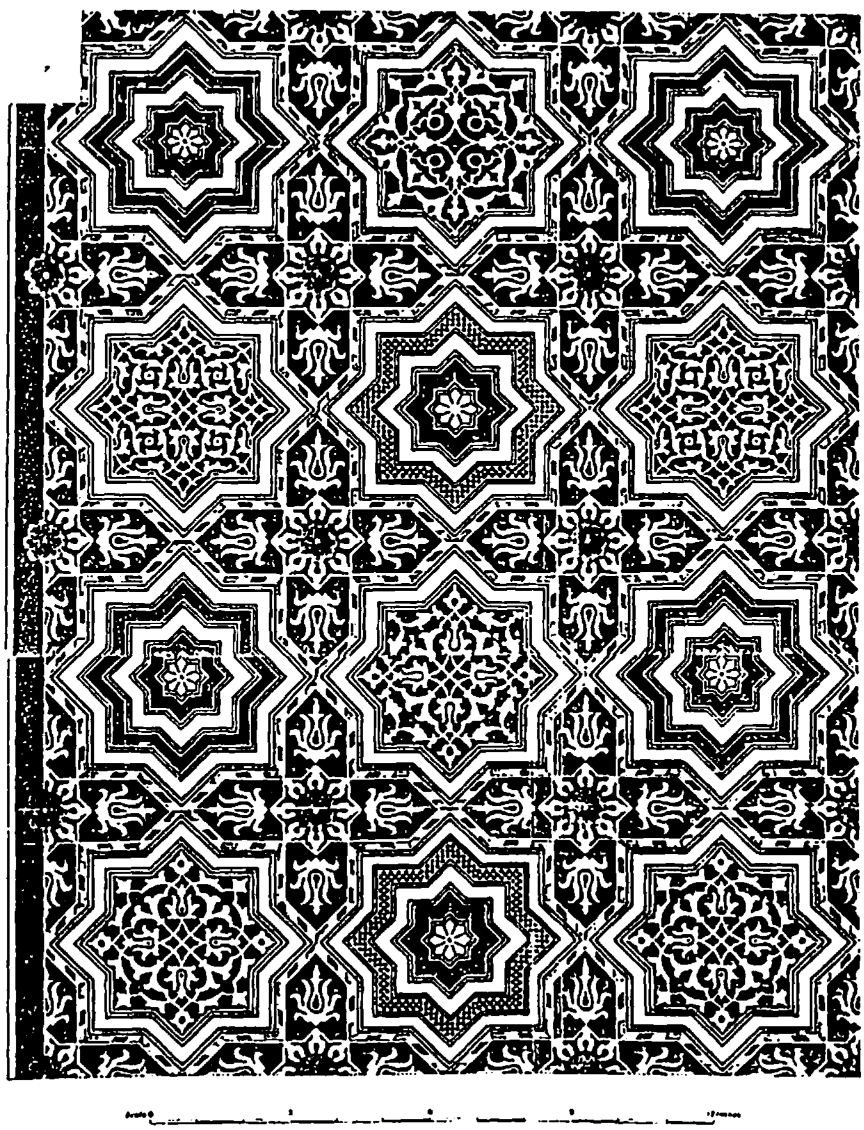


Figure 47

AMBER PALACE

INLAID IVORY DOOR



AMBER PALACE

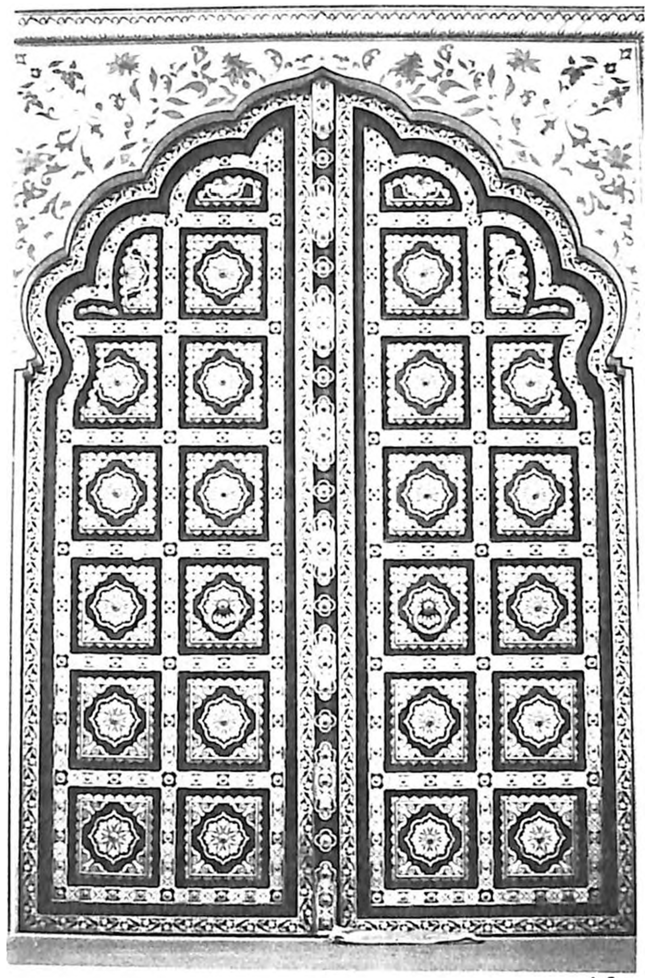
Ornamentation on Door Panels

1. Sandalwood *'Swastik'* pattern door adorned in Govind Deoji Temple. The wooden beading makes a *'Swastik'* pattern skeleton for inlay work. Then wooden boxes are grafted and stuck in the voids, of the bevelled edged beading around. The border alternates with star pattern one in square and one elongated. The *'Gotam* beni' is 2 1/2 inches wide hexagonal in section and fixed in wave pattern in two contrasting woods. Each rectangle pattern is fixed with two round brass *'Phooljharis'* or bolts all along the central vertical rail.

2. *'junk'* work in Natwarji temple. The flat portion of the *'Seep'* is obtained from sea and is used. In the engraved pattern of boxes grafted and stuck between the wooden beading on the panel again form the *'Swastik'* pattern. Here the 'Gotam beni' is decorated with wood and pearl combination. The border's star pattern is similarly engraved in wood and inlaid in pearl. The rectangles in the *'Beni'* are screwed with concealed nails instead of bolts.

3. (a) *'junk'* and *'junk'* in Natwarji temple an iron dye is made in different patterns and 1 mm thick silver foil is hammered carefully to the dye and cut to size. Then it is stuck to the wooden beadings on the door panel by means of silver nails itself. Different dyes were made for filler, vertical member and borders.

   (b) *'junk'*: Concave copper cups are made and Belgiam coloured glass of different colours is poured while in molten state and allowed to set until cooled. Copper is used because of its flexibility. Once set only the copper edging is visible. 'Meena work' flowers are adorned all along the periphery of the silver foil door and on the central member. Each panel is divided into 4 rectangular divisions upto the base of the arch and one division on top echoes the arched shape itself. *'Meena'* flowers (5 nos.) are on the central member and the door handle and knobs are designed as elephant trunk shape made in pure German silver.



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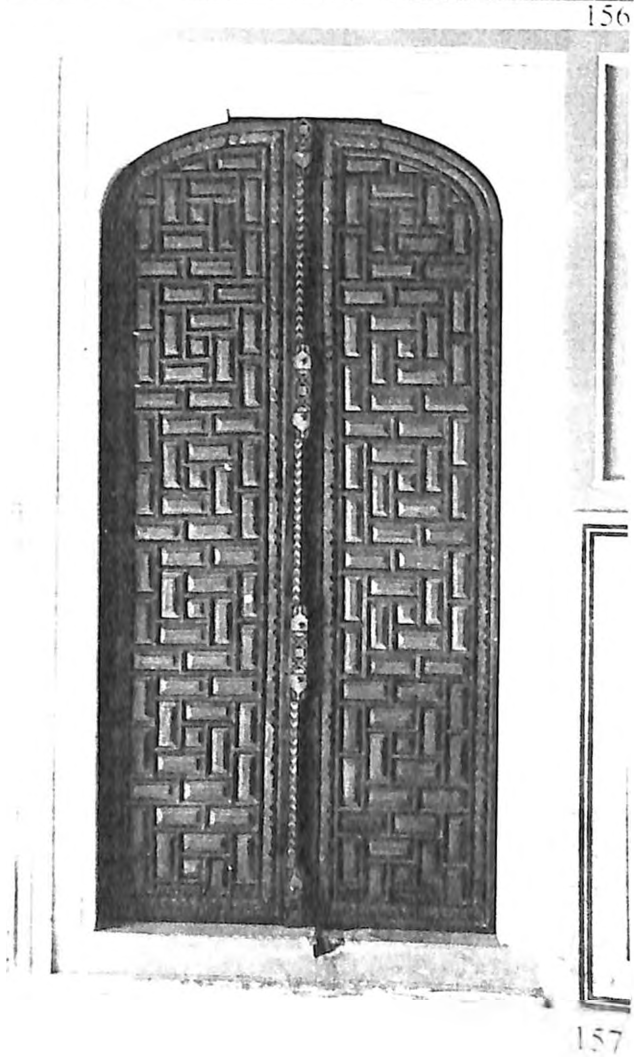

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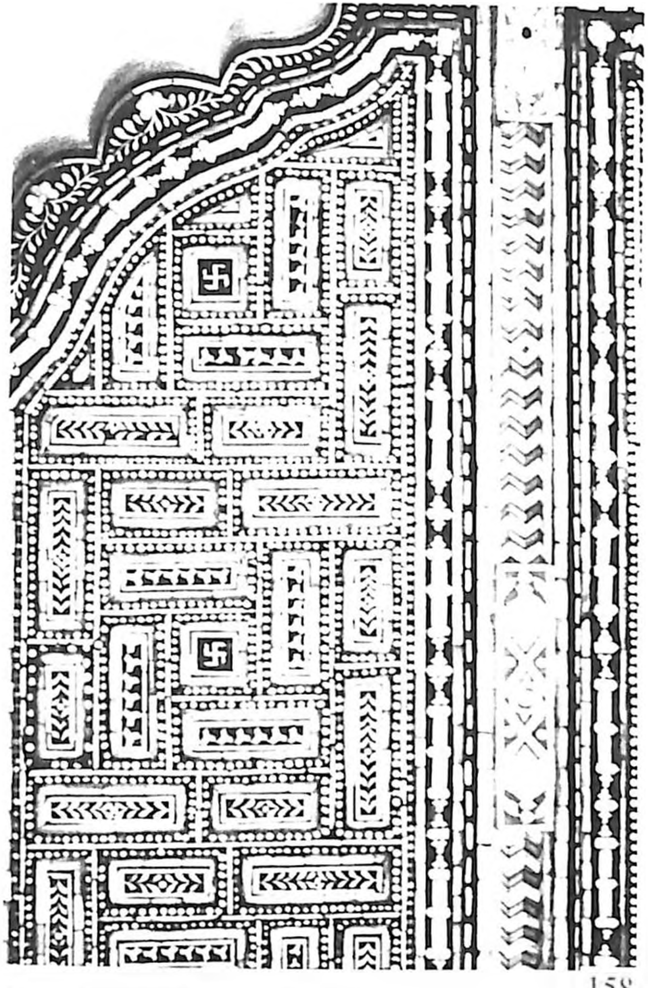
PLATE LXXXVI



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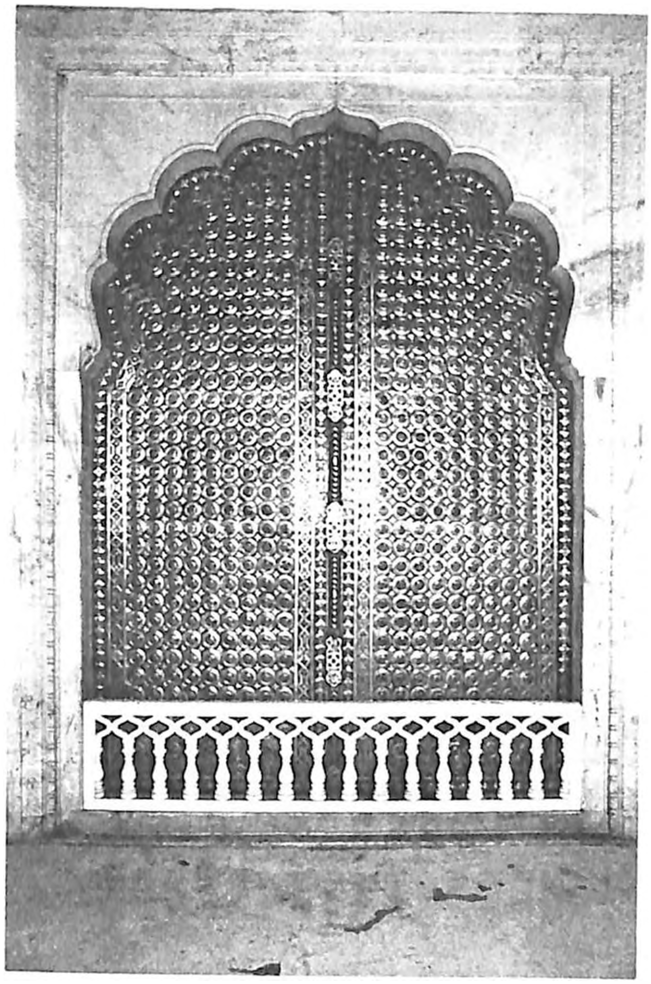

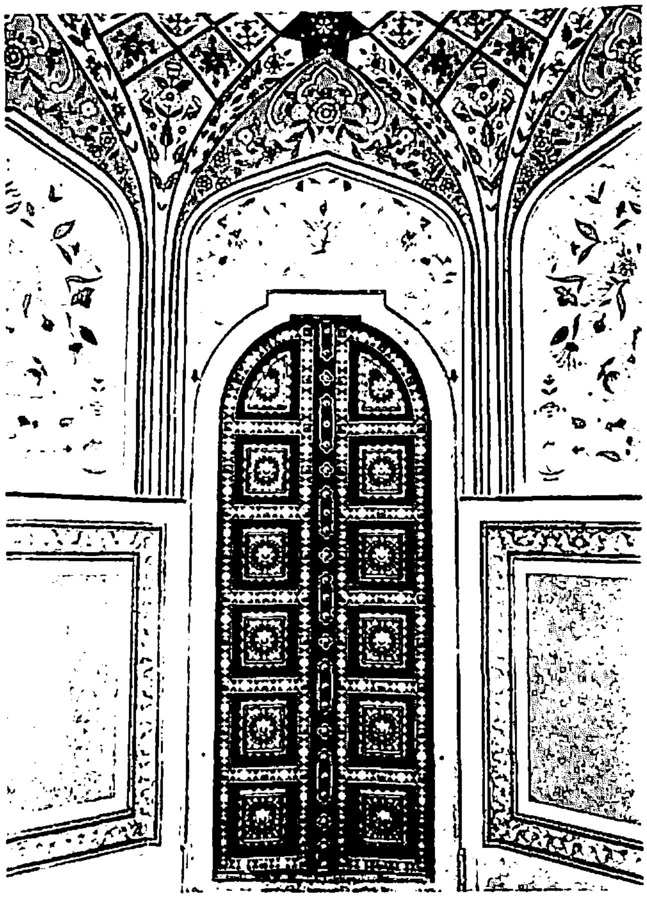

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4. Brass inlay door at Govind Deoji temple. Its size is 6x10 feet with 5 bracings. 1 1/2 inches diameter brass ring patterns were nailed all over to fill in between the wooden bracing on the panels. The border has a star patern in brass stuck alternatively in square and elongated stars.

5.2.11 Izzaras

Ther term *'Izzara'* refers to the traditional continuous band that runs all arojnd the walls, in both interiors as well as exteriors, like a *'dado'*. Usually this band acts as an index of the whole colour scheme. Besides the aesthetic value of this permanent wall surface it allows the viewer to appreciate the balance of geometrics and colour contrasts at an eye level itself.

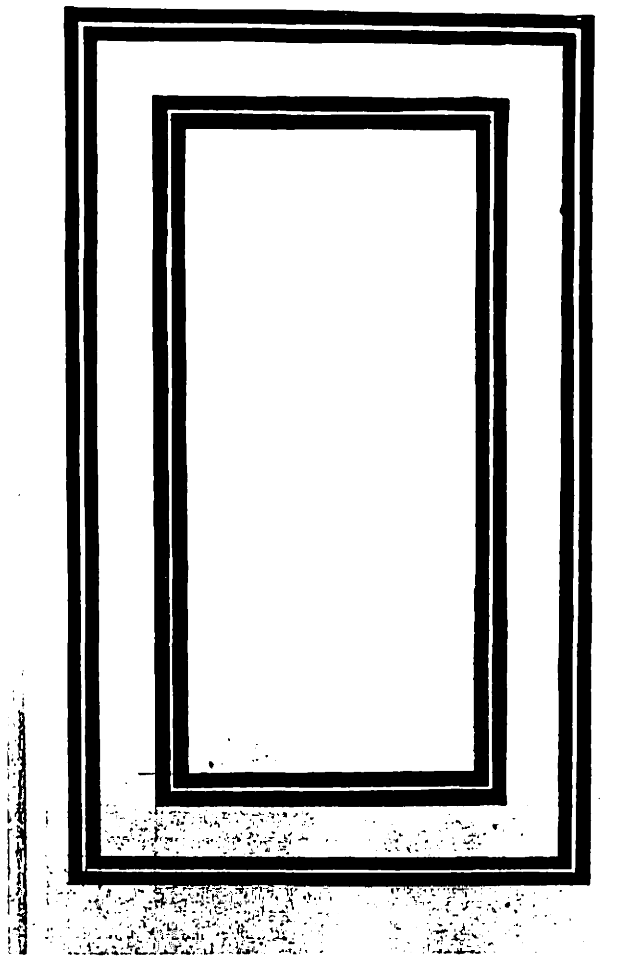
In Udaipur practice this decorative band is 1'-6" high and is adorned with rich wall paintings. These paintings are based upon vanour themes depicted in natural stone pigments, stone inlay work or carved motifs. In Jaipur practice we find the 'dado' varying from 3 feet to 4 feet height.

At Galtaji we find the 'Izzaras' to be the favourite canvas that witnesses the master carftsmanship of the painters and artists, who have adorned them with rich frescoes and wall paintings. They usually bear themes from the lives of lord Rama and lord Krishna and also the daily activities of women of that time.

The Govind Deoji and Natwarji Temple complexes emphasizes the 'Izzaras' by line work of varying thicknesses all around, thus creating rectangular borders.

AT Ganesh Pole, BISR Jaipur, the 'dado' is 4 feet high with saffron colour in the centre and a green border all around. The 'Izzara' thus provides a pedestral to the entire external facade.

At Amber's Jaya Mandir and Jas Mandir one finds exquisite examples in 'Marble inlay' work along the borders and intricate monolithically carved floral relief patterns at the centre.



DADOS

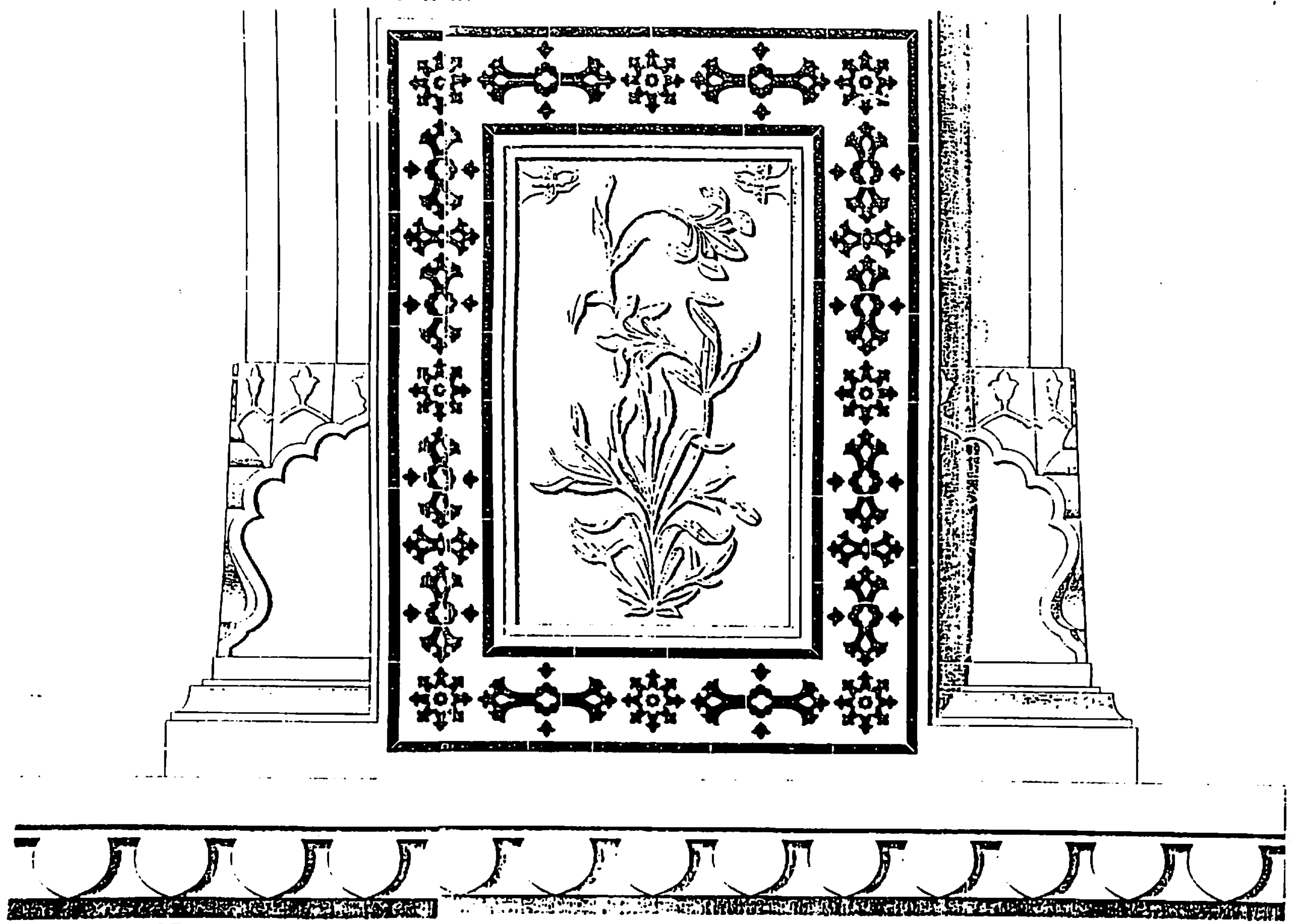


Figure 49

JAYA MANDIR, AMBER

CHAPTER 6

RESTORATION

The traditional architecture in different regions of Rajasthan has gradually evolved over the centuries into a rich blend of styles. The regional uniqueness has a great relevance to the climatic conditions, availability of material and the craftsmanship. Besides the living traditions influenced by socio-economical and religious values of the period, it has been noticed that no two regions of the state have same architectural style. Each has a distinctive flavour and identity of its own crafts and craftsmanship although they have a consistent pattern interms of setting, scale, proportions, colours and finishes spreads all over. The distinctive architectural style is thus represented in the design of palaces, forts, havelis and temples. The Patwan's Haveli at Jaisalmer, Bagore Ki Haveli at Udaipur (Mewar region), Umaid Bhawan at Jodhpur (Marwar region), Hawa Mahal at Jaipur, Sunhari Haveli at Laxmangarh (Shekhawati region), and some other buildings represents the impecable architecture of urban context. The rural building traditions too shows regional variations due to microclaimtic conditions, constraints of materials and variations in living traditions. Thus it is represented at cluster level at Haruti, Shekhawati, Barmer, Bikaner, Dungarpur and Jaipur regions with more functional design.

The architecture thus composed elements *like 'Chatris', 'Kabanis', 'Arches', 'Jharokhas'*, Ornamental, Columns, Intricate *'Jalees', 'Brackets' ('todas')* and Inlay doors. All these demonstrate perfection in skill and use of material. The finishes and ornamentations also reflect perfection of various arts. *The 'Mirror work', 'Panniwork', 'Pacchikari', 'Dak Meena'* and decorative stained glass work in addition to *'Aaraish* finish and fresco rendered richness to the historical buildings.

With the aim of reviving the heritage, the restoration is carried out adhering to the traditional building materials and their application skills. The indiginious materials were used after analysing the original materials employed in the historical buildings. The samples were taken up from individual building without affecting the integrity and harmony of the structure.

It was found that the materials used were most adaptable and compatible with the ancient techniques of crafts. This prevented the decay and revived the life span of these buildings to a great extent.

The traditional building materials have been used for the restoration work of the following components of the historical buildings under study.

6.1 MATERIALS

Lime Mortar

a. Lime

b. Surkhi

c. Addatives

6.2 TECHNIQUES OF STRUCTURAL RESTORATION

6.2.1 Repairs of Crack Structures

6.2.2 Reconstruction of the Roof without Dismantaling the upper portion

6.2.3 Lime Plaster

6.3 TECHNIQUES OF RESTORATION OF ARCHITECTURAL FINISHES

6.3.1 Lime Stucco

6.3.2 Lattice Work

6.3.3 Dar

6.3.4 Loi

6.3.5 Kara

6.3.6 Frescoes

6.3.7 Khamira

6.1 MATERIALS

The restoration of structural and architectural components and their finishes was done by Lime Mortar prepared as per the given procedure.

6.1.1 Lime Mortar

The lime mortar for the restoration work consists of the following components :

a. Lime

b. Surkhi/Sand

Additives

These components vary in quantity and preparation techniques depending on the part of restoration.

Lime :

Good quality lime stone is abundantly distributed in the western belt of Rajasthan. The pure form of lime deposits are found near Kotputli, Maonda, Ramgarh, Sandhkotra, Ghatra while the reserves of impure form are wide spread and occur near Naila, Raori, Sirohi, Nimla and Dabla. The best quality of Rajasthan Lime Stones are available at Sojat and Ghatra.

Lime in the mortar is used in the form of slaked lime or (Calcium Oxide - $Ca(OH)_2$). It has been made for thousands of years by burning native Calcium Carbonate ($CaCo_3$) which together with wood or coke in specially constructed kilns produces through calcination Calcium Oxide - CaO known as quick lime.

Slaking of Lime (Plate XC,163)

When lime is mixed with water, a chemical reaction occurs and the product is Calcium Hydroxide ($Ca(OH)_2$ known as slaked lime or hydrated lime. Theoretically, lime is combined with water to the amount of 32.1 percent of its weight; actually, it takes somewhat less on account of its impurities. This figure is based on Stoichiometric, and the resulting product would theoretically be a dry powder.. Because the heat generated by the slaking of lime evaporates a considerable amount of the water, and there excess amount of water is required based on the type of its use. For lime mortar we require in the form of slurry (55% to 70% of free water and for Fresco it will be in the form of putty (30-45% of water). Slaking of lime for mortar is done in specially designed tank.

Different limes have different types of slaking. Nonhydroulic fat lime slakes rapidly with much heat and the expansion on slaking is considerable, whereas Magnesium lime slakes slowly with variable expansion and matures in minimum 48 hours. Semi hydraulic and hydraulic lime takes 36 hours each.

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Rapidly slaked lime tends to be colloidal whereas slowly slaked lime tends to be crystalline therefore it is important that the required amount of water should be added at once and quickly mixed with the entire amount of lime. The amount of water differs on the quality of lime. Too little water causes "burnings" of the lime resulting into weak currenting of particles and known as hydrated lime.

Freshly slaked lime contains unslaked particles of active quicklime which will combine with moisture after the mortar is applied causing the defect called blowing or pitting.

Surkhi

'*Surkhi*' is the vernacular name for pozzolana, a binding material of Lime mortar obtained by burning clayey sand with wood at a high temperature. '*Surkhi*' can also be substituted by using the pounded bricks. The grades of '*Surkhi*' or pounded brick powder varies according to their use.

Additives

Resins (Plate XC, 164)

The natural resins are hardened exudation from the trees. Those resins which are extracted from living trees are sometimes called "recent resins" to distinguish them from the fossil resins which are dug from the earth or steam beds. They are insoluble in water, but will dissolve wholly or partially in liquids such as oils, turpentine etc. commonly known as gums but the term gum is applied only to water - soluble substances. Resins vary greatly in properties such as odor, shape, hardness, solubility, and colour stability.

Traditionally the fresco painters employed coloured resins as paint pigments. Those resins formerly used as transparent paint colours. Centuries ago they were replaced by more permanent colours. The chief among them are Lac, Turmeric (Curcuma), Aloe vera.

Turmeric was prepared from the roots of several varieties of a plant. This resin was formerly used to some extent as a yellow dry stuff, and Aloes, are the materials received from the juice of a great many varieties and is used as deep brown colour.

Gums

Gums are the hardened saps which oxide or are made to exude from certain trees and shrubs. When mixed with water will either dissolve or swell to a jelly. When heated strongly it chars like sugar with a smoky flame. Most gums are hygroscopic in their original or pure form than when they have been mixed with other materials. In case of gum arabic from Acacia arabica it is vital to add considerable amounts of honey and other materials to induce this property, in order to keep the pigments moist.

The two varieties of gums extracted from Acacia senegal and Acacia arabica are good binders. Gum from Senegal is harder and less easily dissolved than gum arabic which has more balanced working qualities. Gum arabic is grouped into two classes. The clean, pale variety used for foods and the darker kinds used for technical uses. The later is umber or pinkish brown with greater adhesive strength, but their colour difference is because of sun-bleaching during collection of gum.

The gum is prepared by cooking with water and adding preservative and an essential oil. However the gums used in binding colour pigments and lime is '*Khamira*' finish it was procured from market itself.

Glues (Sares)

Glues contain other materials that impart flexibility, adhesive qualities, body or structural reinforcement to the gel. They reduce shrinkage and improve permanent adhesion. They are made of hide and gradation but in the traditional techniques a paste of wheat floor and water is employed effectively.

Common paste is made by mixing floor or starch smooth with little water to make a thin milky consistency, and carefully, heating with constant stirring until the desired thickness is formed. The proportions vary with the nature of material used. Other additives are alum and some preservatives. The minute quantity of preservative is not intended to prevent a material from decomposing or losing its durable properties by chemical or physical action.

Waxes

All vegetable waxes belong chemically to the group of oils and fats and melt below the boiling point of water. They have the greatest degree of impermeability to atmospheric moisture of any of the protective building materials. Finished *'Kara'* or *'Aaraish'* can be waxed by beeswax, made from melted honey combs.

5. Curd/Casein

The crude curd from skimmed milk has been employed as a binding or adhesive material from the earliest centuries but in modern context it is used as a carefully controlled and uniformed product *'casein'*.

Curd as Binder

Curd solution when mixed with pigments dries to form tough masses which are considerably more resistant to moisture than those made with glue. The paint cracks, flakes or chips off if the binder is too strong. If it is too weak it will crumble and will dust off when rubbed with cotton.

Curd as an Adhesive

As an adhesive it has many advantages over glues. It can be applied cold whereas glues need continuous heat. It dares to a more water resistant mass than glues.

Curd as a Purifier

When a small quantity of curd is mixed in lime and churned well it removes the impurities in the lime as surface slag, which can be scooped off easily.

Curd for Lusture

In '*Aaraish*', technique curd imparts a durable shine and lusture to the finished surface making it smooth and resistant to dust particles.

Methi (Fenugreek)

Powdered '*Methi*' is added to '*Dar*' mortar used for flooring and acts as a powerful waterproofing agent. The same can be used in all wall surfaces also since it is hygroscopic and water repelling by nature.

7. San Fibres

San fibre is used in Lime mortar as san fibres is a reinforcement layer of fibrous skin yellowish in colour and maximum 2 m in length with diameter varying between 0.06 to 0.08 mm usually 0.06 mm average. The fibre is extracted from many type of plants, the best suitable San fibre is of Jute which has properties mentioned below.

Jute Fibre - specific gravity 1.5, tensile strength 227.0 N/mm^2, elongation at break 1.30 per cent, water absorption 120 per cent and modules of elasticity 30,000 N/mm^2.

6.2 TECHNIQUES OF STRUCTURAL RESTORATION

Bernard Feilden (1989) has described the object and process of restoration as "The object of restoration is to revive the original concept or legibility of the object. Restoration and re-integration of details and features occurs frequently and is based upon respect for original material, archaeological evidence, original design and authentic documents. replacement of missing or decayed parts must integrate harmoniously with the whole, but must be distinguishable on close inspection from the original so that the restoration does not falsify archaeological or historical evidence. In a sense, the cleaning of buildings is also a form of restoration, and the replacement of missing decorative elements is another".

Fielden has rightly said that the restoration is much more than the rebuilding of the structure. The restorer architect should know the language of the designer for understanding the structure and composition of the building in terms of the conjectural plan, architectural components, colour scheme and how the same was related to its surroundings.

Following the above mentioned guidelines the total plan for the restoration of various buildings under study was drawn after recording the required details, the restoration of the buildings and work on the environmental conservation was undertaken.

The plan for restoration work included the documentation of the status of the buildings, structural assessment, recording of the causes of decay, analysis of the materials used, identification of the methods and techniques used by the designers and the craftsmen for the construction of the building and ornamentation work. The detailed plans of the original designs, geometrical intricacies were drawn and aesthetic preferences of the fine elements including colour were also recorded.

The analysis of the materials and techniques used were scientifically analysed. It was noticed that the materials and techniques used by the craftsmen hundreds of years back, had scientific basis. It has therefore, helped in the planning and execution of the restoration work in systematic manner.

Restoration of various structures as described under documentation and analysis of architectural components has been done by the use of the specific required techniques. There were some typical problems of structural/architectural components which required common technical treatment for the restoration and this had been explained as follows:

6.2.1 Repair of Crack Structures

The cracks in the buildings can be classified on the basis of their nature, sizes and locations. Horizontal cracks are common in historical buildings and the same were found in the temples of Kanak Vrindavan Ghati. Horizontal cracks develop by the aging and weathering process. Due to the damage to the plaster the foundation and structural masonry gets exposed and the mortar of the joints undergoes weathering and becomes loose and powdery. Due to the weakening of the mortar and weight of the super structure, the stones in the portion of the walls were dislocated from their position, leading to the development of horizontal cracks. This type of cracks were repaired by removing the weak mortar layers and the loose stones. The base masonry was cured properly and the repair was done by properly fixing the required size of stones in rich lime mortar. Such repair work was undertaken from foundation to roof level. After completing the repair work of the masonry, the plastering of the total surface (foundation and superstructure) was redone by using lime mortar with specific additives (as explained in this chapter on techniques).

The other type of cracks were the vertical cracks. The vertical cracks develop due to the over loading, uneven settlement or other structural causes. These were repaired by different types of techniques.

The common types of vertical cracks were repaired by bracing technique. The stone slabs of Budhpura or Karoli sand stone of three inches thickness and required width was placed in masonry in lime mortar in properly prepared horizontal surfaces at different heights along the vertical cracks. The gaps were filled with stones and brick pieces in lime mortar in ratio 1:2 (one part Lime and two part Surkhi). The repaired portion was cured for few days and then the structure was replastered. In one case a wide vertical crack was developed. The crack had disturbed the roof portion leading to the collapse of the roof and bending of the corner portion of the wall upto plinth level (involving both the sides of the corner portion).

Such cracks cannot be repaired by the above mentioned procedure. In this case the total corner portion of the structure had to be dismantled and redone in lime mortar with the use of stones with required types of bonding of this new masonry with the old masonry.

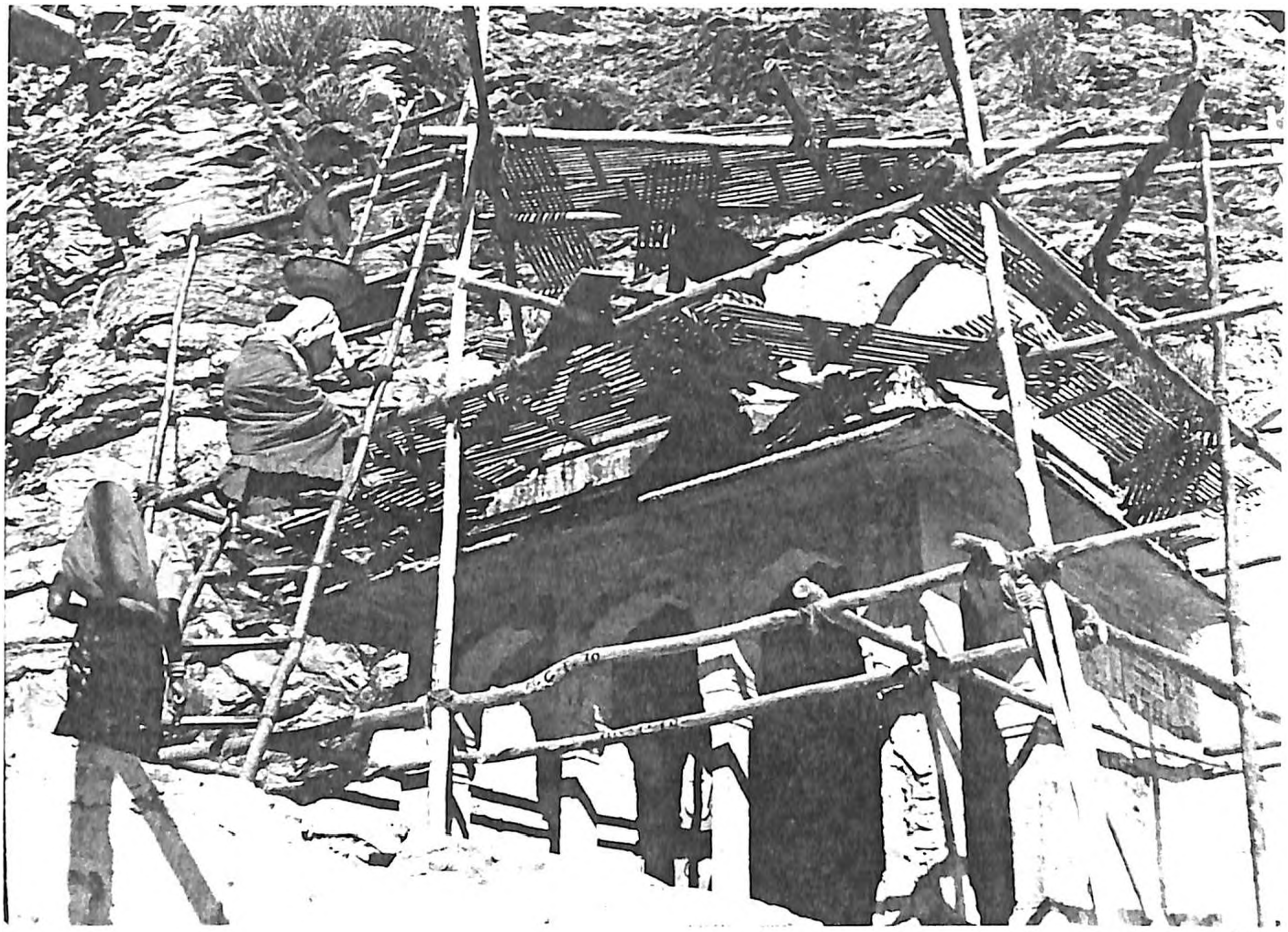
6.2.2 Reconstruction of Roof Without Dismantalising the Upper Portion

There was a challenging task for restoration. The western side Pavilion of Kanak Bagh was damaged. It was reconstructed in a traditional manner. The actual condition of the structure and method followed for restoration is an interesting case for learning and therefore this has been described in detail.

The slab of the roof of the western side of pavilion had developed cracks. This was previously temporarily repaired by the use of wooden rafters for transfering the load of the super structure. Thus on to the Arches and piers.

The load of the upper structure was transfered four sets of joists. The stone columns were inserted in the required positions and arches were made in using lime mortar. After restoring these components a new roof *Ladav-ki-Chat* was made and therefore by this technique the *'Kabani'* in the upper portion was retained.

There is another case of similar type but had the involvement of special type of expertise. The arches in the lower portion of the central *'Kabani'* of western side of the Govind Deoji Temple had become weak and accoupant had repaired the portion by raising a thick brick wall upto the arch level. In this case the restoration was done by using four sets of joists with wooden planks and specially designed scaffolding. After transfering the upper load, the temporary wall was removed and stone arch of one foot six inches thickness was constructed to received the load of Kabani above. The scaffolding were removed after the proper setting of the material of the newly constructed arch.



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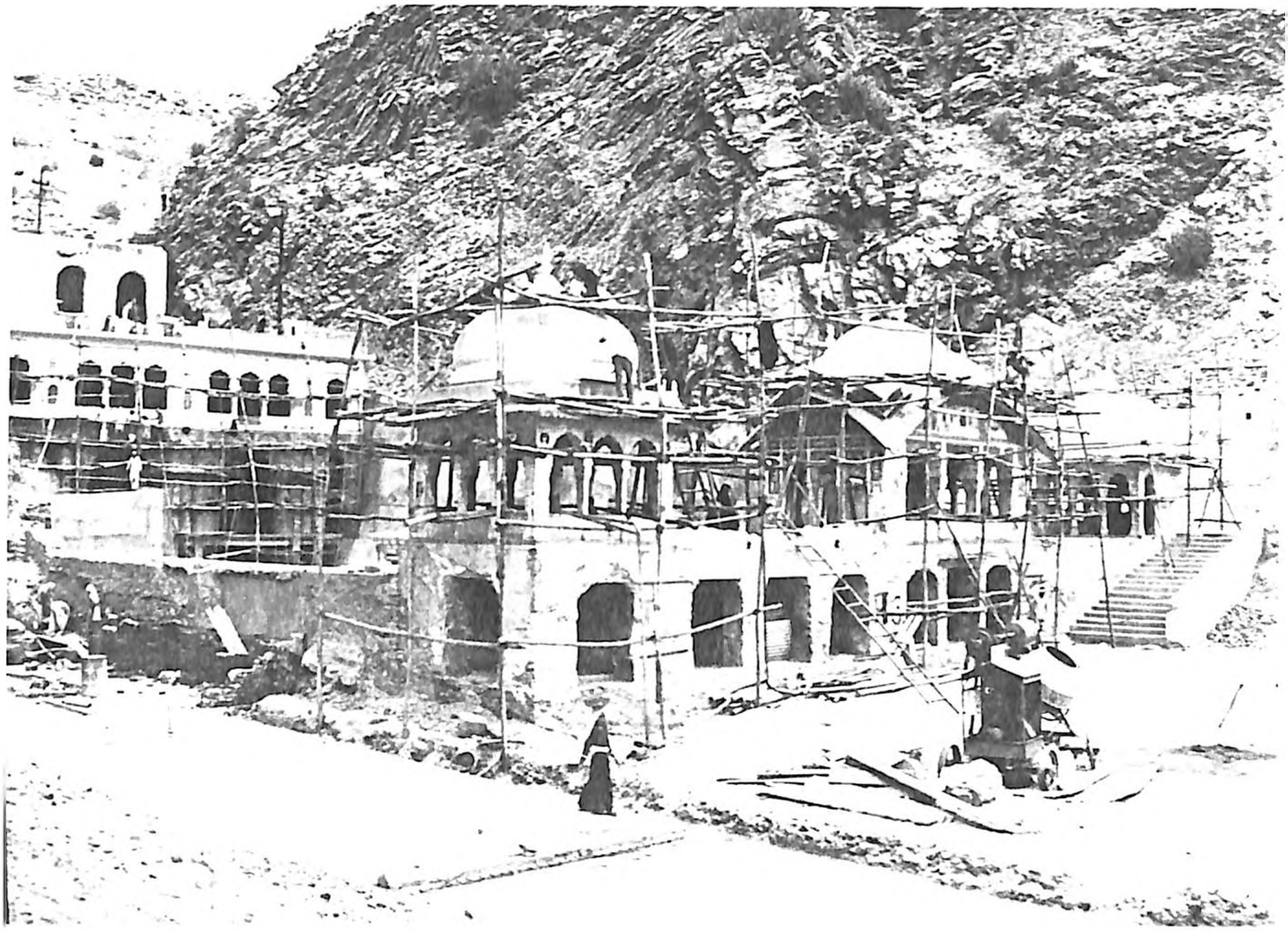

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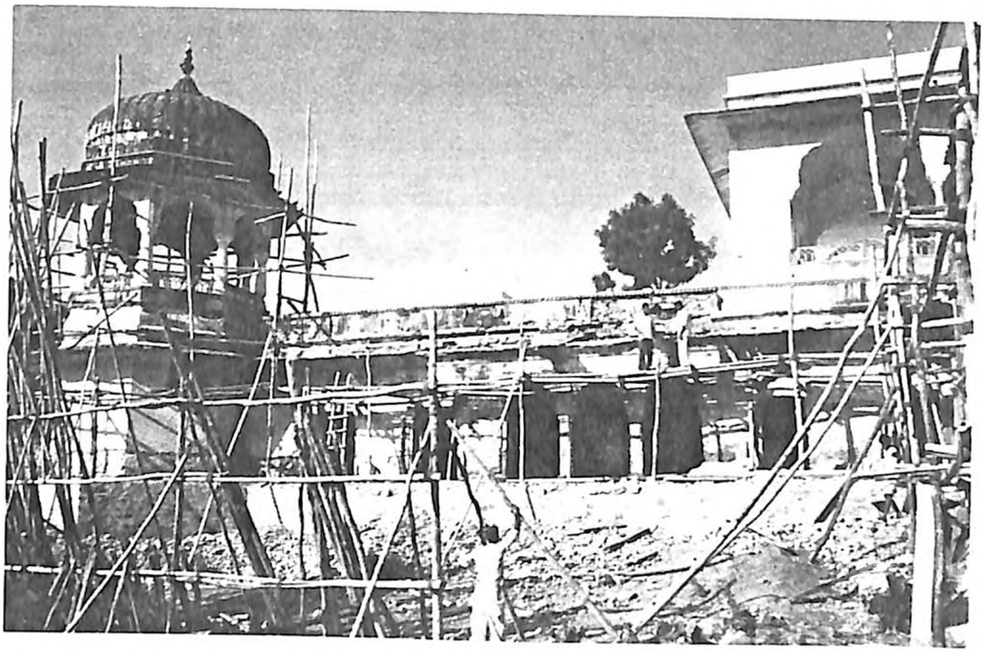

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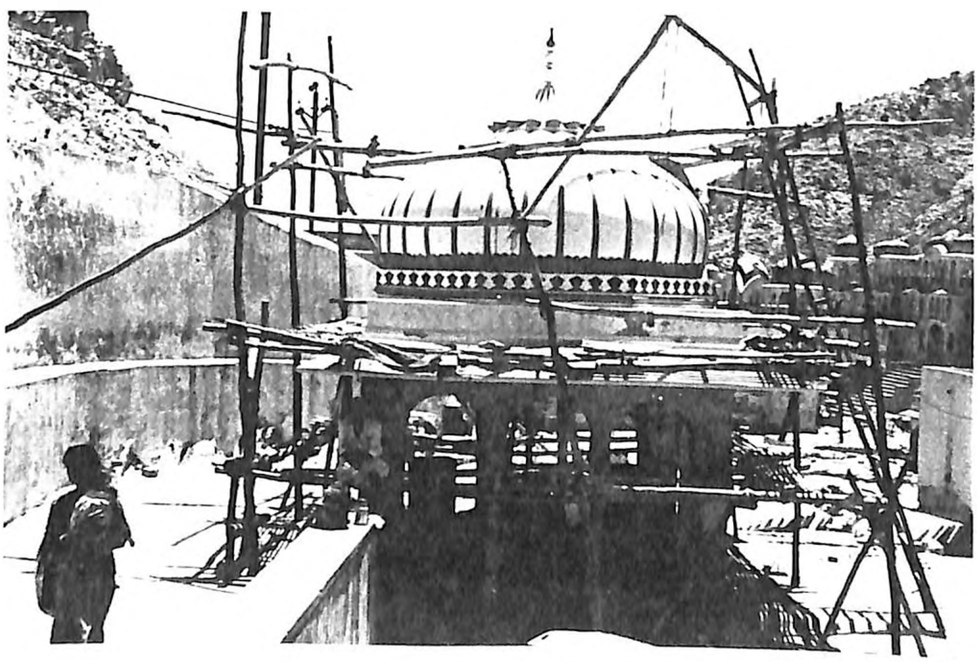

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The restoration of other components of the buildings have been described along with the documentation. The other important aspect of restoration work was that the restored buildings should have the adaptability to its immediate surroundings and have contextual blending with the nature. The restored system should also have the overall acceptability in the conserved ecosystem and it should help in the improvement of the microclimate. This aspect has been studied in detail and has been described in Chapter 8.

6.2 3 Lime Plaster

Lime '*Surkhi*' Plaster

Lime sand plaster are synonymous to wall surfacing. These terms are now commonly accepted by Govt. agencies. While restoring historical buildings repairs of old plastered wall of stone/brick are most commonly used item of works. The usual thickness required is 33 mm, 45 mm and 75 mm which differs in locations in different historical buildings.

Components : Lime, 'Surkhi'/Sand

Proportions : Lime 'Surkhi' Mortar 1:2 (1 lime putty; 2 *'Surkhi'*)

Lime Sand Mortar 1:2 (1 lime : 2 Sand)

Tools : *'Karni'*, *'Batkara'*, *'Gurmala'*, *'Gurmali'*, *'Sawl'* (Plumb),

Process : Wall surfacing is carried out with different ratio of lime *'Surkhi'* depending on quality of materials in different layers of varying thickness as the requirement of the surface to be restored. These identified stages of lime mortar application is known as *'Saresi'*, *'Plaster'*, and *'Loi'* finish. The process is as follows :

Step 1:

The old plaster is removed and surface of wall is cleaned properly using iron brushes to rakeout old decayed mortar from the joints. The surface thus exposed required to be watered properly to saturate the receiving surface for over two to three days.

Step 2:

The lime mortar *'Saresi'* layer in thickness 6 mm to 12 mm is than applied with *'Karni'* using lime mortar in the ratio of 1:2 (1 part lime putty, 2 part *'surkhi'*) on the moist surface of the wall. In case the surface is very even thickness will vary as per the site judgements. In situation where seepage is the cause of decay, water proofing agent must be mixed in mortar in all layers.

Step 3:

The second layer of plaster made of lime mortar 1:2 (1 part lime putty, 2 part Surkhi) is applied in thickness 12 mm to 20 mm and flattened with wooding *'Batkara'*. To achieve good results base *'Saresi'* should be wet and partially set to provide grip with the upper plaster coat. The plaster is applied in two to three successive coats as to achieve desired thickness. Every coat should proceed after three days from the previous layer application. The surface is partially smoothened with *'Batkara'* but left rough to receive the final finish layer of *'Loi'* or *'Kara'* as desired for 45 mm lime mortar. Plaster is carried out in six coats to provide grip to the surface.

In case the thickness exceeds 75 mm use of *'Tuman'* with brick bats are desirable on each successive coats to avoid cracking and to provide grip to the upper coat.

Step 4 :

Water is mixed with *'Lapti'* (Jaggery) in ratio 5 kg to 100 liter of water and sprinkled over the surface for proper curing till the lime mortar is set and hair cracks are removed.

Step 5 :

Before applying final finish it is necessary to complete the lower surface accordingly. When *'Khamira'* is to be applied then the lower surface is left smooth with the use of *'Gurmala'* and for other finishes such as *'Loi'* or *'Aaraish'* surface need to be left rough to receive further applications.

Precautions :

1. The lime plaster should be carried out in successive layers in small thicknesses to provide grip to the wall surface.
2. All hair cracks must be removed before final layer which may have appeared due to shrinkage.
3. The impurities of materials must be removed to avoid later mattering of lime 'kankars'. Slaking should be proper to avoid cracks and popping.
4. The surface should be cured properly after every application of coats. The time gap of minimum three days must follow between two successive coats.
5. The use of 'San fibre' is desirable in the uppermost layer to avoid 'Map-cracking' during shrinkage of lime mortar.
6. Due compaction of each layer is required to avoid air gaps.

Labour Components

To carry out lime Surkhi plaster in 100 sq.m in thickness, 33 mm, 45 mm and 75 mm, the requirement for labour are as follows as per AVS/PWD practice.

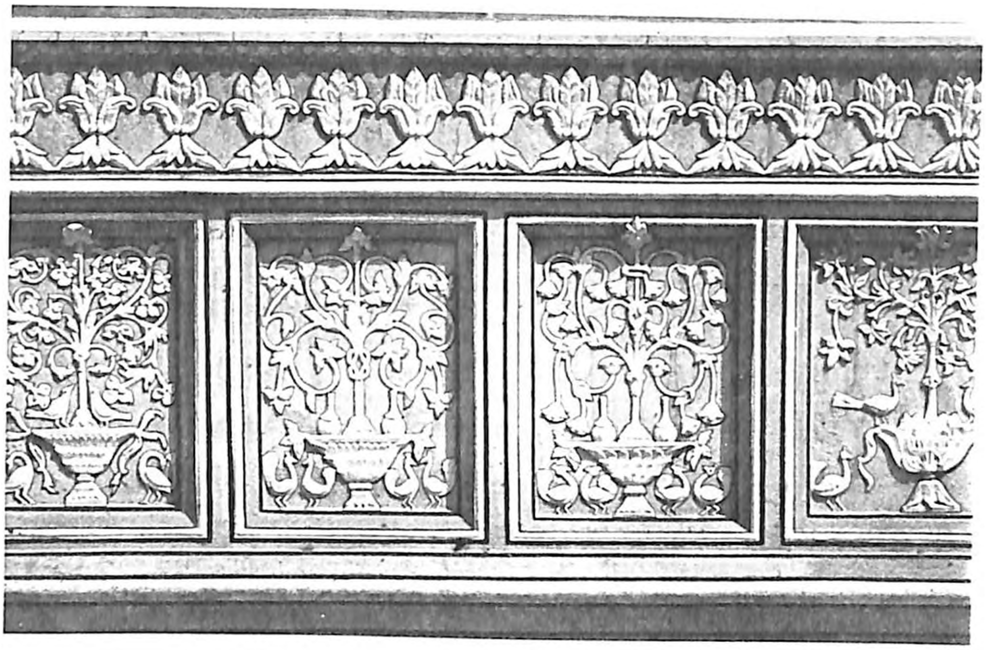
33 mm (4 coats)	22	7	20
45 mm (6 coats)	30	10	25
75 mm (9 coats)	50	16	45

'Tuman' is required if thickness exceeds 75 mm.

6.3 TECHNIQUES OF RESTORATION OF ARCHITECTURAL FINISHES

Lime Stucco Work : (Plate XCVI, 174)

To carry out 'stucco' work in lime the thickness of motifs can vary between 10 mm to 20 mm. The mortar should be prepared in ratio 1:1 (1 part lime putty and 1 part *'Surkhi'*) and



should be hand grinded. The final design is carved out from the surface mortar used for the 'stucco' purpose varying in depth from 6 mm to 20 mm thickness. The use of *'Naila'*, *'Kalam'*, *'Langot'*, *'Nail'*, and other minor tools are used. The coarse variety is used in the under coat or plaster known as *'Sarasi'* while the finer and more uniform variety is used in *'Loi'* (finest plaster finish).

Lime Mortar Proportions

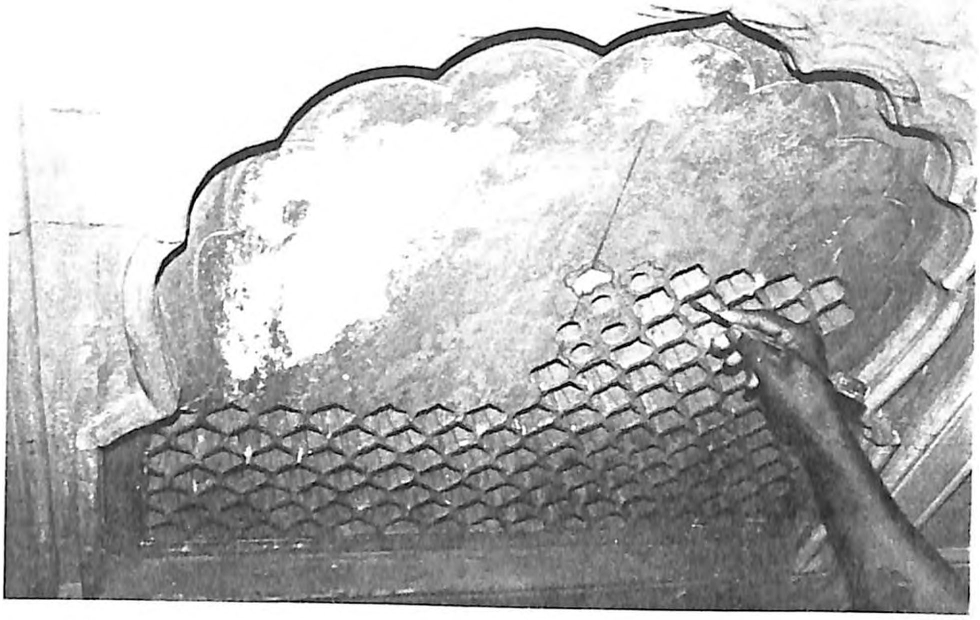
Lime mortar is prepared by adding *'Surkhi'* in slaked lime. The quality of mortar depends on components and varies in the ratio of its use. For the structural work the ratio is 1:6, for plaster 1:4 and *'Loi'* finish 1:2 (1 part of slaked lime to variable proportion of Surkhi). The details can be referd in 6.4.4.

6.3.2 Lattice Work (Jalee Work) (Plate XCVII, 175,176)

Perforated screens locally known as *'Jalee'* are extensively used as architectural features. These are used for partitioning of space or for privacy and are good for keeping the area well aerated and allow natural light.

The *'Jalees'* are prepared in Lime mortar with additives or by sculpturing the designs in marble or good quality sand stone slabs. In Mughal architecture red sand stone *'Jalee'* with ornamentational sculpturing is common. The historical building understudy also have stone and Lime mortar *'Jalees'*. The techniques for making stone *'Jalee'* is similar to any stone sculpturing techniques but the technique for making lime *'Jalee'* is special.

The materials used are lime putty *'Surkhi'* mortar (1 part lime putty two part *'Surkhi'*), *'San fibre'*, *'Lapti'* (Jaggery) and *'gugal'* (1 part gugal in 100 part mortar). The tools used are *'Naila'*, *'Batkara'*, *'Batkari'* (small size), *'Kalams'* (*'Barmi'*, *'Kisni'* and other different shapes of *'Kalams'*).



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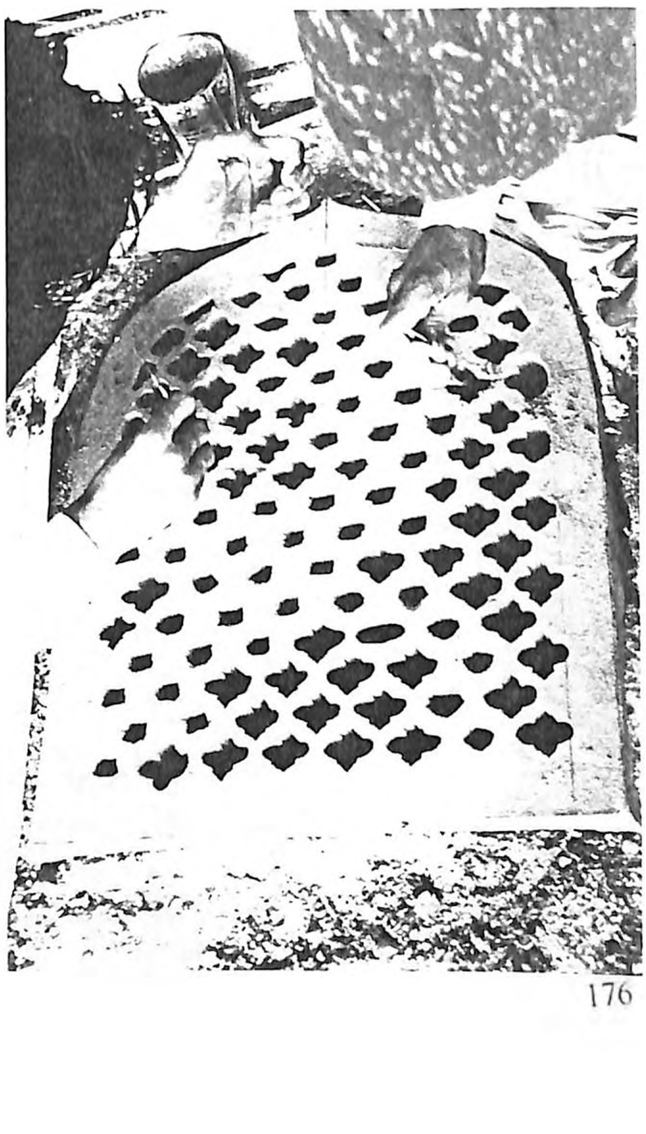

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The procedure of making lime '*Jalee*' has been described as follows.

The Lime '*Jalees*' are usually 1 to 3 square feet in size and are about one to two inches in thickness. The border area or the frame of the 'Jalee' is 1.5 to 2.5 inches broad in thickness usually 2 to 3 inches. Lime '*Jalee*' is designed at site as per the following procedure.

Four inches thick brick wall in clay is made as a scaffolding at the site of '*Jalee*' work. The surface of the brick wall is made smooth by river clay or '*Surkhi*', lime mortar of slightly less than desired thickness (to allow other layers thickness) 1 to 2 inches thickness is applied with 2 to 3 inches thickness in the border area. It is allowed to set and mild beating of surface is carried out by wooden sticks and once the mortar gets set, but still not dried up, the second fine mortar layer is applied on it. The design is transferred on this surface like that is done in relief work. The pattern is cut from both sides with alternating scaffolding on either side with special tools and the '*Jalee*' thus prepared is allowed to dry up with proper curing. The designed portions are made smooth with '*Loi*' or '*Aaraish*' finish.

Precautions :

1. The size of lime '*Jalee*' should not exceed 3 feet in size as it will be susceptible to damages.
2. Curing should be carried out after beating the surface with wooden sticks. '*Lapti*' and water is used for curing.
3. Surface should not allow to set before designs are completely cut.
4. Work should not be preferably carried out in extreme summer.

6.3.3 Dar

'*Dar*' is a local name of a particular type of surface achieved and carried out in a traditional manner in most of the historical buildings in Rajasthan. The flooring of the rooms, '*Tibaras*', '*Varandhas*' and roofing is done by this technique.

Components :

'Dar' surfacing is done by using lime mortar stone aggregates, and additives like *'Jaggery'* locally called *'Gur ki Lapti'*. Phaelous mungo crushes in powder form as binding agent and *'Fenugreek'* called *'Methi'* is used as a water proofing agent. *'San fibres'* of Jute are being used as reinforcement to provide lime mortar resistance against *'Map cracking'* of surface due to temperature variations.

Proportions :

The proportion of *'Surkhi'* lime is usually 1:2 (1 part lime putty; 2 surkhi/sand) in lime mortar. The Jaggery is mixed in the ratio 1 kg in 5 cuft of mortar. The *'Sanfibre'* should have specifications such as tensile strength 227.0N/mm^2, elongation break 130 per cent, modules of elasticity 30,000 N/mm^2, absorption 120 per cent and specific gravity 1.5 is desired. However, *'San fibre'* from other source are not to be used.

Tools :

The surfacing is carried out using particular sequence of operations and tools such as wooden sticks made out of bamboo three to four feet long, wooden *'Thapies'* slates, *'Durmat'* to consolidate surface by stone rammer and *'Batkara'* and iron brushes. The wooden sticks extracts water from wet lime mortar freshly laid. *'Batkara'* is spreader for the mix, which spreads it evenly. Whereas *'Thapies'* consolidates the surface.

Process :

The process is followed in following steps as mentioned below :

Step 1 :

Removal of old lime *'Dar'* surface which has been weathered and work out in layers need to be loosened with careful hammering. The loosened material must be cleaned from the site and transported outside the site. (Plate XCVIII, 177)

Step 2 :

Cleaning of surface by using iron brushes to expose lower *'Tuman'* or hard layer underneath. The racking is carried out to remove loose material and sandy substances.

Step 3 :

Watering of the surface is carried out for few days before using it for *'Dar'* flooring. All cracks on the surface must be observed and repaired before further work to ensure no leakage to the lower floors.

Step 4 :

A layer of 12 mm lime mortar is spread on the surface which is known as *'Saresi'* coat to provide base for the upper aggregate layer. *'Saresi'* will have lime mortar 1:2 (one part putty lime and two parts *'Surkhi'*).

Step 5 :

Before the *'Saresi'* is applied, *'Tuman'* is carried out. This is a local term used for arranging stone aggregate in a particular arrangement. Once the receiving floor is ready the *'Tuman'* floor has to be laid. In this process the entire surface area is divided into grids approximately 5 x 5 feet from the centre using small stones, placed tightly. These stones vary in size from 40 mm to 100 mm. These square grids are then filled with smaller stone grids placed

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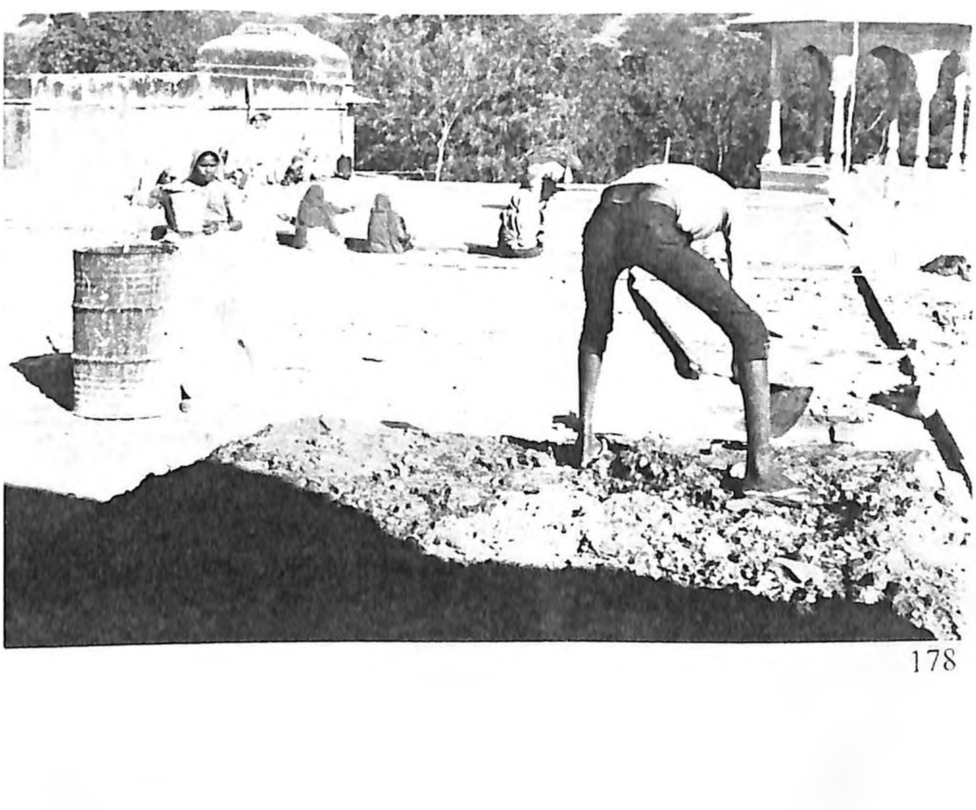

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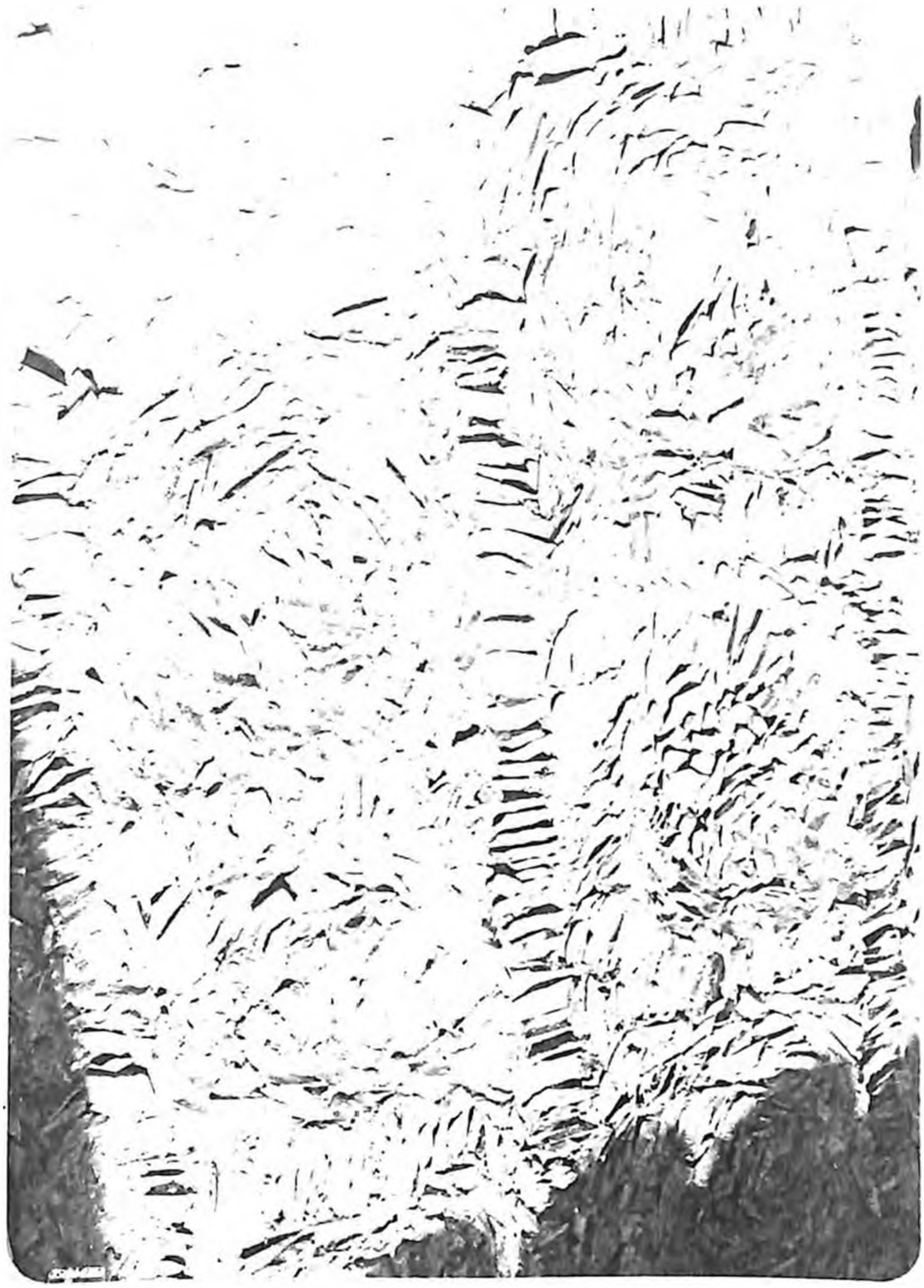

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in a circular form tightly compacted together in such a way that it leaves an even surface. The surface is smoothened by the use of a specific equipment called *'Durmat'* made of stone. Following this the surface is intensely rammed by a wooden *'Ram'*. (Plate XCIX, 179)

Step 6 :

The surface is cured with water and kept wet. The lime mortar already prepared, is spread uniformly over the wet ground surface, following a specific pattern i.e. from the central grid to the periphery or in the reverse order. This work of laying lime mortar in 20 mm thickness on terracing proceeds in stages covering atleast 100 sq.ft. daily. The edges should remain wet throughout the process. The *'San fibre'* is spread over the lime mortar in upper layer to avoid *'Map cracking'*.

Step 7 :

The *'San fibre'* remains embedded 2 mm below the upper surface. *'Batkara'* a wooden mallet and spreader is used to even the lime mortar over the *'Tuman'* floor. The surface is then beaten with four feet long *'Bamboo'* sticks to remove the excessive water from the lime mortar (Plate C, 180). This process requires patience and regularity for atleast one to two weeks until the floor surface is fully hardened. The surface is than beaten by *'Thapies'* in a rhythm to achieve compaction of the surface. Water is dropped at places in order to check leakage. In case water is soaked, the compaction is carried further by the use of wooden *'Thapies'* (Plate C,181). Lime water with *'Jaggery'* mixed homogeneously is sprinkled constantly to avoid the appearance of hair fine cracks on the top layer. The binder *'Jaggery'* is added in ratio of five kgs of *'Lapti'* to 100 litres of water. Moisture is retained permanently till surface hardens permanently and presents a smooth floor of light pink in appearance. In case *'Aaraish'* is desired on this *'Dar'* surface then surface is left rough to receive the final *'Aaraish'*.

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Precautions :

1. The entire laying of floor is to be completed at a stretch over a period of time without any hindrance.
2. The lime terracing should proceed in a well planned manner.
3. Where the two surfaces meet the receiving surface should be wet and the layers of the two surfaces should be homogeneous and well protected by 'San' *'Fibre'*. 'San' acts as a reinforcing agent and prevents minute cracks up on drying.
4. The sequence of work is vital. To illustrate; when one section of both work is undertaken the adjoining section should be followed by *'Thapies'*.
5. The terracing should not be done in rainy or humid seasons and extreme temperature conditions of weather.

Labour Components :

To carry out *'Dar'* flooring over 100 sq.mt. area 50 masons, 15 beldar, 45 coolie are required to complete terracing.

6.3.4 Loi Finish

'Loi' is final finish layer usually 2 mm thick applied over lime plaster surface to achieve smooth, light pink finish surface.

Components : Lime putty, *'Surkhi'*

Proportions : 1:2 (Lime putty one part, *'Surkhi'* two part

Process :

Step 1 :

The *'Loi'* is prepared with fine textured *'Surkhi'* with no impurities. To ensure this *'Surkhi'* should be cleaned properly in water dried before use and sieved in a wire mesh (Plate CI, 182). The mixing of lime putty to *'Surkhi'* should be carried out over few days to avoid unslaked particles presence in the mix.

Step 2 :

The paste semi liquid is than applied over the surface by use of fine *'Gurmala'* or brush as per the practice of the master craftsman.

Step 3 :

The surface is than rubbed properly to allow setting by use of *'Gurmala'*. The application of water with *'Lapti'* in ratio 100 liter of water to 5 kg of *'Lapti'* should be sprinkled over the surface while consolidating the surface to avoid cracks (Plate CII, 183).

Precautions

1. The lime plaster should be well cured and any cracks appearing on the top surface should be immediately filled by *'Loi'* itself. The curing should continue over few weeks.
2. The *'Loi'* thickness should not exceed 2 mm otherwise it will develop cracks and chip off.
3. The application by brushes is undertaken in one layer at a time or hair cracks may appear between the two areas on the same surface.

PLATE CII

6.3.5 Kara

The '*Kara*' is a local term used for the surface finish achieved by using the paste of lime putty with marble powder. The rough '*Kara*' finish is also ideal for '*Aaraish*' and '*Fresco*' work.

'*Kara*' material is prepared by using Lime putty and marble powder in the ratio of 1:1 (one part lime, one part marble poweder). Lime putty should be prepared as per the procedure described in Frescoes techniques for allowing slaking for more than two months minimum (Plate CII, 184). '*Kara*' material is prepared by mixing marble powder with lime putty in the above mentioned proportion and grinding the mixture on traditional rotating-grinding stone ('*chakki*') or on stone slab with grinding stone locally called '*Sil-batta*' (Plate CII, 185). The traditional grinding procedure is helpful in reducing the size of marble powder grains and mixing putty with the marble powder and changing the chemical nature of lime paste for developing the proper binding properties.

Tools

We require the following tools for '*Kara*' work. The tools have particular shapes and are used for application of '*Kara*' material on the surface and for the creation of design work, as described.

List of Tools

1. '*Karni/Naila*'
2. '*Batkara*' - different sizes
3. '*Gurmala*' - two types
4. '*Langot*'
5. Chisel
6. Special size spatula (5 mm)
7. '*Jhava*' and '*Hakik-ka-pathar*'

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Hog-Hair flat and round brushes of different sizes.

Other Materials

1. Washing soap
2. Coconut oil

Procedure for '*Kara*' Finish
On Walls, Ceiling & Floor

The '*Kara*' paste is applied in one to two layers on the lime mortar plaster. The plaster should be cured for atleast two to three months to over come the development of cracks due to diurnal temperature. The first coat of '*Kara*' material of about 3 mm thickness is applied on the moist plaster surface with '*Karni*'/'*Naila*' and spread with the help of '*Batkara*'. The second coat of 'Kara' material prepared with finer grinding in about 1.5 mm thickness should be applied on the well set moist first '*Kara*' layer & rubbed with '*Jhava*' stone. We want to have '*Khamira*' finish on the walls it is applied directly on the surface. In case of '*Aaraish*' and 'Fresco' works both layers of '*Kara*' should be applied with a gap of time to allow hair cracks appear on surface. The surface shouldn't be very smooth to receive third finest layer of lime putty (Plate CIV, 186,187).

'*Kara*' for Ornamentation Work

'*Kara*' is also used for giving surface finish to the tracery or relief work done on the sand stone e.g. relief work on Jodhpur or Karouli stone or Mehrab and Pillars. The required relief designs are made of the above quality sand stones or on pillars or '*Mehrab*' and thin '*Kara*' material of 1.5 to 2.0 mm thickness is applied and the surface is given smooth finish with the appropriate tools (Plate CV, 188).

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Labour Components

1. To carry out *'Kara'* work on a flat surface of 10 sq.m area requires the following man power; 25 mason, 14 beldar and 18 coolies.
2. Decoration work on walls of the same area require, 49 masons, 31 beldar and 18 coolies
3. For decoration work on *'Mehrabs'* and pillars of the same area will require the efforts of 70 masons, 36 beldar and 30 coolies man hours.

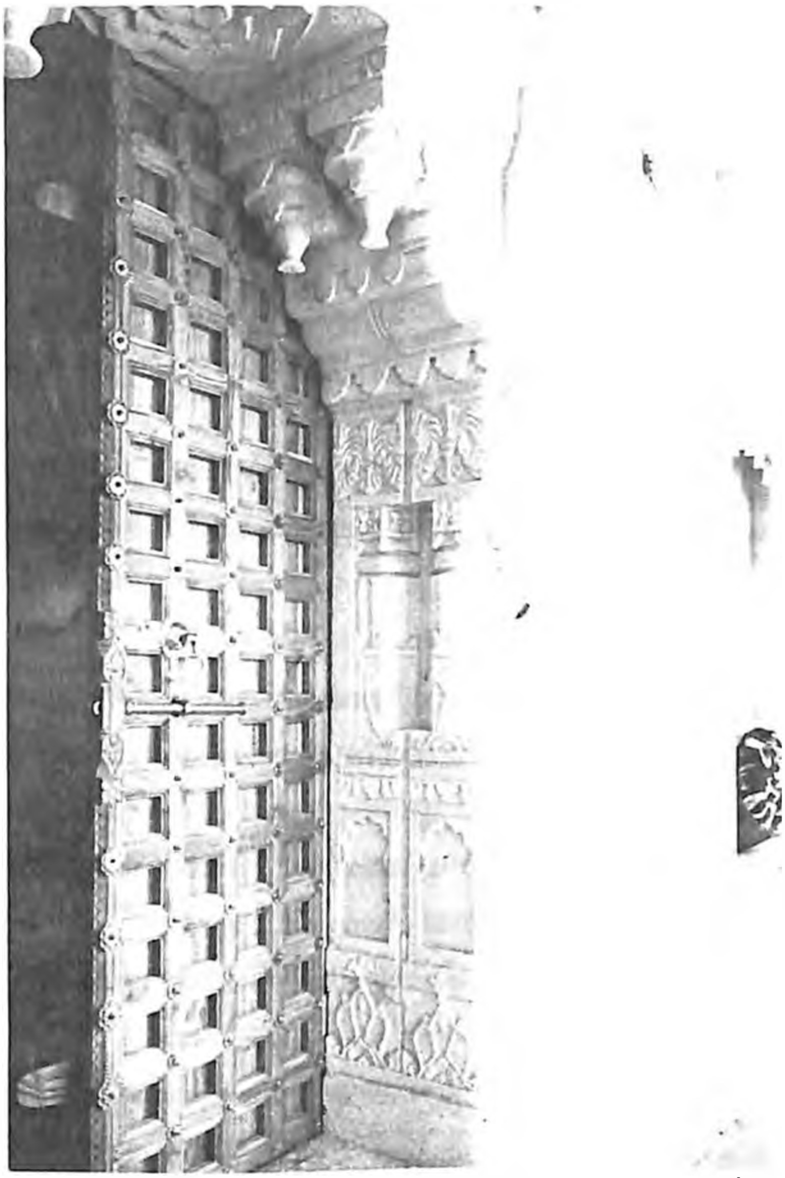
6.3.6 Frescoes Fresco Techniques

Wall paintings or *'Bhiti Chitras'* made by the specific techniques on freshly applied, still-wet plaster are called .Fresco paintings. While paintings made on dry plaster are also known as *'Bhiti Chitras'* but the technique is known as *'Seeco'*.

The murals of ancient Rome, Pompeii, Herculaneum, Egypt and Ajanta bear witness to the high level of development of ancient Fresco paintings. In Rajasthan the technique was used in drawing paintings in palaces and temples. The fresco paintings of Amber palace and Galtaji are good examples of Fresco paintings of 17th and 18th century. The wall paintings or Haveli paintings of Shekhawati region of 19th and early 20th century have been made by Fresco and *'Seeco'* techniques. The third type of art work on walls done in palaces and Havelies of Shekhawati is called *'Aaraish'* work. *'Aaraish'* is a type of fresco preparation without the figurative work. The method of fresco paintings and aaraish work is a complex process and therefore this has been described under the following heads.

Principle of Fresco Paintings

In fresco paintings pigments are made into a paste in water and are applied on the fresh lime plaster surface. The pigment particles bind with the lime during the process of carbonation as illustrated in the following diagrams.



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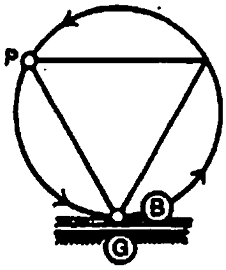
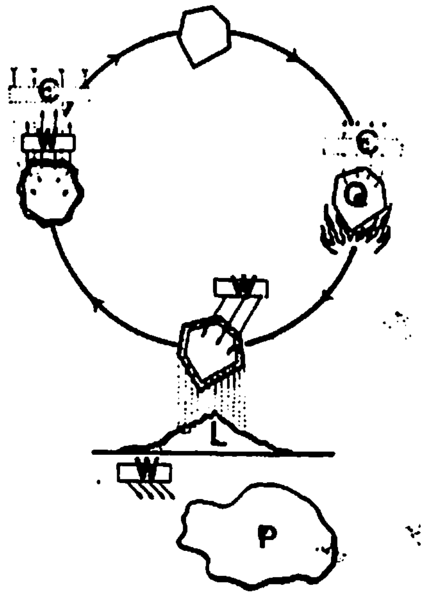
Metamorphosis of Lime





The Metamorphosis of Lime

Limestone(L) is heated and turned into quicklime (Q) while giving off carbon dioxide(C). When water(W) is added the quicklime disintegrates and forms calciumhydroxide powder. The addition of more water produces pit lime (P). When the plaster dries, water escapes and carbon dioxide is reabsorbed and the pigment(s) applied during the process in water binds with the calcium and form the rocky painted surface.

The Ground(G), consists of lime plaster, supplies the binding medium (B) as slaked lime, which cements the pigment(P) to the support (G).

Lime

Not all kinds of lime can be used for fresco paintings. Lump hydraulic lime and dolomite lime are quite unsuitable. Only white lime (Quicklime) should contain ninety-five percent Cao and less than five percent magnesia. In Rajasthan lime from Ghatra and Sojat of district Jodhpur are found to be best for 'Fresco' and 'Aaraish' work. Lime stone should be burnt with only wood and not coal because it imparts sulphur compounds to the lime and partly charges it to calcium sulphate or gypsum which is treated by all fresco painters because it interferes with the setting of plaster and reduces the hardness and the durability of the plaster layer.

Slaked lime is prepared by the addition of water in the quicklime. Slaking process requires a great deal of experience because the different kinds of limestone are treated differently therefore, neither little nor too much water should be added. The slaked lime should be seasoned for atleast six months so that it may become smoother although there is no chemical change. The old fresco painters used lime that had been slaked for about ten years. In Europe commercial suppliers keep slaked lime upto one year age while in Rajasthan slaked lime is kept in the big earthern containers for 3-6 months and it is churned for few hours every day. This makes the slaked lime into a paste form and is known as lime putty.

The lime putty is used for 'Kara', *'Aaraish'* and fresco work and also in the form of 'Khamira' for painting the walls and architectural compounds.

Mortar

The quality of 'Aaraish' and 'Fresco' plaster depends not only on the choice of the materials, but also to a very great extent on the ratio of lime putty to sand. The opinion of older and modern practitioners differ somewhat on this point. In older fresco works (e.g. Roman) the lower layer of plaster contained less lime. Entire of the upper layers contained equal parts of lime and sand, while the modern 'Fresco' painters use one part lime and three parts coarse sand for the lower layers and for the upper layers one part lime and two parts sand. The ancient Roman plasters are found to contain coarse stone fragments close to the painting surface.

In Rajasthan the plaster for fresco painting is done in three layers. The first layer of plaster is done on masonary with 1:3 parts of lime putty and coarse sand. The second coat of plaster is called Kara in this mortar lime putty is mixed with marble powder instead of sand in the ratio of 1:1 and the last layer of plaster for *'Fresco work'* is only pure lime putty.

In traditional terms when the surface is finished with the above materials and smoothened or made glossy is called the *'Aaraish'* work and if the painting is done by special types of pigments on this surface it is called *'Fresco work'*.

In Roman style it has been found that the use of stones or coarse sand was good technique, because, this facilitates the permeation of carbondioxide and thorough carbonification down to the deepest layers. Plaster containing too little lime weak freable, while a plaster too rich in lime cracks. It has been noticed that the *'Fresco'* paintings in Amber and Galtaji and number of Haveli paintings in Shekhawati have hair cracks and this must be due to the one of the pure lime putty in the final coat for *'Aaraish'* work and *'Fresco'* paintings. In the present work, therefore, the final coat for finish or painting work was done with the mortar of lime putty and marble powder in the ratio of 1:1.

Addatives

For the preparation of proper quality of surface for 'Aaraish' and 'Fresco' work certain materials are added in the mortar. In Rajasthan salt (sodium choloride) 'Jaggary' (gur) and curd are added. In some cases sugar is added in place of jaggary.

The salt and sugar are hydroscopic in nature and therefore can prolong the setting time of the plaster and could thus have a beneficial effect on the complete carbonification and eventual plaster hardness. The curd is used for improving the plasticity of the mortar. Curd contains weak casein solution and therefore small quantity of casein power will have a similar effect. Excessive amount of curd or casein is bad because it deprives the mortar of its plasticity, making it fluid and thus the craftsman can't use the pigments properly.

The Roman fresco artists used to add the following inorganic additives like European artists of today. Pumic sand, Laval, crushed brick, brick dust and fire clay. These materials have hardening effect on mortar.

Recipes for Fresco Plaster

The lime putty used in 'Aaraish' or 'Fresco' is pit- lime of pulpy consistency. The required amount of lime putty should be mixed with moderate amount of water and strained through a medium-fine sieve, in Rajasthan straining is done through the coarse pore size muslin cloth. Similarly the sand and marble powder is sieved to remove the stone pieces or the bigger size of particles. The lime putty and sand is mixed in different proportions as per the requirements for different coats. There are a number of recipes for the 'Fresco'/'Aaraish' plaster. The following recipes give the proportion of ingredients as used in Rajasthan and other artists in Europe.

RECIPE FOR FRESCO PLASTER

Nature of the layer	Name of the ingredients	European Receipe			Recipe of Rajasthan Fresco
		Receipe 1	Receipe 2	Receipe 3	
Roughcast	Lime putty	1 part	1 part	1 part	1 part
'Plaster'	Gravel	2.5 part	2.5 part	2 part	-
	Coarse Sand	0.5 part	0.5 part	0.5 part	2 part sand/ surkhi
	Crushed bricks	-	-	0.5 part	-
Equalizing	Lime putty	1 part	1 part	1 part	1 part
Coat	Coarse sand	2 part	2 part	1.5 part	-
'Kara'	Fine Sand	0.5 part	0.5 part	0.25part	1 part
	Crushed bricks	-	-	0.25part	-
Painting	Lime putty	1 part	1 part	1 part	1 part
Coat	Coarse sand	0.5 part	0.5 part	1 part	
'Aaraish'	Fine Sand	0.5 part	0.5 part	1 part	
	Marble grill	-	-	1 part	

Rendering Techniques

There are a number of rendering techniques followed by various Fresco artists but the following steps are common for the *'Fresco work'*.

The wall (surface for fresco) must be soaked with water until it will hold no more water. The wall should be wetted not only immediately before curing begins, but also several times during the previous evening. The first course is roughcast and the following equalizing coat should be done simultaneously. The lower plaster layers should be left rough in order to give them the necessary key and only the last coat should be smoothened with the wooden float or *'Batkari'*, on no account should this coat be smoothened with the gurmala or felt covered rubber faced float, because *'Gurmala'* will remove much of the lime water from the plaster which will be surely needed later to bind the pigments.

There is no agreement between the experts of *'Fresco'* paintings about the optimum thickness of the various layers of the plaster for Aaraish or Fresco work but the last coat for the application of pigments should always be very thin to the maximum thickness of one millimeter. Some *'Fresco'* craftsmen beat the equalizing coat (*'Kara'*) with special shaped wooden tools, in order to compress the plaster layers as much as possible to reduce the risk of cracking but it also forces too much water to the surface prematurely which is bad for fresco work but this is necessary in the *'stucco- lustro'* technique. Before each new plaster coat is applied the previous coat must be wetted by splashing with a brush.

Fresco Pigments

Lime is highly alkaline and therefore the pigments used for fresco work should be fast to lime, therefore, *'Fresco'* pigments are usually the earth or natural colours.

Colours have an entirely different effect on walls, as compared with that achieved by the techniques of easel painting and this difference is particularly striking in *'Fresco'* paintings. Here the brilliance of all colours is enhanced, which means that the earth colours, natural as well as artificial, become especially important. The pigments also differ due to their use on the location of the *'Fresco'* work. Most of the *'Fresco'* pigments are suitable for interiors but the pigments to be used for exterior walls should have the quality of light fastness. The *'Fresco'* pigments should be free of natural clay, gypsum and soluble salts. Some grades of ultramarine causes a white efflorescence that, after drying lies on the surface lime.

Ivory black contains salts and therefore has been replaced by manganese black or the iron-oxide black. White lead is not suitable for '*Fresco*' despite the fact that it is basic oxide compatible with alkalis. Sulphur fumes in the air turns it brown and eventually black as has been observed in some old '*Frescoes*'. Zinc white and Titanium are other white pigments but are unnecessary because pure slaked lime lime putty is normally preferred as a white pigment. The pallet for '*Frescoes*' is very wide and therefore the comparative list of '*Frescoes*' pallets has been given as follows.

Pigments Used in other Countries

(Based on Reference from Ralp Mayer 1981)

Egyptian Mural Palette

Black	Carbon (lamp black)
Blue	Azurite and Egyptian blue frit
Brown	Various native earths
Green	Malachite and Crysocolla
Red	Native red oxides
White	Chalk and gypsum
Yellow	Ochre and native orpiment

Minoan Fresco Palette

White	Lime putty
Black	Powdered slate
Red	Native red oxide
Blue	Egyptian blue frit

Green	Mixtures of blue, black, and yellow
Yellow	Ochre **Roman Fresco Palette**
Black	Lampblack, possible also bone black
Blue	Egyptian blue, possibly copper ores
Brown	Native earths
Green	Egyptian green earth
White	Lime
Yellow	Ochres
Red	Native oxides, Possuoli red etc.

Probably refined, washed, and burnt earths were used. The method of making egyptian blue and green was brought from Egypt to Possuoli.

Traditional Italian Fresco Palette

White	Bianco Sangiovanni
Black	Lampblack
Red	Native Venetian red or Spanish red, Possuoli red
	and other native red oxides.
	Burnt sienna
	Vermilion applied secco
Blue	Egyptian blue, Azurite, Smalt
	Native ultramarine applied secco
Green	Green earth
	Mixtures of blue and yellow
Yellow	Ochre. Raw sienna
Brown	Raw umber
	Burnt umber
	Burnt green earth

Refined, washed, and burnt native oxides and ochres were well known.

Modern Fresco Palette

White	Slaked lime putty
	Bianco sangiovanni
	Neutral blanc fixe
Black	Mars black
	Lampblack
Red	Several shades of pure artificial red oxides:
	Mars red, Indian red, Light red, etc.
	Burnt sienna
Blue	True cobalt blue
	Cerulean blue
Green	Viridian
	Chromium oxide
	Cobalt green
	Green earth
Yellow	Mars yellow. French ochre. Italian raw sienna
Violet	Cobalt violet
	Mars violet
Brown	Raw Turkey umber
	Burnt Turkey umber
	Burnt Green earth

Pigments for Fresco Painting

In different countries of the world, fresco paintings are done in lime putty in the base and different types of pigments as mentioned below. But the pigments should have these properties. The pigments should be light proof, resist the alkaline action of lime putty and acid action of polluted air. Pigments must be free from soluble salts and any other impurities that are likely to reach with acids or alkalis. The pigments should be brilliant in texture and contain purity of tone in dry state.

Indian Frescoes Palette

Standard Pigment

Black	*'Kajal'* (Lamp black)
Blue	Indigo, Lapis, Luzuli
Red	Geru, Hirmich native red oxide
Yellow	*'Ramraj'* yellow ochre
Green	Maluchite or Green earth
White	Lime putty, chalk or gypsum
Brown	Native earth

Pigments used in *'Bhitichitra'* (fresco) as per the local craftsmen from Udaipur

Stone pigments are the most suitable to extract colours since there is no risk of chemical reaction of any other non inert colours with lime. Colours are also obtained from mud such as *'Hirmich'* (Geru), *'Ramraj'* (laterite soil in Jaipur), etc. Each colour has a different mode of application listed below (Plate CVI, 189):

White, Chalk (khariya)

Chalk (khariya) is crushed and soaked in fresh water for a day. Then the water is changed and again grounded well on a stone slab called *'Sil batta'* and again soaked in fresh water for 1-2 days. This paste is strained with a fine muslin cloth and the white colour is ready.

PLATE CVI

Yellow, *'Gau Goli'*

The preparation of this natural yellow colour demands extreme patience and skill. Cows are fed with the yellow mango tree leaves in spring season and then the cow's urine is collected. This yellow urine is boiled until all the water evaporates leaving behind a thick consistency occurs. Gum arabic is added homogeneously to this colour and this mixture is used as yellow colour.

Yellow, from Aravalli Plants

Yellow colours are also extracted from flowers of *Butea frondosa (Dhak) Butea monosperma* and *Bombax malabari- cum* (Tesu).

Black, *'Kajal'*

Natural lamp black is obtained by burning a mustard or oil lamp. An earthen vessel is covered on top where the soot deposits. This black soot is mixed with gum acacia and used as black colour.

Brown, *'Sindur'*

'Sindur' is mixed with sheep milk and well stirred until it makes a homogeneous mixture. This mixture is cleaned several times by diluted lemon juice. After this process the clean mixture is well mixed with Gum Acacia in a coconut shell and readily used.

Red, *'Lac'*

The *'Lac'* obtained from *'Banyan'* and *'Pipal'* trees. Carefully these *'Lac'* crystals are mixed with tepid warm water and then the crystals begin to impart red colour to the water. This strained red water is boiled until essential thick liquid is obtained. This is again mixed with Gum

'Acacia arabic' for binding. The *'Hirmich'* earth colours rich in iron oxide are located at Iswal 21 kms from Udaipur extensively used in 'Khamira' colours.

Blue, *'Indigo'*

Indigo (neil) is tied in a muslin cloth and left in water so that clear blue colour is obtained. The essential blue water is mixed with diluted lemon juice and thus absolutely clear blue colour is attained. When mixed with gum 'Acacia arabic' it is readily put to use.

Silver, 'Ranga Foil' (pt 100)

Extremely thin ranga metal foil and *'Sares'* are well grounded by hammer in a stone vessal. When the two become a fine powder, it is cleaned with dilute lemon juice as done for all other colours and similarly mixed with gum Arabic. Purifying the surface where this colour is used, is rubbed with *'Hakik ka Pathar'* or *'Agate'* stone also known as *'Ghooti'* in local language because by doing this a silver lustre appears on the surface. As a precautionary measure, silver foil should be used less since silver tarnishes black with time.

Gold, *'Gold-Foil'*

Thin gold foil is pasted with glue in a plate and rubbed immediately with hand. This process is followed in all successive layers. The ground paste is now cleaned with fresh water added with few drops of fresh lemon. This is followed by repeated cleaning with fresh water. The gold will now remain stuck on the plate surface which is used for gold colouring along with gum *'Acacia arabic'* as an adhesive on fresco/secco.

It may be noted that the information given under list of materials used by Rajasthani Fresco workers has not been scientifically tested and the information has been recorded as described by a school of Udaipur workers.

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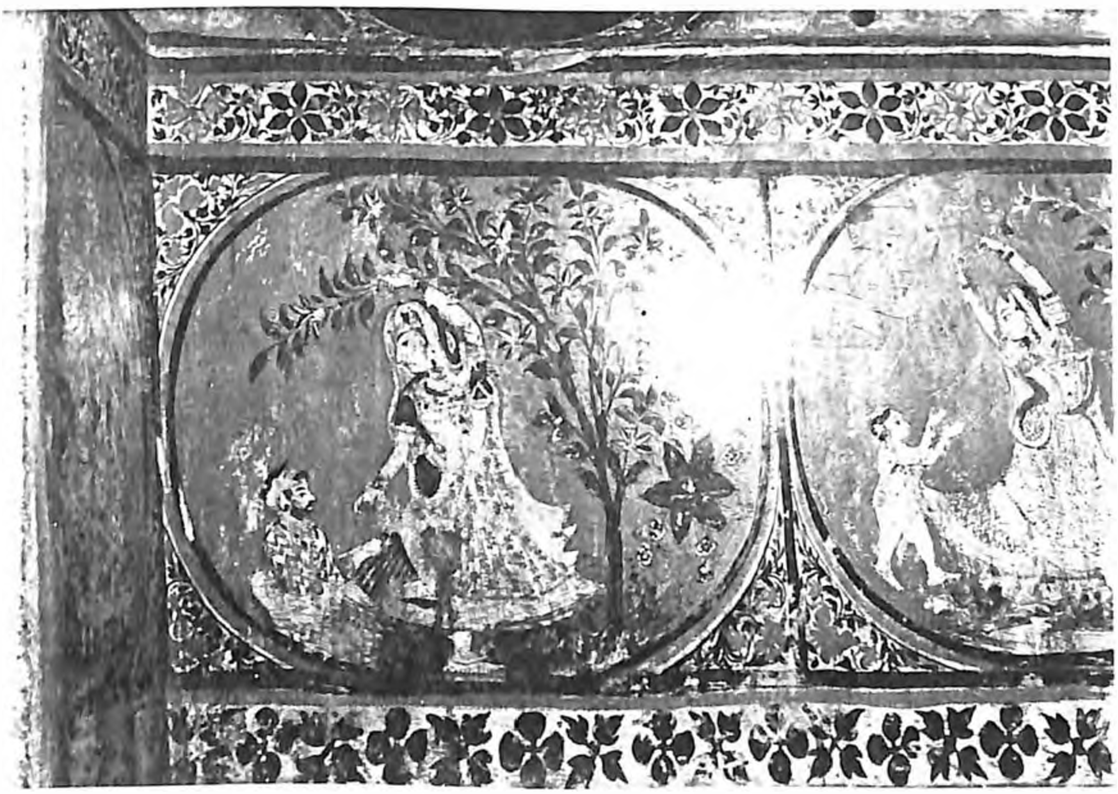

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The Fresco Medium

The true fresco normally requires no special medium. The finely grounded pigments are made into a paste with water or, if necessary grounded in pastel and mortar with water and diluted with water during painting. Distilled water gives good results if the supply water contains gypsum/clay or iron salts. Some fresco workers prefer lime water (the clear liquid from the container of slaked lime). It contains significant amount of calcium hydroxide in solution which helps in binding the pigment particles. For opaque fresco paintings milk of lime is used as a painting medium and it is made by strongly diluting slaked lime with water.

Painting Method for Fresco (Plate CXII, 194, 195)

The subjects of *'Fresco'* paintings are largely historical events, figurative compositions in architectural or landscape backgrounds and purely decorative. Religious subjects figure very prominently in *'Frescoes'* paintings in the temples at Galtaji. However, when we study the *'Frescoes'* of previous centuries in Rajasthan or of Ajanta caves we find no difference in nural and easel paintings but *'Fresco'* painting offers a far greater range of technical possibilities than the paintings done with tempera or oil colours.

The *'Fresco'* artists of antiquity and the middle ages designed the *'Fresco'* paintings with a brush directly on the coat of plaster immediately below the intonaco as a rough guide. The provisional drawing was usually carried out with sinopia, a reddish yellow earth, colour, which in turn has given its name to the drawing. The final coat of plaster was applied in small sections and on it the drawing was repeated in more polished form and with more details. This technique has a great disadvantage because in many cases the lower plaster layer often dried out too much and in future, in many Italian 'Frescoes' the intonaco carrying the 'Fresco' painting had fallen off.

Now a days the artists first designs his painting on the paper with all the required colour combinations and later the full-scale drawing of the design is made on the paper and transferred on the surface where the actual painting has to be drawn.

PLATE CX

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The transfer of the design is done by two methods. In the first method which is commonly in practice - all limes of the sketch are perforated with a needle. The design is then attached to the wall with battens, whole or in several pieces and the design is transferred on the wall by rubbing and dabbing the dry powdered pigment filled in the porous material e.g. several layers of muslin cloth. The second method of transferring the design to the wall is usually preferred by the good 'Fresco' artists. In this case instead of perforating the design, design on paper is attached over the fresh plaster and all contours are pressed through with a pointed brush handle or better still with a metal styles which can be improvised by mounding off the point of a large nail. The limes are used into the soft plaster in low relief. For such work the paper should be soft and there should be sufficient tear strength to permit the lines to be easily pressed through on the plaster. The disadvantage of this method is that tracing takes longer time than pouncing method but it eliminates the chance of leaving pounce marks on the surface.

The positioning of the design on the wall is of utmost importance. One should never rely on guesswork but always use spirit level and plumb line. If the design is transferred in sections, each part should contain at least one clear grid line from which it can be aligned correctly.

The *'Fresco'* painting on the marked design is simple and water colour is tranferred to the wall. The pigments of the required tones (shades) should first be prepared and then applied on the required space with soft sable brushes because the plaster should on no account be disturbed by careless handling or by the use of hard brushes. The artist should develop a light hand and should never touch the painting surface with his fingers. The artist should also remember that one cannot correct mistakes in *'Fresco'* technique because every line drawn with *'Fresco'* pigments immediately gets soaked into the pores of the plaster and cannot be removed. The correction by overpainting like oil paints is not possible in fresco and are comparable with the corrections made in water colour paintings which always remain distinct.

If a correction is absolutely necessary, the *'Fresco'* painter must cut the respective part out with a special type of scraper and replaster the space. As usual, the lower coat of plaster must be moistened with water before the mortar is applied. After setting, the newly inserted

PLATE CXI

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plaster surface must also be moistened and smoothed and the required pigments should be used to complete the designed '*Fresco*' paintings.

Glazing of Frescoes (Plate CXIII, 198,199)

All '*Fresco*' paintings gradually become lighter as the mortar sets and dries. The striking difference between the wet and the dry painting can at first present the artist with the most annoying difficulties. The lightening effect is different for all pigments and becomes almost entirely unpredictable when lime produces various shades These difficulties are reduced to a minimum in the glazing method of Fresco. As it dries the entire plaster surface becomes almost uniformly lighter. Different degrees of lightening among individual colours are slight and as in water colour painting are hardly noticeable.

In Rajasthan technique the glazing of '*Fresco*' painting is done by dabbing the painted portion by coconut oil. The dry coconut is shredded and the shredded material is kept in soft cloth and a pad is prepared when this padded material is softly rubbed on the painting the oil released from the shredded coconut evenly spreads on the painted surface. This increases the glare of the pigments and improves the tonal effect. This treatment also protects the paintings from bright light of the sun and the dust particles. Now a days some fresco craftsman also use polish instead of coconut oil. Wax polish gives the same effect and is better than the coconut oil because it will not be absorbed by the surface of the painting and will not be damaged by environmental factors and on cleaning with soft cloth makes the surface shining.

Secco Painting Techniques

Although '*Secco*' is an accepted, durable and legitimate technique of great antiquity, some painters consider it an imitation on the 'Frescoes' process, to be adopted only where various conditions will not permit the complex manipulation of true '*Frescoes*'. In general use the term '*Secco*' is not always strictly confined to the traditional limewash-casein Italian techniques. It is often used to signify any dry (as opposed to '*Fresco*' or fresh plaster) wall

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painting and includes work as regular tempera painting upon a perfectly dry wall or over dried '*Frescoes*'. Large number of Haveli paintings in Shekhawati region have been done in Secco and in the modified version as mentioned above.

'*Secco*' paintings are made on a finished, dried lime plaster wall with pigments ground in an aqueous binding medium by the following procedure. The finished perfectly dry lime-plaster wall is thoroughly and completely saturated with lime water (or baryta water) the night before the painting. In the morning, the wall is impregnated again with as much lime water as it will absorb. Painting is carried out on this moist surface as in 'Fresco', but the colours instead of being ground in water only, are mixed according to the painters preference either with glue or egg york as a substitute for casein. In Rajasthan, artists normally use gum arabica and a few craftsman even use dilute solution of fevicol as the substitute for casein. Casein solution is the best medium for the limewash type of secco painting. Egg is also used but may yield defective results, especially when insufficient actinic light reaches the mural during the beginning of its drying, because egg will not harden properly without either daylight or heat, whereas casein will harden merely upon exposure to air. The drying of egg, however may be expedited by improvising a suitable electrical heating apparatus which can be passed close to the surface of the freshly painted mural. Some success has been reported with ultraviolet light used in a similar manner.

If the wall becomes too dry during the paint manipulations it may be kept moist by spraying with distilled water. But if it has been allowed to become thoroughly dry it must be entirely re-impregnated with lime water. All secco paints must be thinly applied.

6.3.7 Khamira

'*Khamira*' is a special type of Lime wash used with different types of frescoes pigments and additives.

'Khamira' contains lime putty and water in the ratio of 1:5; Gum *arabic* 3 kg (aqueous solution) per 100 liters of solution, curd or casein 100 gms per 250 liters solution and 10 gms of copper sulphate as the fungicide. The above mentioned ingredients should be properly mixed before use.

'Khamira' is applied with flat hog brushes in two to three coats on the moistured plaster surface after the repair of the cracks.

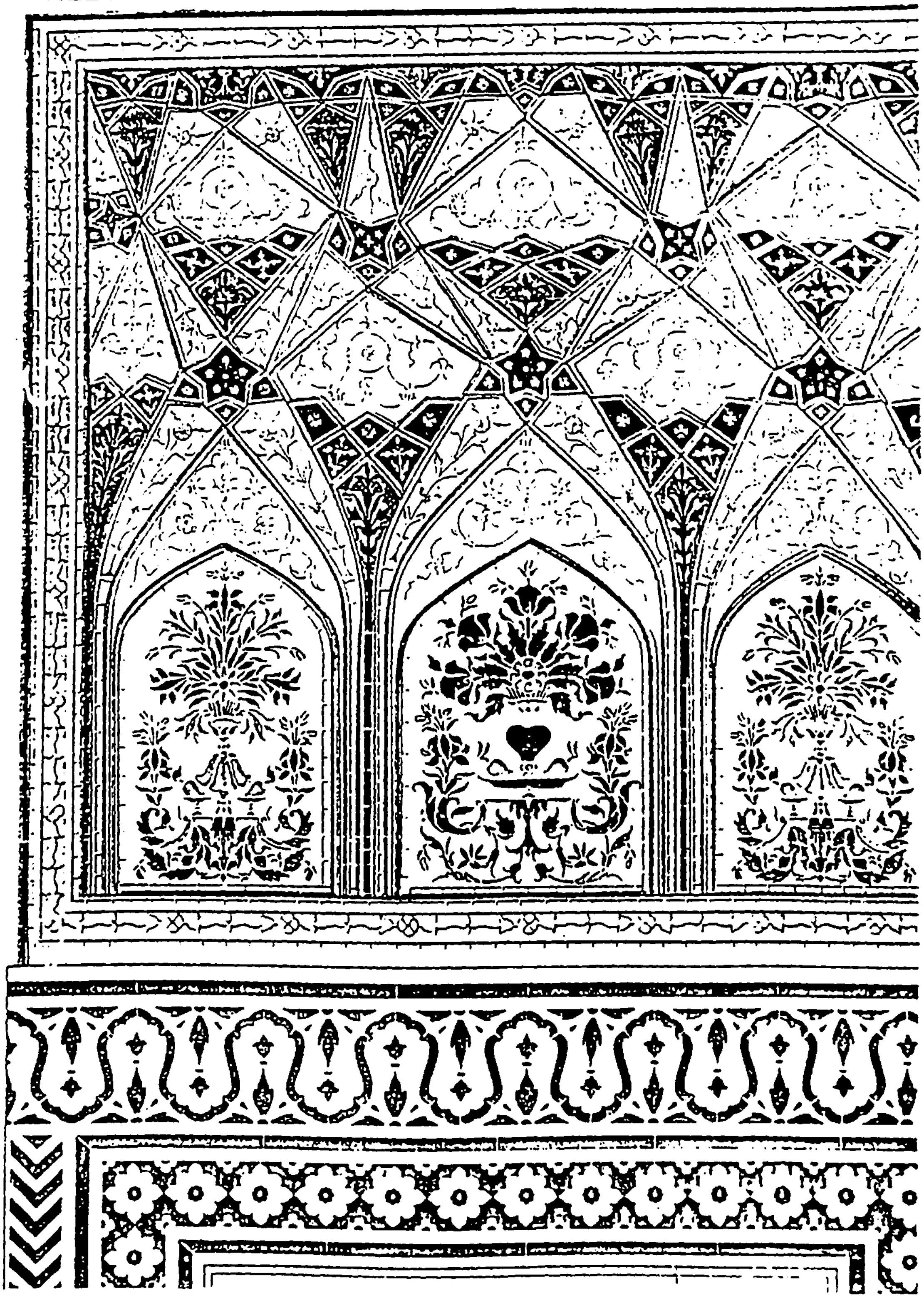
6.4 TECHNIQUES OF RESTORATION OF ARCHITECTURAL ORNAMENTATION WORK

6.4.1 Mirror Inlay Work on Tracery

This highly intricate process requires specific micro tools for eg the *'Karni'* for applying the paste, *'Naila'* for finishing the surface, different types of *'Kalam'* for scratching the lime paste and pointed plier & scissors for cutting the mirrors and a *'Chimti'* for gripping the mirror firmly -- in addition to a special type of glue. The coloured mirrors are not available easily and come from Ahmedabad or Faizabad in circular shapes of 30 cm diameter and 2-4 mm thickness, costing approximately Rs. 150 per kg. These mirrors are also known as *'Jamia'*, mirror glasses.

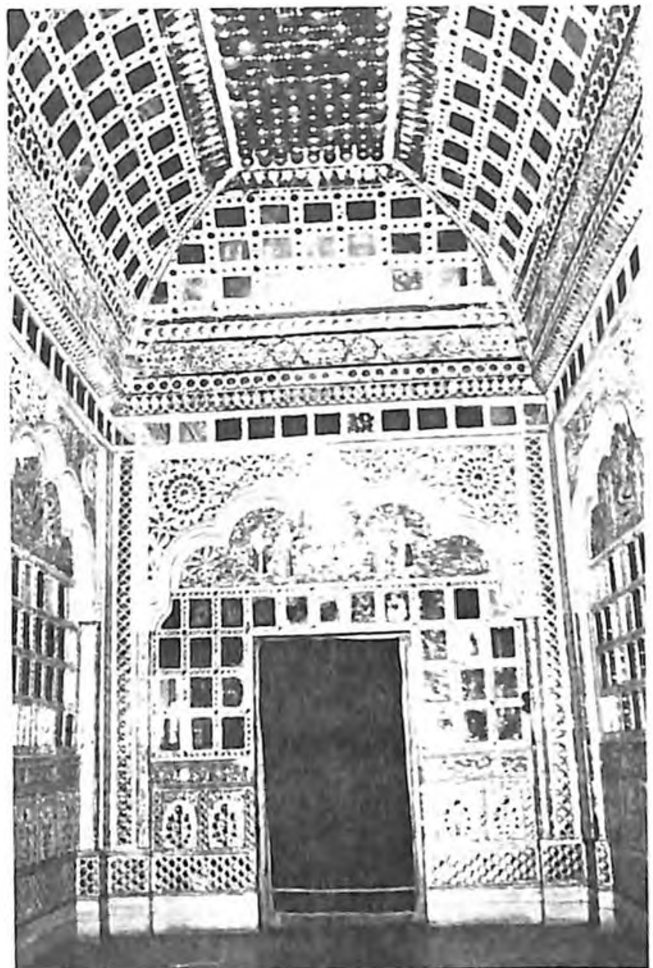
The base on which the mirrors are placed is of lime plaster that has been watered for few days and made rough to prevent cracks & provide grip to mirrors. A special finish known as *'Loi'* is then applied. This is a paste formed by mixing *'Kali'* (baked lime) and *'Surkhi'* (crushed burnt brick bats) in a 3:10 ratio with water. This imparts a fine reddish brown look to the surface now ready to receive the mirror work. A 20-23 cm long kalam is used to carve out the design. (This tool has pointed upper tip for carving, while the lower tip is left flat for scraping off the undesired paste. A circular central portion ensures a good grip). The *'Relief'* work is

WALL AND SURFACE DECORATION



AMBER PALACE

PLATE CXV



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followed in gajmitti* after which the finer details are worked out in a paste formed by boiling a mixture of *'gum'* and *'gajmitti'* in 1:5 ratio with water. Finally the mirrors are cut into the desired shape using pointed plier and their edges softened with a 15 cm long kalam (this one has teeth-like edges). With the help of a 10 cm long chimti they are then placed piece by piece to form the floral pattern as per the design and geometry (Plate XVII, 209, 210).

Mirror inlay in a tracery work at *'Gardand'* costs approx. Rs. 600 per sq.ft and Th. carryout one sq.ft of design pattern in mirrors two craftsmen require weeks time. Labour component varies as per the design and also varies due to the location.

6.4.2 Panni Work (Plate CXIX, 211)

Panni work in another traditional art similar to the Mirror work. Panni is this (   ) Ranga, Copper or Aluminium Foils available in different colours in 10 cm x 25 cm size. The process of *'Panni'* work involves, outlying of floral designs in required colours, on 2 mm thick plain glass sheet of the proper size. The *'Panni'* (foil) pieces of required shape are cut with scissors and the coloured side is made concave by rubbing with Agate stone (Hakik-ka- pathar) and fixed on the glass plate at the appropriate place by using an adhesive made by boiling baked clay, gum and water. The glass sheet thus prepared is framed in lime plaster with a slight gap between the glass plate and the wall. The overall effect will be three dimensional and with the sun's rays or light reflects the pattern is made with great clarity.

6.4.3 Pacchikari (Plate CXIX, 212)

'Aaraish' if carried out with different materials, produces various other traditional art forms. *'Pachhikari'* is one such traditional decorative art made from coloured glasses with *'Aaraish'*. The famous peacock in *'pachhikari'* is a symbolic representation of such work in Udaipur palace.

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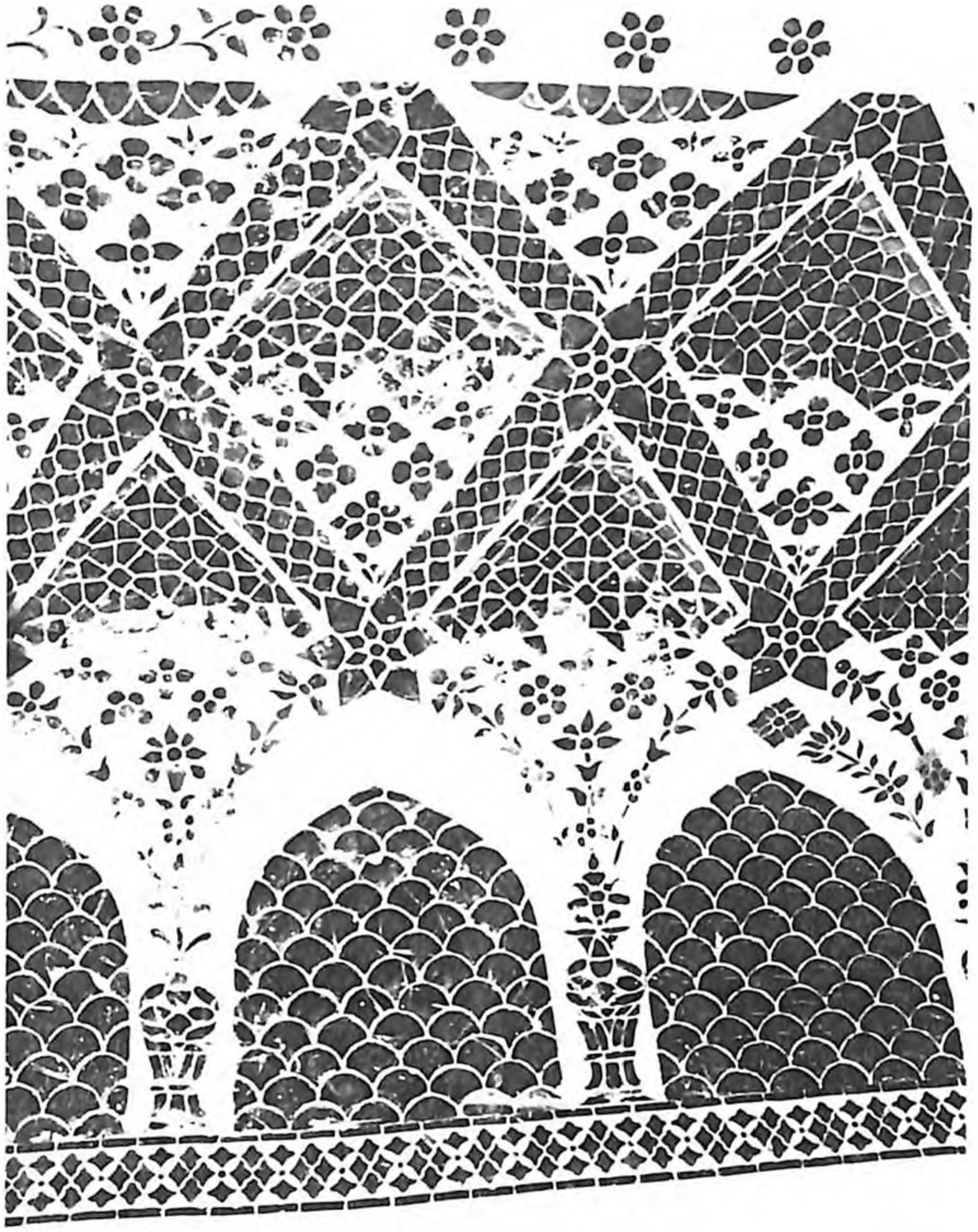
* Now a days plaster of paris is used in place of gajmitti with fevicol as an adhesive.



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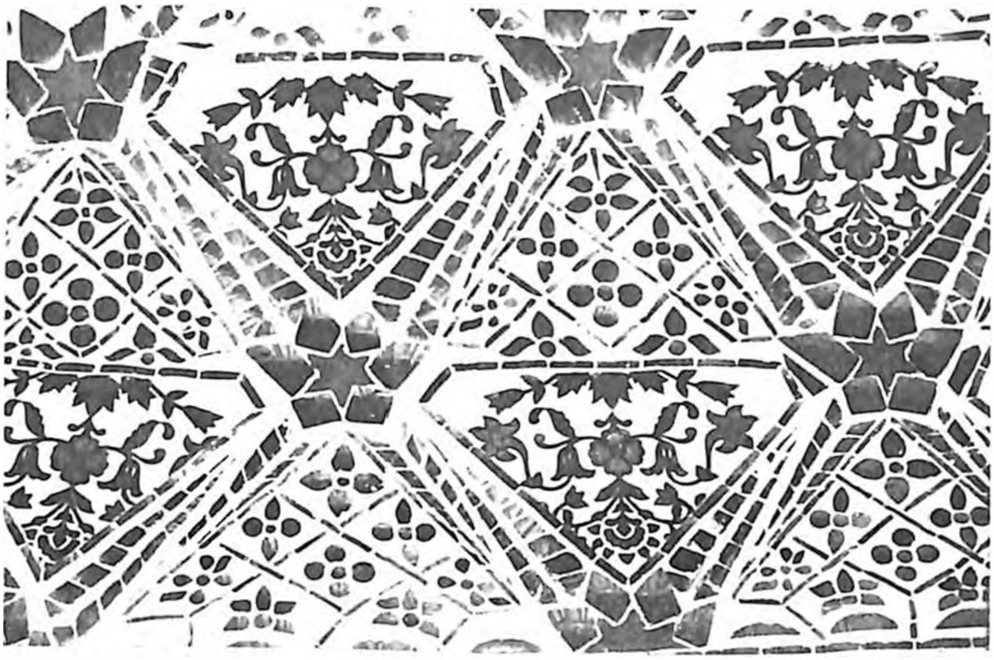

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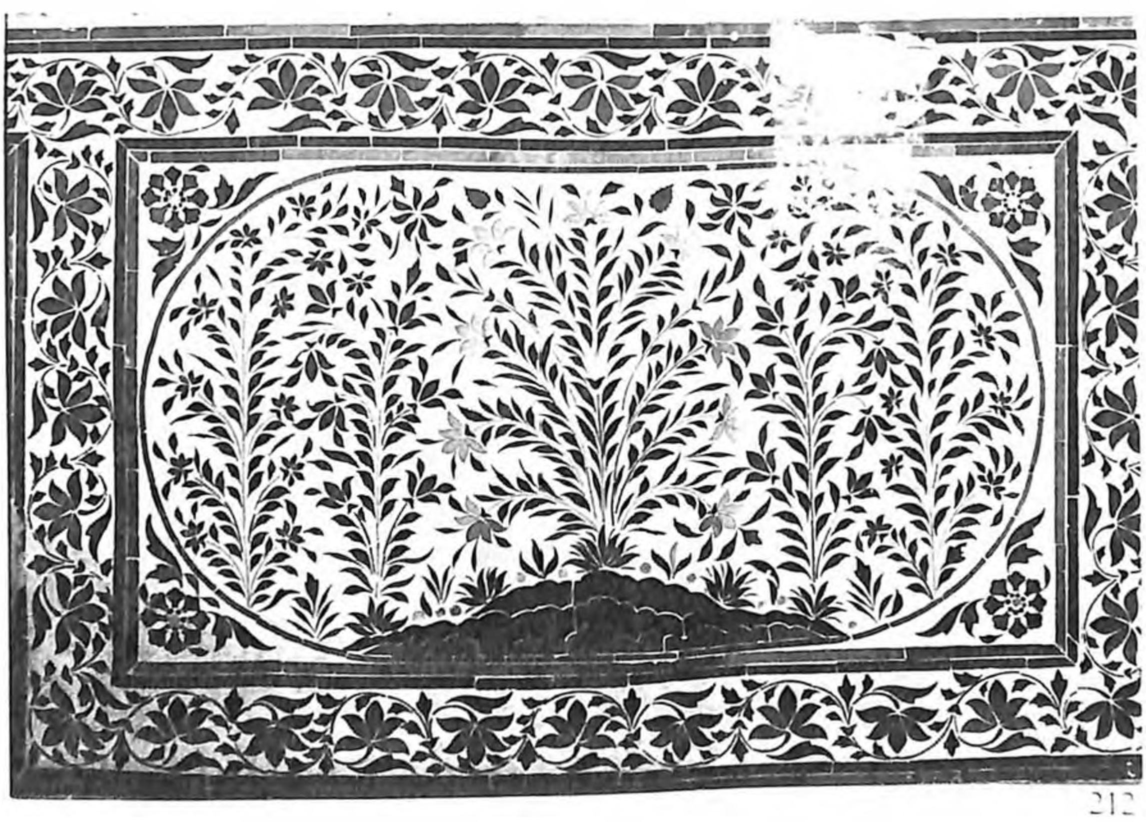

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'Pacchikari' designs are made in the following manner :

Step 1 : The patterns of the designs to be made in Pacchikari are first developed on paper.

Step 2 : The required size of coloured glasses are cut with glass cutter and fixed on this paper with glue.

Step 3 : Properly prepared *'Aaraish'* material is applied on the surface where the design has to be created.

Step 4 : The designed motif of glass is transferred on the freshly applied *'Aaraish'* layer and pressed so that the glass pattern gets embedded in the aaraish.

Step 5 : After the *'Aaraish'* material gets set or dries-up the paper is removed with water. *'Pacchikari'* art is popular because it forms patterns in deep transparent colours and we can also develop figures in three dimensions.

6.4.4 Manovat Work (Relief Work) (Plate CXX, 213, 214)

Relief work in lime mortar for ornamentation work is known as lime Stucco or Manovat work in local language. The materials and tools used are the same as used in other ornamentation works.

The *'Relief'* work is normally done on architectural elements like arches, *'Parapet'* walls or in *'Gardana'* (cronices) to beautify and also to cover the joints between the wall and the ceiling area.

In Rajasthan floral or geometric patterns are commonly preferred for *'Relief'* work but in some cases elephant and Avian designs are also used.

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The relief work is done on properly cured rough plaster surface by the following procedure.

Step 1 : The design patterns in scale are drawn on thick paper and the borders of the designs are perforated.

Step 2 : About 12 mm thick lime mortar prepared by mixing lime putty and surkhi in the ratio of 1:2 is applied on the wet plaster in the region where the relief designs have to be made. The surface is made even by the use of Batkara and the design is transferred on the surface by dusting Indigo powder or Red earth powder kept in muslin cloth and sprinkled on the perforated designed sheet.

Step 3 : The new plaster layer is removed on the border area of the transferred design pattern and the proper patterns are developed by the application of mortar or by cutting and shaping the design as required. Once the design is complete it is allowed to set with proper curing. After the setting final coat of *'Loi'* or Gajmitti or plaster of Paris is applied with brush to make the design surfaces smooth for the application of paints or the Khamira for coloring of the relief patterns.

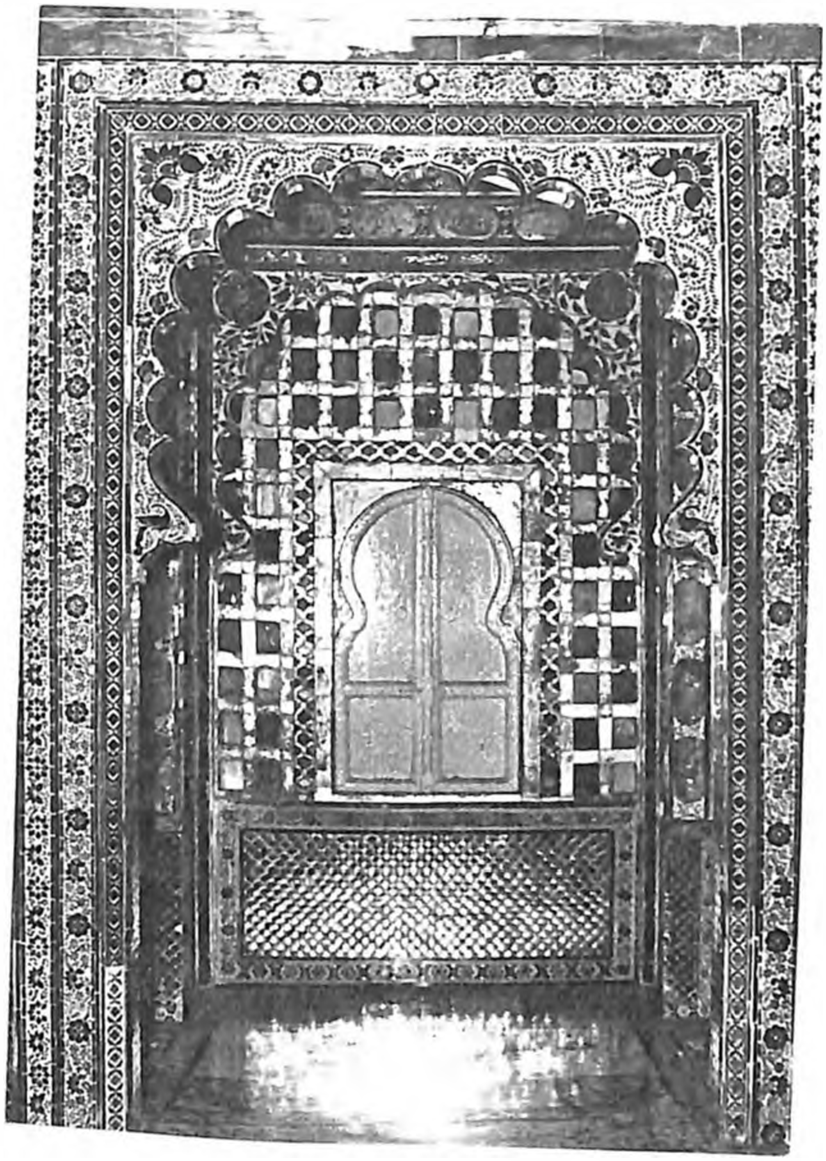
6.4.5 Silver Stucco

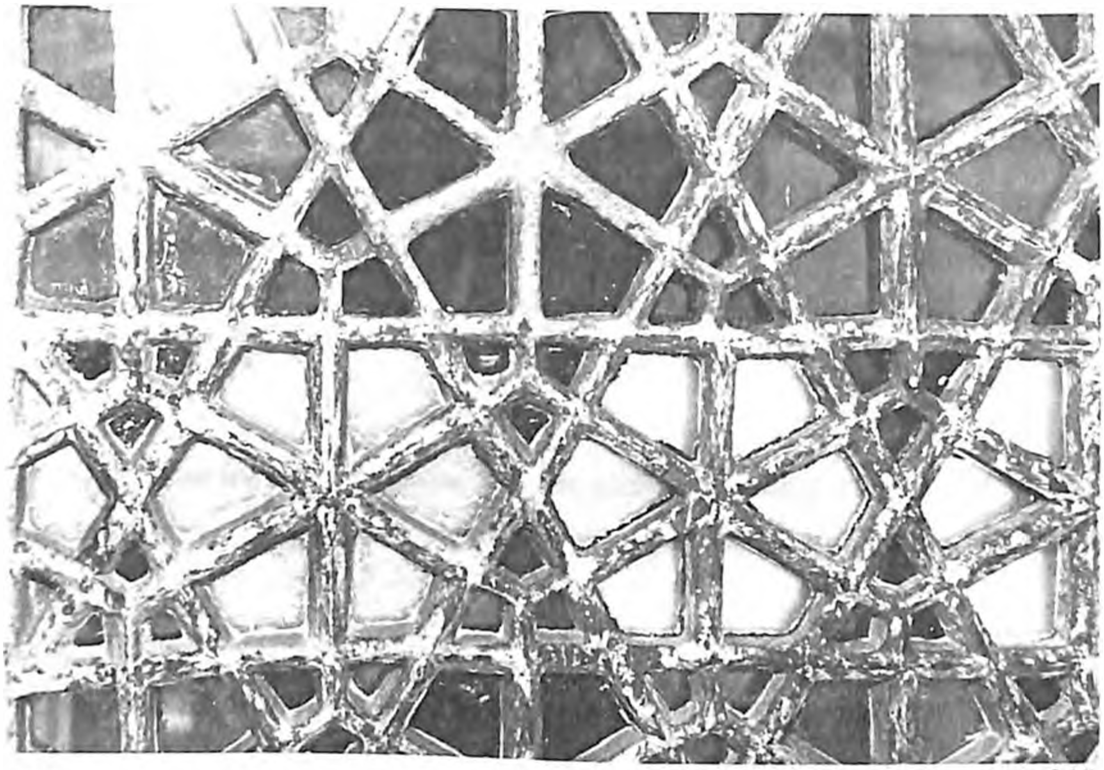
In special cases the *'Relief'* designs are given silver or gold finish after smothing the designs; special type of glue prepared from gum arabica is applied on the surfaces of the designs silver or gold foils are carefully transferred with their tissue paper on the specially prepared surface and by the delicate rubbing of the tissue paper the foils are fixed on the surface.

6.5 RESTORATION OF INLAY WORK

6.5.1 Stained Glass Inlay Work : (Plate XXII, 217, 218)

Use of stained glasses in various building elements like jalees, doors, windows, ventilators





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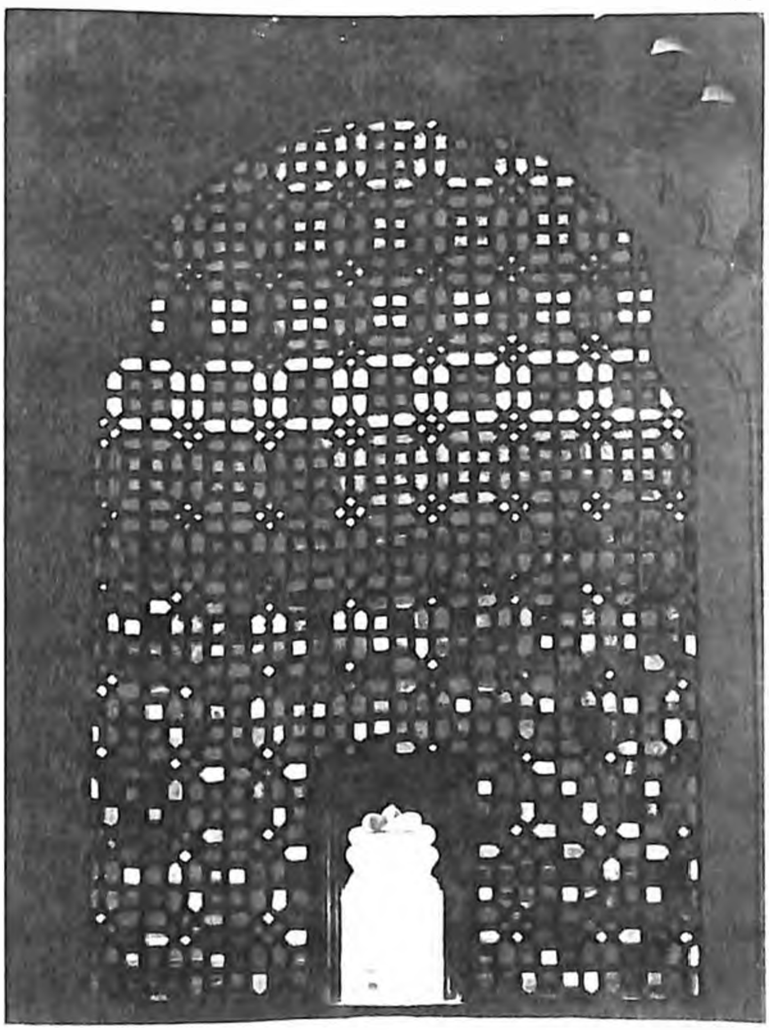

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and other openings have been a pupular technique adopted for various geometrical designs in the interiors of Havelis, Palaces of Udaipur and Mewar region.

The stained glass technique was originally introduced in this region by local rulars utilizing Belgium glass. The glasses of 3-5 mm thickness and 4-9 inches size of different colours like blue, green, yellow, red and plain white are pupular for stained glasses work. These days are available only with a few antigue deolers. Glass have to be imported for larger sizes & special specifications.

The tools used for mirror techniques are also used for stained glass work. To protect the work from dust or any other disturbing elements plain glass is normally fixed on the out side jalee.

Tools used for stained glass work are kalam, glass cutter, pointed plyer, small naila scissor, coloured glasses (Belgium make prefered). To complete one sq.ft of coloured glasses work in a jalee one person will take two days. The cost of stained glass work including the protection glass between Rs. 600 to Rs. 850.

6.5.2 Meena/Dak Meena/ Enameling :

Metal enameling is known by the name of *'Meena'* or *'Dak Meena'* work in local language. According to Polly Rothenberg (1969) "metal enameling is an art so ancient, its beginning are lost in obscurity". In Europe until the present century, only the wealthy could buy on commission a fine enamel. Historically it was customary for members of ruling and rich community to support and carefully mixture the talents of enamel craftsmen so they could spend all their time creating priceless enamels for their patrons alone. A tight society of craft guilds perpetuated the system.

In India *'Dak-Meena'* craft is confined to gold and silver jewelery and some poor quality artifacts in other metals, historically this art was used in creating number of other articles as we find in Garbh-griha doors of Natwarji's Temple the floral ornamentation is *'Dak-Meena'* work has been done in copper base.

The *'Dak-Meena'* are glossy, colourful and transmit light and are of two types : Transparent enamels and Opaque enamels.

Enamel is composed of a basis fret and various metallic oxides for colour and opacity. Like glass, enamels are silicates and have quality of fusing to metals for giving them brilliance. Potash, lime and silica (sand) in specified proportions produce clear glass. Potash and soda contribute sparkle and elasticity. These ingredients are combined with oxide of lead and borax for degrees of hardness or softness. Borax also aids enamel in writing with the metallic oxides that give enamels their vibrant colors. For example oxide of copper produces turquoise and green. Iron oxide make some browns, greens and blacks.

The oxides are combined with the other ingredients and melted together for several hours in a furnace. When mature, the are poured out to cool on steel slabs. The resultant shuts of enamel are broken into chunks, pulverized in large ball mills, then strained and sifted according to mash size. Brilliance, stability and colour depend upon perfect intimacy of combination of component parts and maintenance of temperature throughout the fusion.

Enamel work is done only on a few metals like gold, silver, copper, steel. The metal is made into the required shape and then the enamel materials of the required qualities is mixed by firing enamel at the desired temperature in specially designed kilns.

The melting temperature of the metal and fusing temperature of the enamel have direct correlation. And therefore enamel work can be done only on metals or alloys with high melting point. In our country the Dak Meena work is done in artificial jewelry by using ordinary

coloured glass powder. This develops poor quality of *Dak Meena* work which cracks and loses its grip and gets delivered from the metal surface.

6.5.3. Door Inlay Work (Refer in chapter 5.0).

6.6 CRAFTSMEN

The building crafts flourished over centuries for the taste and requirements of both the connoisseurs and the common man. However, since the middle of this century, rapid growth of industrialisation and the so called modernisation has failed to understand the importance of natural resources present in the region and local materials used traditionally. As a result the present generation of ancestral craftsman engaged in the building crafts and skills took up vocations which were never a part of their heritage.

For the upliftment of these building crafts and to revive the skills of traditional craftsman for successful revival of the ancient historic buildings an organised search was carried out in different regions of Rajasthan, to identify and locate a few traditional artisans and old families who were conversant with these skills but had not practised for over three decades and especially in architectural context.

Along with the documentation of the site the documentation and search for traditional craftsmen was a vital part of the continuing documentation. An extensive search was carried out all over Rajasthan. Artists and craftsmen knowing the skills by word of mouth from their ancestors; understood the history of their craft but due to lack of patronage, non-availability of materials and other reasons had given up the vocation. The very few aged artisans were hesitant to impart knowledge to others. Those who were untrained and unskilled but volunteered to take up these traditional skills were put forward.

Another major problem was to make the craftsmen work together as a team and with appropriate knowledge of the sequencing of various construction activities which were to be followed in restoration. The author being an architect had evolved the skills to match with geometries, scale, colour combination, durability of the receiving surface, cost effectiveness and most importantly the aesthetics in restoration. The author's work may depict less work on the whole; but towards perfection; rather than overdoing restoration at one place.

A scientific assessment of the technique was undertaken so as to make it more valuable in the present condition. Issues such as environment pollutions, existing microclimatic conditions, were minutely studied on a regional scale. Interaction between different kinds of artisans was envisaged. Thus the craftsmen who was a fresco painter but not an artist could learn from the other. Majority of these artisans were not skilled workers but with the traditional background and the willingness to take up the building arts, have now ingrained the techniques. During the last one decade they have worked on restoration projects undergoing in the state of Rajasthan but the author polished their skills and now can be called the master craftsmen of today and saviours of the age old tradition for tomorrow.

The following list contains the names of the craftsmen who have undergone training and are the members of the team involved in the restoration work of the projects under study:

a. Civil Work

Madanji

Lime Jalee

Prabhu Dayal **b. Finishes**

Aaraish and Khamira

Babulal

Ganesh

Navaratna

Nisar

Ram Sahay

c. Frescoes

Bhagirath Sat Narayan Jagdish

Nisar

Ladoo Ram

d. Ornamentation

Art Work

Ram Gopal

Stucoo Work in

Lime: Sooraj

Silver: Prabhu Dayal

Gold: Ladooram

Mirror & Panni Work & Dakmeena work

Sooraj Prabhu Dayal

e. Inlay Work

Wooden inlay

Nanagram

Mother of pearl inlay

Angira

Wood work

Nanagram

Silver work

Angira

f. Horticulture

Nanagram

6.7 TOOLS

To carry out the diverse techniques of traditional finishes, ornamentations and other inlay work, specialised tools are required. The craftsmen retain the original form and design of the tool with changes in sizes for convenience and ease. The tools generally are madeup of wood stone or metal (iron). The original form of the tools was based on its function and the variations in designs of the tools in terms of sizes and thicknesses has taken place in order to achieve details in different designs and materials in various techniques. These are marble inlay work, *'Pacchikari'* work, *'Panni'* work, *'lime stucco'* relief work, lime *'Jalees'*, *'Khamira'*, *'Kara'*, *'Aaraish'* work, etc.

Some of the traditional tools used in Jaipur and Udaipur for restoration work are illustrated below :

6.7.1 *Batakara:*

A rectangular wooden mallet with a handle fixed on top. The *'Batakaras'* are of three types: The size of *'Choti Batakari'* is 2 1/2" x 1" x 1/2" (Plate CXXIV, 221). *'Bada Batkara'* has the size of 2 1/2"x 4 1/2" x 1/2". These are used for levelling and consolidating plaster and *'Kara'* finish.

For smoothening concave surfaces, such as in arches a special type of *'Batakara'* is used which is called as *'Gol Batakara'*. It is a solid cylinder measuring 4" length with 1" diameter and has a grip extending like handle.

6.7.2 Gurmali:

It is a metal blade mallet with a wooden handle on top. It measures 2 cms x 5 cm x 1 mm and is known as Gurmali in local language (Plate CXXIV, 222).

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6.7.3 *Gurmala:*

For smoothening a larger continuous surface a larger size is required; 23 cm x 10 cm x 1mm (Plate CXXIV, 222).

6.7.4 *Naila/Karni*:

It is a flat spatula used for the application of lime with force on to the receiving surfaces. The metal spatula is 1 mm thick in the shape of a leaf, tapering into a rod. This rod is secured tightly inside a 6 cm long wooden handle.

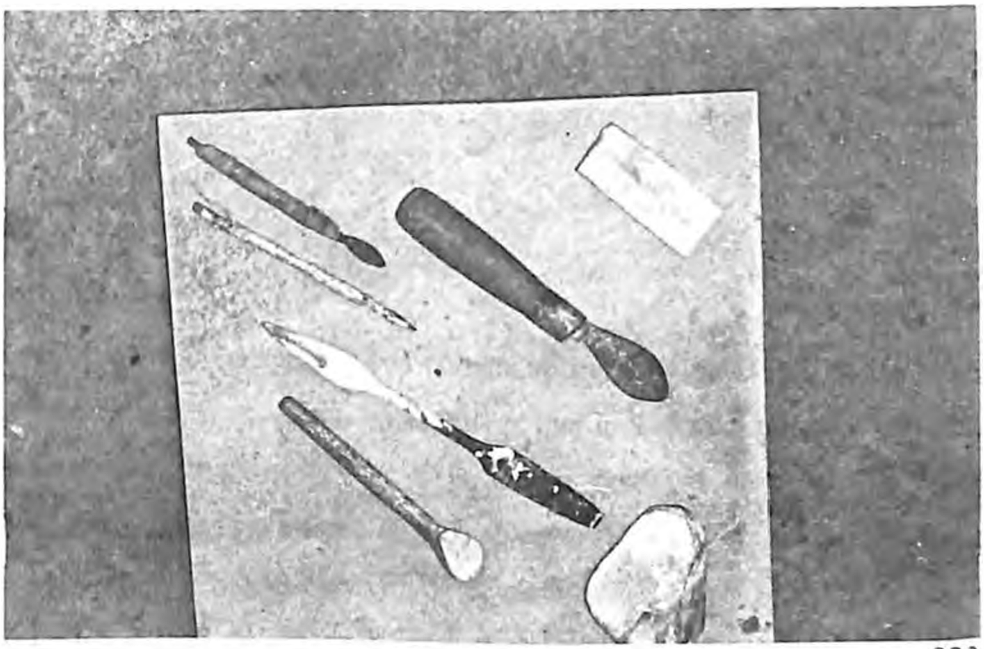
This tool has different sizes and is used for the application of material and smoothening of the surface.

6.7.5 *Naila*:

It is comparatively larger in size with the same configuration of blade into 15 cms long wooden handle. The only deviation in design is in the size and shape. 3.4 mm thickness metal plate and 9 cm long with the spatula being slightly pointed at the end unlike the rounded spoon naila.

6.7.6 *Kalam*

In Udaipur region, *'Kalam'* is known as *'Balari'*. *'Kalam'* is used for engraving ornamental designs of foliage, figures etc. in lime 'Kara'. It is a spear headed metal tool with a 5 mm central rod and a rectangular flat of 1/2 mm thickness at the end. The entire tool is about 15 cms. long and bears a slight curvature in profile. The proportions of three divisions being 6 cm, 4 cm and 5 cm respectively (Plate CXXV, 224).



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6.7.7 Nail :

Nail is a 5 mm iron flat which bears a curved depression and specialises for application of lime plaster in grooves.

6.7.8 Langot :

It is used for rounding outer curves and corners in cornices, walls, etc. It is a kind of elongated *'S'* shape in plan. The upper and lower curves vary in thickness and the tool is held from the middle and measures about 17 cms x 1.75 cms. (ends), 1 cm (middle x 1/2 cm thickness. Another type of langot is shaped like the alphabet *'Y'* in side elevation and section measuring 2 1/2" in length, 3/4 inch at the width of the curve and 1" height including the handle (Plate CXXVI, 225).

6.7.9 *Chimti:*

Different sized *'Chimtis'* are used for fixing the mirror piece on the wall surface.

6.7.9 *Sawal (Plumb)* :

'Sawal' is the plumb line to check the alignment of different layers of plaster applied to any surface.

Jhava Stone: It is a vernacular coarse grained ordinary stone. It is used to rub the lime plaster in the second layer of aaraish where marble *'Jhikki'* is added to lime mortar. In Udaipur practice, it is popularly known as *'Kotda Ka Pathar'*.

PLATE CXXVI

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6.7.10 *Ghooti* (Plate CXXVI, 226)

It is a small smooth stone used in rubbing in the final stage of *'Aaraish'* finish and the unique property of this agate stone is that it imparts lustre and smoothens when rubbed with coconut water. It is also called as *'Hakik ka Pathar'*. *'Jhava'* is another type of coarse stone used for rubbing of Kara surface (Plate CXXVI, 227).

6.7.12 *Brushes* :

It is an ordinary nylon brush used for applying *'Aaraish'* coats and rendering designs in *'Frescoes'* and wall paintings (Plate CXXVII, 228).

6.7.13 *Ghatti* :

It is a kind of traditional grinding equipment, where two heavy circular stone slabs are placed one on top of other and a small circular hole in the upper stone horses a wooden rod embedded into the lower slab. The top slab has a circular rod like handle on the edge and the desired material to be grounded or finely powdered is rotated in continuous circular motion. Thick upper slab crushes the lime, brick bats, etc. This *'Ghatti'* is mounted on a brick platform and is roughly 2 feet in diameter. The fine powder is collected within a 9" high brick or stone boundary around the *'Ghatti'*. The stone *'Ghatti'* has 6" gap all around.

6.7.14 *'Silbatta'* :

'Silbatta' comprises of a 2" to 2 1/2 thick rugged stone slab called *'Sil'* and another circular hard stone called Silbatta. It is used when the stone pigments are grounded to a paste by manually grounding the pigments in brisk to and fro motion of the *'Batta'* on the *'Sil'* surface.

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6.7.15 *Micro Tools for mirror Work* :

'Karni', 'Naila', 'Shishe ki Kalam', 'Chimti', 'Plier', 'Glass cutter' and *'Kalam'* for glass cutting. (Plate CXXVIII, 229).

The shaped copper head has a fine diamond edge for cutting small mirror pieces into the desirable shapes.

Plyer (Choch Plaas): This is a special plyer with a bird's beak and is used to bevell and smoothen the edges of small glass pieces which are already cut.

6.7.16 Special Tools for

a. Lattice work.

Sawal
Karni
Batakari
Kalam

Since *'Jalee'* work involves rendering a variety of geometrics in lime *'Jalee'* or stone lattice work, a wide range of carving *'Kalams'* are available and many more can be derived with minor variations in thickness. The local conversant names of some *'Kalams'* are as follows:

Burmi-Kalam, Keesni Kalam, Chaku Kalam, Gol Kalam,
Sidhi and Nok Wali Kalam.

b. For Aaraish work

Karni
Naila

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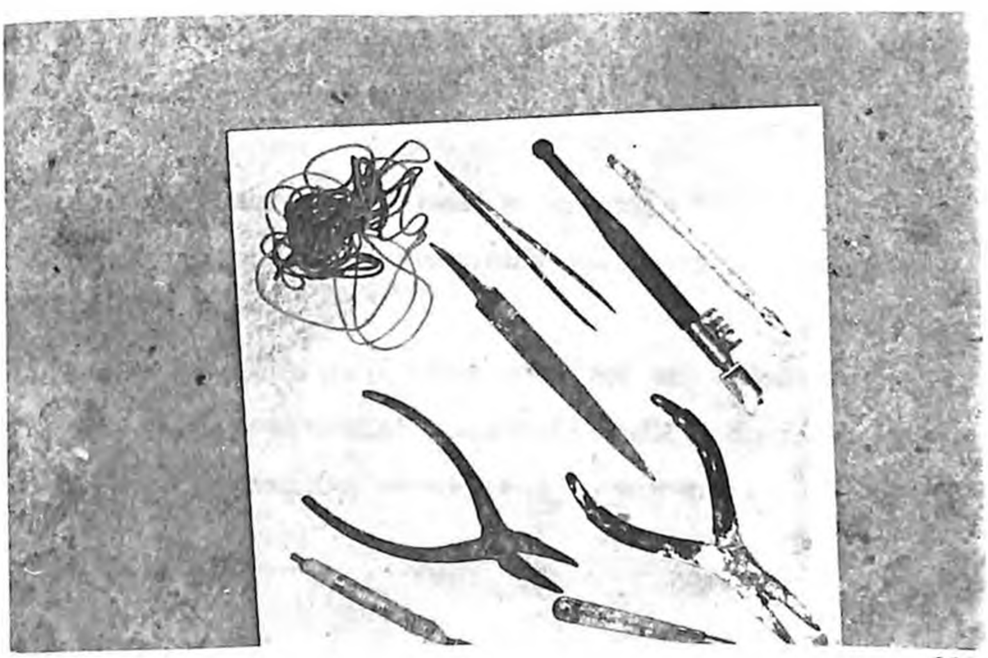

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Batakara

Jhava

Ghooti

Brushes

Wooden spreader

In few cases names of the above mentioned tools are the some as described about but here their sizes and other specifications differ based on their use.

6.8 REHABILITATION

The ancient historical buildings are a reflection of our past heritage and traditional revival of cultural and living traditions. It can be re-established by conservation of this heritage alone.

Conservation process plays a crucial role in architectural revival of the entire era. The most important exercise after the elaborate restoration is the maintenance of the structures restored. The simple key to success of restoration work is to put the building to its original function and use for which the building was designed. The Kanak Ghati was a complete revival. Those buildings which were not religious places like Bagore Ki Haveli in Udaipur were to be rehabilitated by putting the restored parts to its original use with authenticity of cultural, architectural traditions of the period when this Haveli was at its peak. (Appendix; published article)

It is proposed to be rehabilitate for the haveli by creating a living museum inside the Haveli where the diverse environments and uses of an early 18th century haveli are recreated.

Bagore Ki Haveli is the golden era of Mewar and it not only reflects the richness of Mewar's culture but also stands as an invaluable edifice of splendid architectural tradition of Mewar. Now with the living museum, the experience of a visitor to the Haveli will not be restricted to that of a view of a few antiques in an artificial environment but would be transported back in time by a few centuries.

The Jal Mahal structure is proposed to be rehabilitated as a period museum (15th Century - 19th Century) depicting the chronology of developments in the entire Kanak Ghati and also the restoration undertaken here.

The rehabilitation at Kanak Varindavan Temple Complex is solely an architectural, religious and cultural revival. In order to retain the sanctity of the temples which was long lost and forgotten for centuries.

The idols of the Radha-Govind Deoji have been reinstalled in 1987 and now the place is regularly visited by about 3000 to 5000 visitors daily and on religious discourses allowed by the Mahant of city's Govind Deoji Temple. For the last three consecutive years a religious procession carried out through the valley. The idol of goddess Gangaur from Mansa Mata Temple at foot hills of Amber Fort was brought in a traditional procession and deity is placed in the pavilion of Govind Deoji's Temple during the Gangaur and Teej festivals.

It is proposed to establish a Vedic 'Pathshala' in Govind Deoji's Temple to revive the forgotten cultural religious values of the heritage. Shows the condition of the building before restoration and depicts the condition after restoration and rehabilitation by establishing a museum of miniature paintings. The miniatures depicts the episodes from Ramayana, Mahabharata and the Epics(Plate CXXIX, 231,232). (The Kanak Varindavan Ghati was visualized as the abode of Lord Krishna, where he lived and performed the various 'Ras Leelas' with Radha and other consorts).

The entire valley has been restored by recreating the lush green environment with water bodies. The various episodes of the life of Lord Krishna are depicted at various places in the form of sculptures and statues. One of the ponds depicts the scene where the *'Gopis'* (consorts) are bathing and Govind Deoji is sitting on a branch of a tree with the clothes of *'Gopis'* in his

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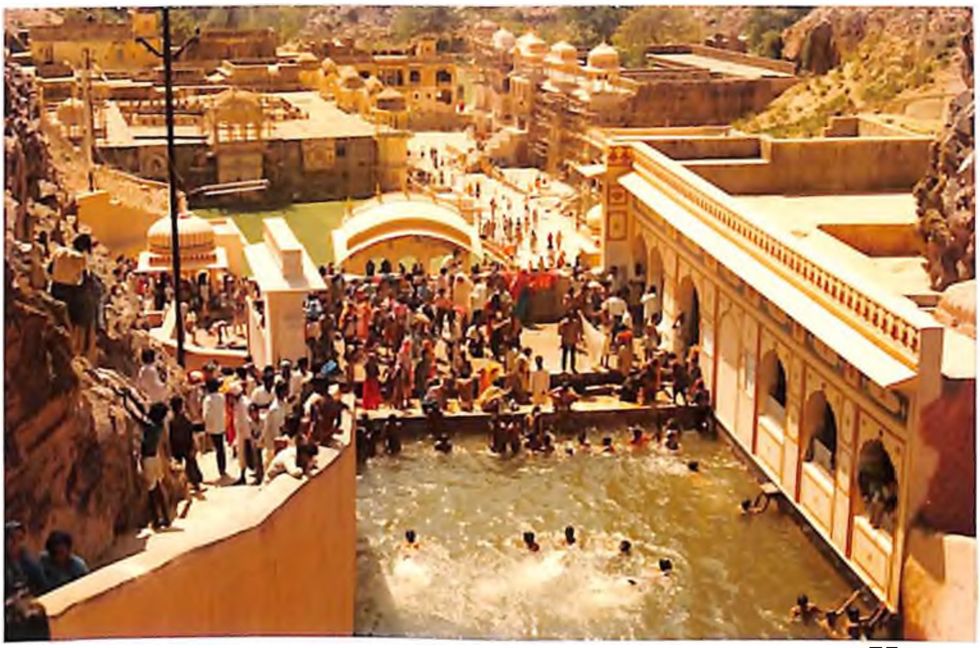
PLATE CXXX



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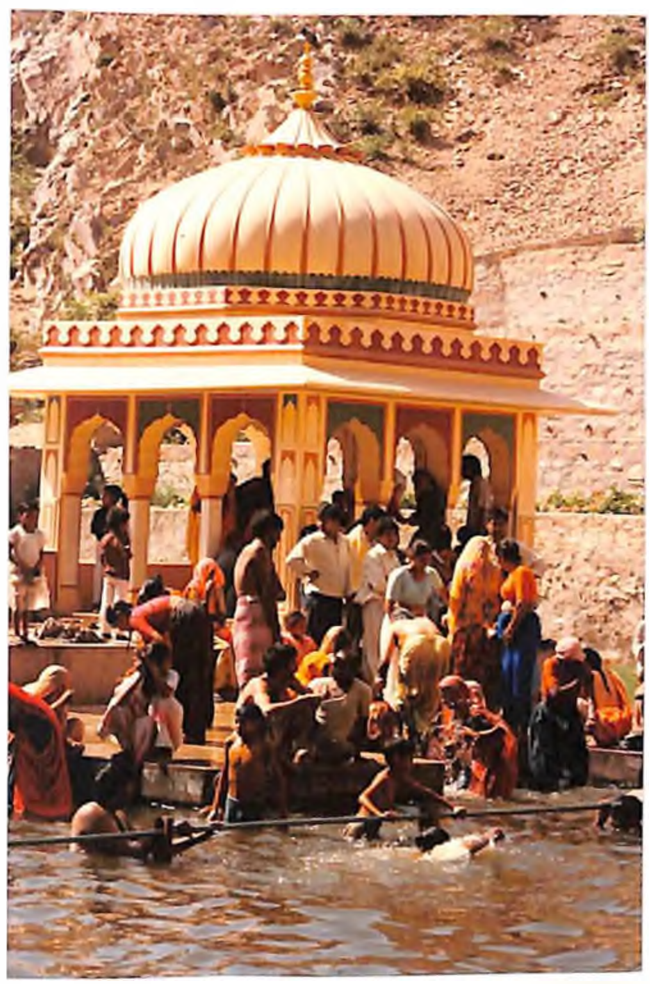

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hands. Similarly, Kanak Bagh is recreated with rich green garden with fountains and water channels as an offering to Govind Deoji and Radha- Natwarji. (Plate CXXIXa, 233a, 234a)

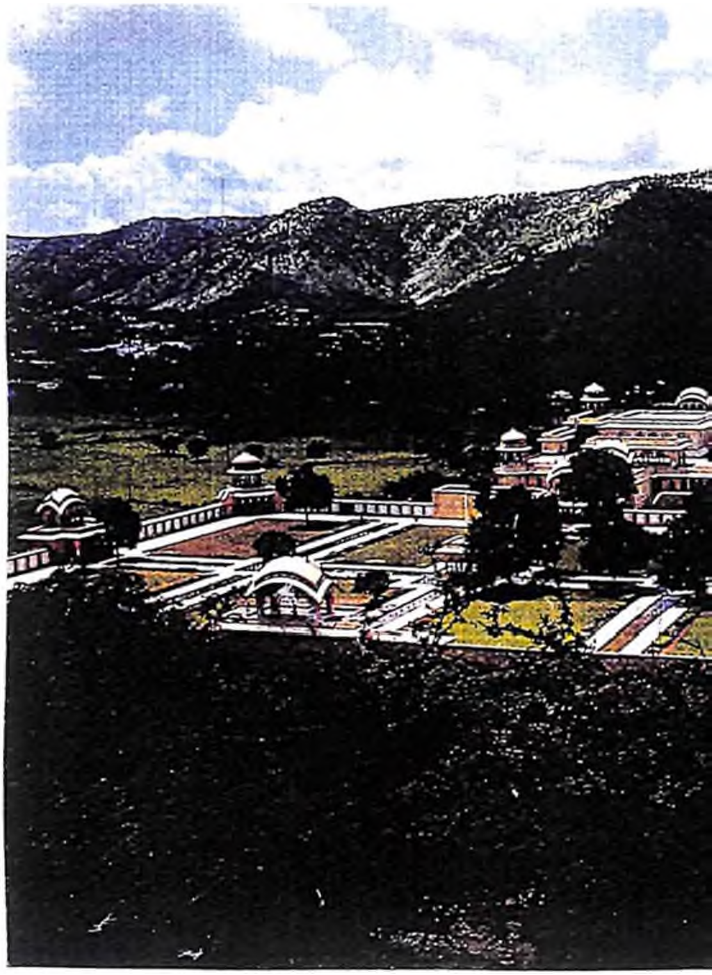
Rehabilitation at Galta Kunds

After restoration various Kunds of Galtaji have become popular with the local population and thousands of pilgrims from the near by villages and towns visit this place of certain occasions like solar and lunar eclipse, during Kartik month (October to November) and on Makar Shakranti day (14th January). (Plate CXXIX 233, 234)

6.9 RESTORED BUILDINGS

Restored buildings of Kanak Vrindavan Temple complex and Galta Ghati complex are shown in the following photographs.

KANAK VRINDAVAN, JAIPUR



The temple complex before and after restoration.

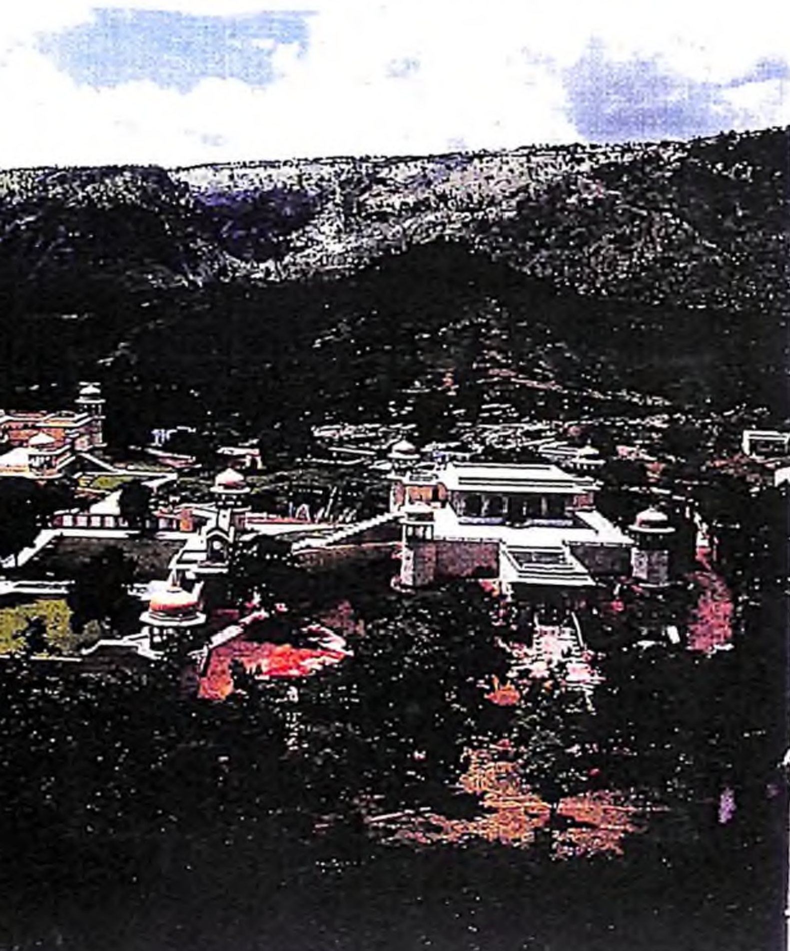


PLATE CXXXI

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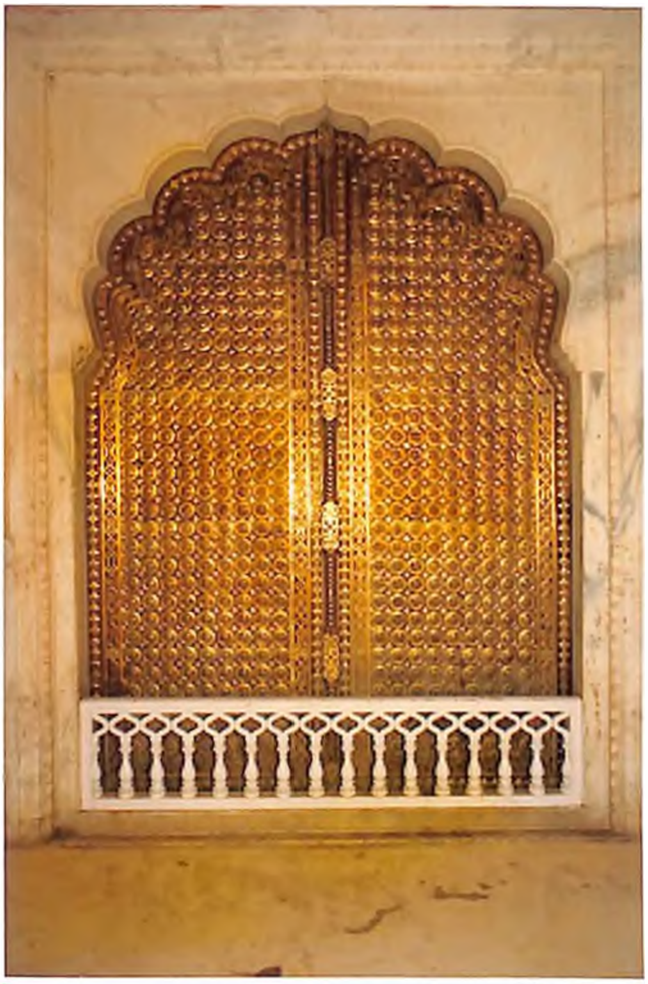

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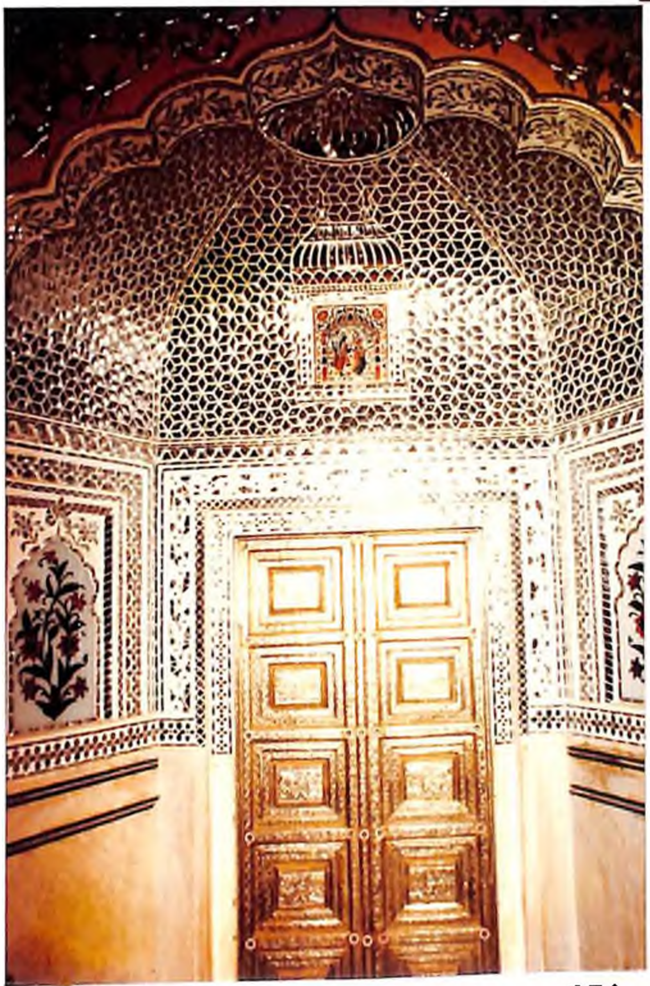

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PLATE CXLIV

PLATE CXLV

CHAPTER 7

ANALYSIS OF ENVIRONMENTAL DEGRADATION

PRESENT CONDITION

The Jal Mahal area has shown drastic changes, especially after the independence. The increase of population at the rate of 25.4% within the walled city, where the density is already as high as 250 persons per acre. It forced people to encroach on vacant land in the immediate neighborhood of the walled city. Thus this area was an obvious choice for the people to spill out. More and more unauthorised constructions began to take up in an unplanned hapazard growth pattern without adequate ancillary services. The result is highly detrimental to the quality of the valley environment. The Valley which represented historical landscape is now at ruin. The natural wealth that it possessed in the form of a lake, flora and fauna began to diminish.

The Mansagar lake began to pollute after 1960 when the untreated city sewer was fed into it at the rate of 5Cu.ft./Sec. annually. Now only a part of this discharge coming from treatment plant is treated. There is one small scale stone cutting plant establishment in the outskirts of the lake which is a source of dust to the lake. The major source of silt to the lake is from open drain known as **Nagtalai Nala** which brings silt from the **Kilangarh** catchment area. The other drain is **Brahmpuri** open drain which brings waste water to this lake from surrounding areas (Plate CXXXIX, 269).

All these have completely ruined the quality of the lake water. There is no sign of Aquatic fauna. Lake ecology is completely disturbed. Undesirable weeds have covered the lake. The lake has lost its scenic as well as utility value.

The outskirts of lake area inhabited by a number of settlements are increasing in their population day by day. Exposed areas in the lake are heavily subjected to grazing. Roughly 1500 mammals graze every day in the lake area. Trucks are also washed and also drying of clothes dying is done on the south east Nagtalai open drain. When the water level recedes considerably, exposed areas in the lake are cultivated, approx. 40 *'Bighas'* of land is under cultivation annually. Nitrogen fertilisers like urea etc. are used with small amount of pesticides (Plate CXXXXIX, 270).

Often birds visit the lake and their excreta along with the cattle excreta is a source of organic matter to the lake. At present irrigation during *'Rabi'* season seems to be the only use of lake water.

7.1 CAUSES OF ENVIRONMENTAL DEGRADATION

Some salient factors those are responsible in degradation of this area are :

1. The reactivation of some of the recent fluvial and aeolian sand deposits along the Western flank of Kilangarh foothills due to quarrying and growth of construction activities in the foot-hill areas are the serious interferences with the fragile natural system resulting in air pollution. These sand deposits in form of dunes are accumulated by wind borne material being on the windward side of Kilangarh hill. These dunes are unstabilished as they lack vegetational cover on them. Heavy storm usually transports sand in the air.

2. It is significant to note that this tract does not have any major natural drainage pattern. Recent deposits of sand dunes are devoid of any compaction and cementing material which are characteristic of soil in humid tracts. Infact they are in a state of fragile equilibrium which can be easily disturbed by any interference. Monsoon rain usually carries with its run-off,this unstable sand to the discharge point in Mansagar lake. The

channel known as Nagtalai Nala which brings heavy silt from Kilangarh foothill areas usually chokes culverts, creating congestion and water logging conditions.

3. Due to the sanctioned removal of wood growth in the past at the rate of 200 quintals per hectare over past 40 years for wood products and fuel and even greater amounts of illegal wood cutting, has denuded the forest of Kilangarh and Nahargarh hills thus enhancing heat radiation from areas of exposed rock face resulting in increase in temperature.

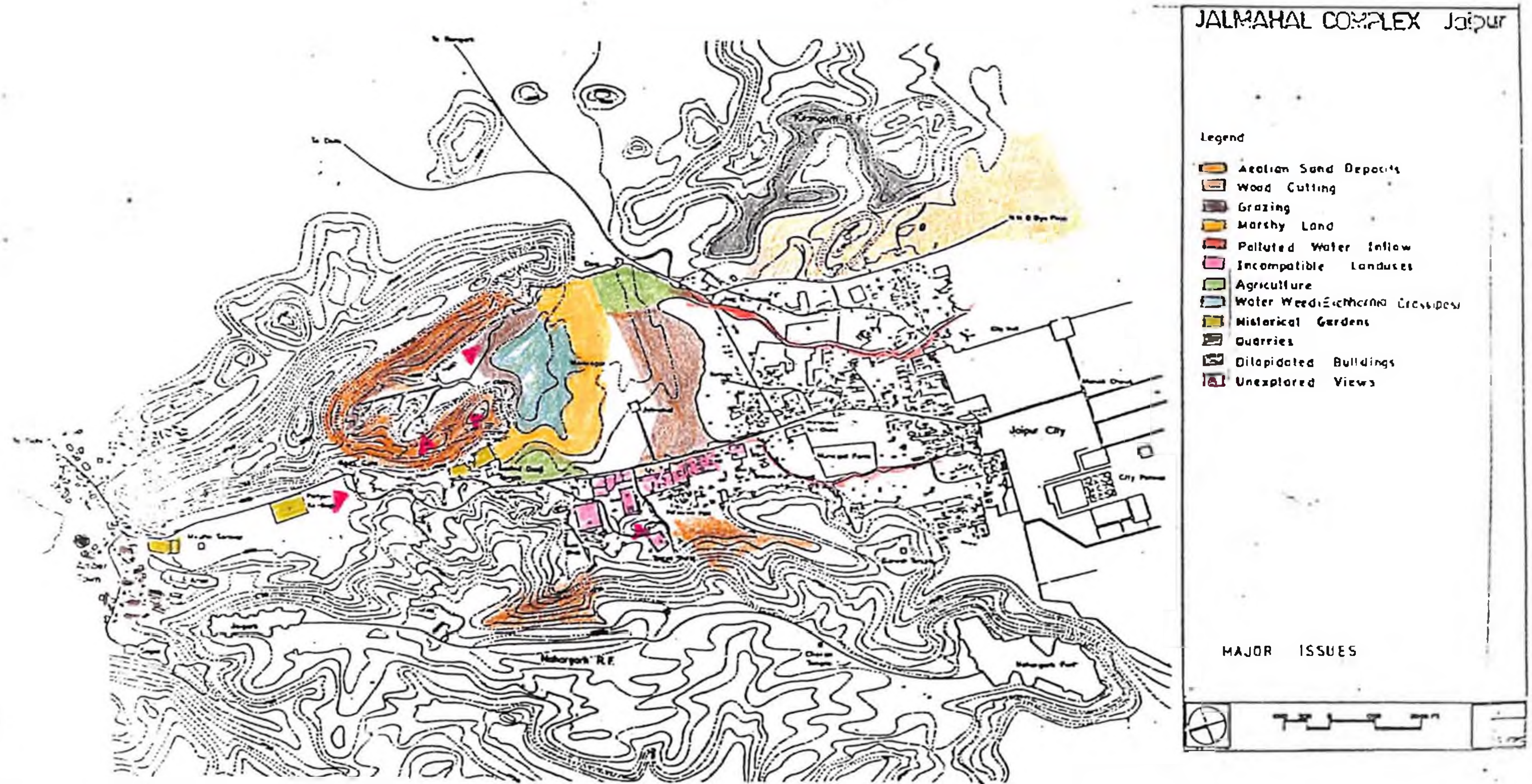
4. Denudation of vast areas of Kilangarh hills by quarrying has upset the Geomorphological balance to such an extent as to cause enhanced heat radiation from large areas of exposed rock face, resulting in increase in temperature.

5. Generation of dust by stone crushers grinding machinery had repercussions in terms of vascular diseases. The enrichment and percolation of ferruginous material of quarries into the ground water bodies caused water hardness.

7.1.1 Natural Resources Depletion (Plate CXXXXVII, 267)

Resources depletion is a serious growing concern in this region. With high contamination of Mansagar lake water, heavy deforestation of Nahargarh forests and Kilangarh hills, reduced recharge of ground water, reduced surface water capacity, diminishing of faunal wealth are of great significance.

1. Mansagar lake which is the only largest surface water- body in the Jaipur and its environs having 400 acres as submerged area during monsoon and live capacity of max. 83 mcuft. at 116.00 level. This storage capacity is considerably reduced due to disturbed catchment area thus reducing potential for its human use for agriculture, forestry or daily consumption etc. It is conjectured that this lake had few decades back had water through out the year. This decline in its capacity and further continuing


JALMAHAL COMPLEX Jaipur
Legend
Aeolian Sand Deposits
Wood Cutting
Grazing
Marshy Land
Polluted Water Inflow
Incompatible Landuses
Agriculture
Water Weed (Eichhornia Crassipes)
Historical Gardens
Quarries
Dilapidated Buildings
Unexplored Views
MAJOR ISSUES
Jaipur City
Nahargarh R.F.

267

2 68

trend with this rate will end up with complete disappearance of the lake in only half a decade; a resource which is so essential and a boon for such a climate.

2. Degradation of flora and fauna has reduced natural wealth of entire region which is non renewable. Disturbance in ground flora of 'climax' vegetation *Anogoissus pendula* (Dhok) resulting in interference in its plant associations have made their existence difficult. This climax vegetation has lot of significance in overall ecosystem of this area and the Aravalies (Plate CXXXXVII, 267).

3. The fauna in the region is on decline because of extensive human interferences and commercial exploitation. There is nevertheless a smaltering representation by orders of mammals and 12 of birds.

4. Mansagar lake receives rain water run off from Nahargarh hills by two defined gullies. Both of these seasonal natural gullies are intercepted by unplanned growth of Parasrampuri *kachhi basti* and Gujarghati settlement. These settlements have altered the natural water drainage pattern. The quantity of water coming from hills has been considerably reduced because of obstructions in free rain water flow causing ground infiltration. The lake monsoon rain water inflow is considerably reduced creating problems of its recharge, little amount of run-off that could still reach this lake carried with it unhygenic substance from these settlements which lack in their essential amenities.

5. These two settlements have a large number of grazing mammals surviving on lower vegetation cover in Nahargarh forest. The other settlement known as Kala Mahadev in Amber Ghati north of Jalmahal depends on this valley for fodder fuel. This extensive removal of ground flora resulted in leaving steep slopes susceptible to erosion. Heavy silt is brought from this catchment to Mansagar lake which has been silting up over a few decades. The lake depth which was recorded forty feet in depth. This reduced capacity of lake is the cause of low ground water recharge.

7.1.2 Lake Water Pollution

1. Polluted inflow from Brahmpuri open drain carrying 19 lacs gallons waste water daily has B.O.D. 380 mg/lit. C.O.D. 980 mg/lit. solids 2856 mg/lit. results in Eutrophication of the lake (Plate CXXXXIX 269).

2. Whereas Nagtalai nala having inflow 14 lacs gallons daily adds solids 2772 mg/lit. inform of dissolved solids and suspended solids 1930 mg/lit. giving rise to siltation of the lake.

3. Run-off from agriculture brings water borne nitrates favouring proliferation of aquatic weeds like <u>Eichhornia spp.</u> (Jalkumbhi) (Plate CXXXXIX, 270).

4. Essential amenities lacking is developed area pollutes run-off e.g. Parasrampuri, Gujarghati and unauthorised construction in Mansagar catchment area.

5. Disposal from Textile industries pollutes lake water (Plate CXXXXIX, 270).

7.1.3 Incomplete Landuses (Plate CL, 271)

1. Incompatible landuses like small scale industries, particularly Textile Industry, Stone Crushers etc. are deteriorating the environment. Most of historical sites are occupied by people for living purposes.

7.1.4 Dilapidated Historical Structures

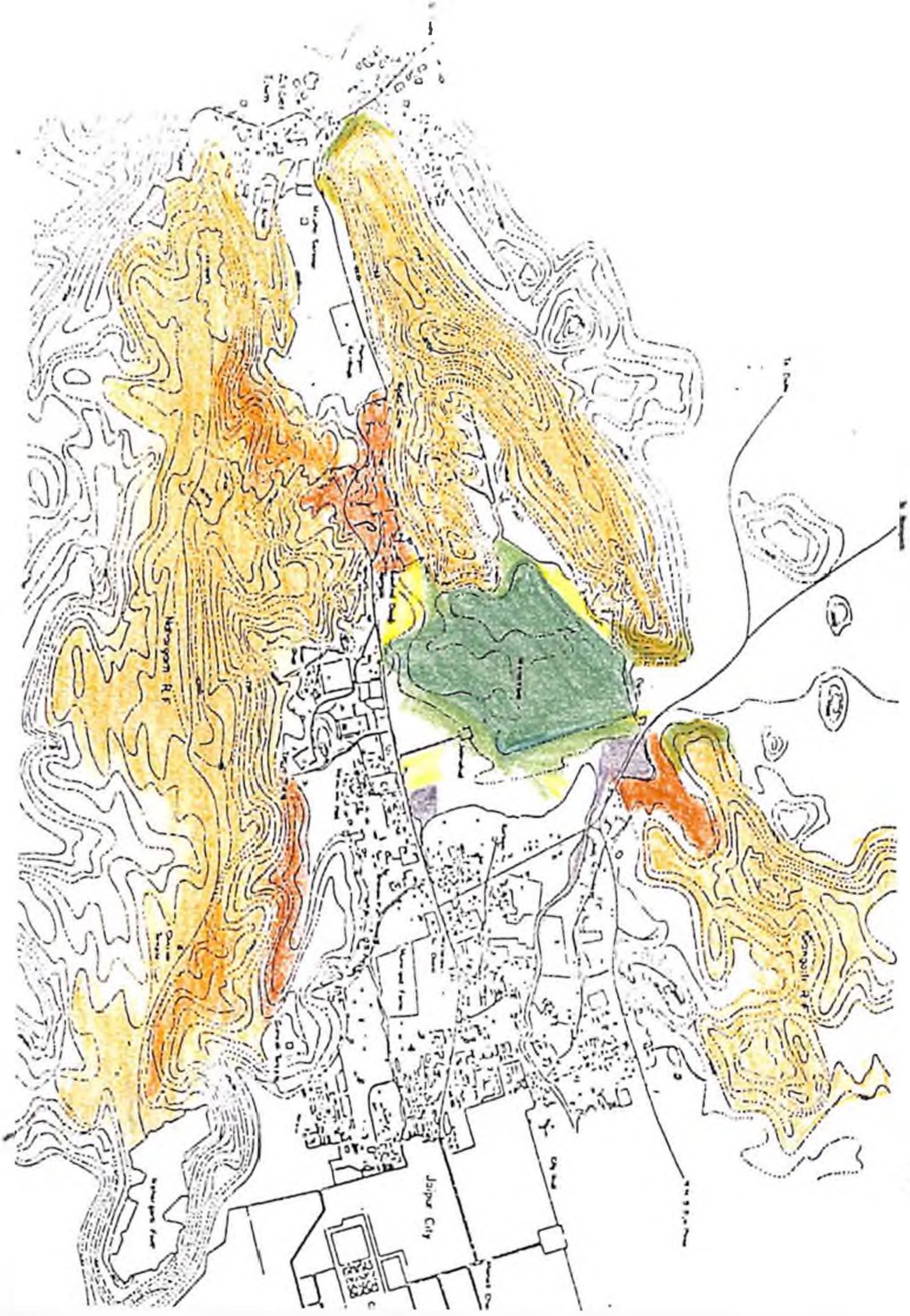
1. Identity of historical site where *Ashwamegh Yagya* was performed is lost. Existence of *Yagya Shala,* a temple and a Pillar is of historical significance.

269

270

PLATE CL

271



Jaipur City

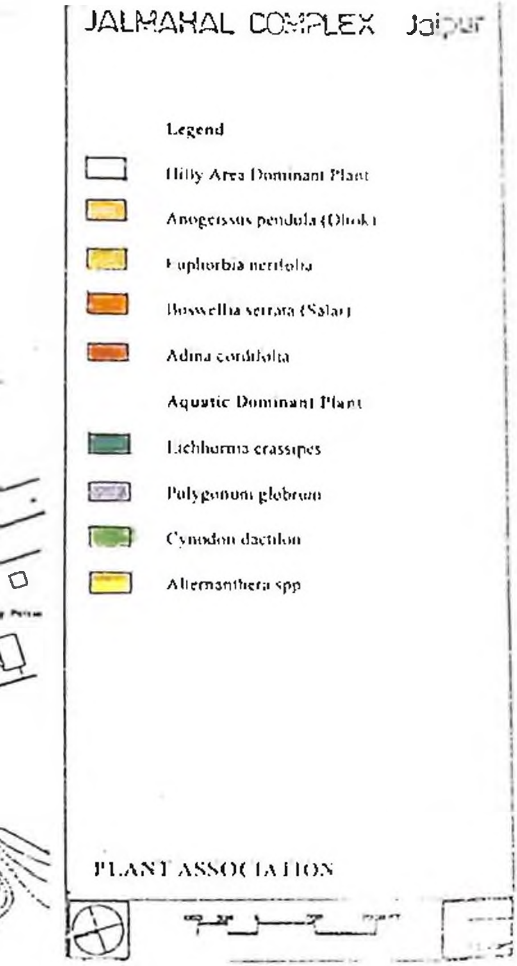
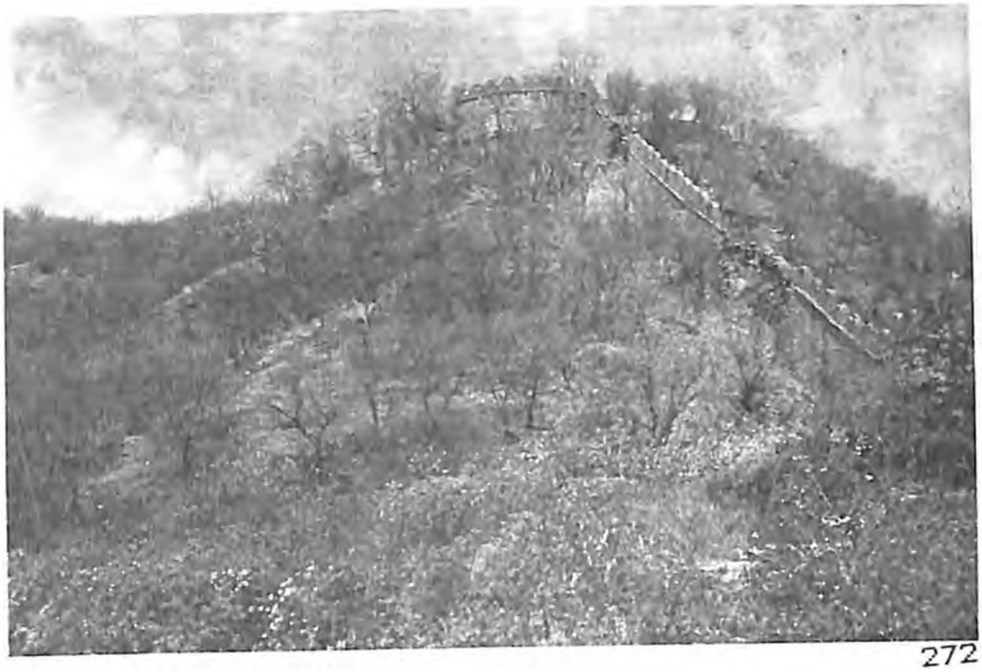

JALMAHAL COMPLEX Jaipur
Legend
Hilly Area Dominant Plant
Anogeissus pendula (Dhok)
Euphorbia nerifolia
Boswellia serrata (Salar)
Adina cordifolia
Aquatic Dominant Plant
Eichhornia crassipes
Polygonum glabrum
Cynodon dactilon
Alternanthera spp
PLANT ASSOCIATION

PLATE CLI



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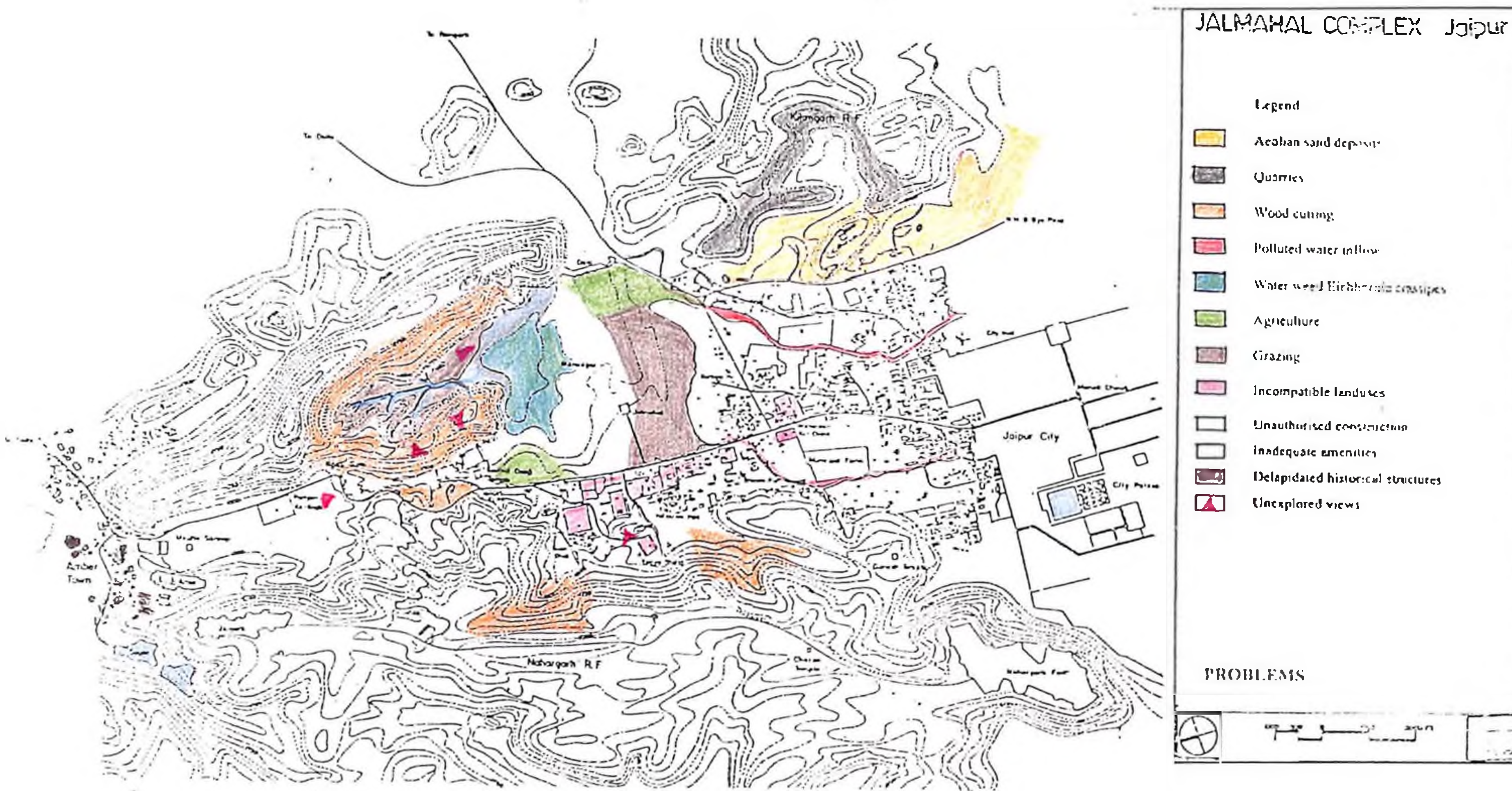


JALMAHAL COMPLEX Jaipur
Legend
Aeolian sand deposits
Quarries
Wood cutting
Polluted water inflow
Agriculture
Grazing
Incompatible landuses
Unauthorised construction
Inadequate amenities
Delapidated historical structures
Unexplored views
PROBLEMS
Jaipur City
Nahargarh R.F
Amber Town

2. Most of historical site like Maharani Ki Chatri, old Govind Deoji's temple, Kanak Bagh are in dilapidated condition with their aesthetic values being severely affected by unauthorised constructions adjoining them.

7.1.5 Visual Degradation

1. Exposed land surface due to depletion in lake water presents an ugly view.
2. Growth is lacking in visual considerations.
3. Highways and roads lacking in avenue effect.

Wrong location of road tarrif site creates traffic congestions on National Highway No. 8.

7.2 ANALYSIS

7.2.1 Vegetation Analysis

The vegetation of the area presented very different scene than what it is now. Hills were thickly forested but plains had vast areas of sand dunes which were also covered by the vegetation. But neither edaphic factors nor biotic ones were permitted to flourish. The soil was extremely scanty in humus, its water retaining capacity was very poor, its microbial flora found itself difficult to exist in absence of the carpet vegetation as the soil was bared by the hot Sun. The most disastrous role was played by the irregular rain-fall. The average annual rainfall could be compared with some parts of the Gangetic plain but it was rendered inaffective due to the long intermittent dry spells of drought-often as long as two to three weeks. Amongst the annuals, only species could occur here which were able to complete their cycle within a very short-moist period. Amongst the perennial species, those which could suitably adapt to these conditions could survive. However, extreme variation in the diurnal as well as seasonal temperature made it very difficult for the vegetation to successfully adapt itself to above conditions. It was difficulty for the perennials to adapt to temperatures as low as freezing points during the cold nights and as high as boiling point of water during the summer season. Moreover the diurnal variation often as great as fifteen to twenty degrees centigrade during the summer. It is thus presumed that a permanent variation is not to be expected in this area. On the contrary, plants which could either adapt themselves to high temperatures or to low temperatures and discouraging conditions of soil and rainfall could be found. This perhaps was the reason for a very low percentage of tree species.

Whatever vegetation grew inspite of such difficult and discouraging condition of climate and soil, got a detrimental treatment at the hands of biotic factors. The tree species were excessively topped for fodder, fuel and other purposes by people. The domestic animals i.e. Camel, goat and Sheep were the worst enemies of the vegetation. The vegetation as existing now is described below :-

The hills surrounding the lake support a rich tree and ground flora. The trees making the top periphery of the hills are of *Anogeissus pendula* (Dhok) which makes the appearance of hills reddish, lower hills are occupied by trees like *Prosopis juliflora* (Vilayati babool) *Acacia _senegal, Holoptelia integrifolia, Wrightia tinctoria* (Khirni) and *Cordia gharaf* (Goondee).

The lower most part of the hills is generally inhabited by shrubs like *Euphorbia neriifolia, Cryptostegia grandiflora* (Rubber-bel), *Adhatoda vasica* (aboosa), while the ground flora is mainly composed of *Commelina undulata, Portulacca grandifolia, Amaranthus spp.* and *Spiteracanthus prostatus.*

Lake boundary is surrounded by *Prosopis juliflora* (Vilayati babool) trees but density is not high. Among the permanent vegetation in the lake some plants of *Tamarix spp.* are present on both sides along the sewage drain, some plants of *Euclyptus spp*_and *Casuarina spp.* are present on the road leading to palace and some plants of *Acacia spp.* and *Prosopis spp.* around the agriculture fields.

The drain bringing sewage is devoid of any vegetation though the margins are occupied by *Pharmagites karka* and *Ricinus communis* (Arand), while the drain bringing relatively cleaner water is having huge growth of *Periphyton spp.* before entering into lake boundary, immediately after the entry in boundary it harbours a huge stand of *Polygonum spp.* and few pathches of *Typha spp.* both *Polygonum spp.* and *Typha spp.* have been recently introduced to water body, and earlier the drain was a mosaic of various aquatic grasses and sparsely dispersed *Ceratophyllum demersum, Asella, Spirodella* and *Hydrilla.* Polygonum has reached to the water level now.

All the exposed areas in the reservoir are occupied by different plants in the course of seasons.

Local People tell that in 1975 *Eichornia crassipus* (Jal Kumbhi) entered into the water body through run-off water from a nearby resident's tank, and it subsequently encroached the whole lake by April 1978.

7.2.2 Fauna Analysis

The Fauna of Jaipur reduced considerably in the past. Still it is represented by **9 orders** of mammals, **12 of birds,** 4 of reptiles and just one of order Amphibia.

Avifauna

Out of 16 order of birds only 12 orders are represented in and around Jaipur. Blue Rock Pigion, Blue throated Barbet are well preserved due to religious reasons. The other birds such as common green Pigeon, Spotted Dove and Ring Dove, are commonly seen. Whereas Weaver bird which prefers solitude is diminishing. The common crow, house Sparrow are found in large number, though Jungle Crow has become a rare sight, common Myna and Bark Myna are commonly sighted and so is white cheeked Bulbul. The

Autotrophs

Habitat Anogeissus endula Forest

Anogeissus pendula Dhok

Boswellia serratta Salai

Holoptelia integrifolia Churel

Mytragyna parvifolia Kalam

Diospyros melenoxylon Tendu

Lannea coromendelica Gurjan

Ficus glomerata Gular

Albizzia lebbek Siris

Habitat Boswellia Serrata Forest

Boswellia serrata Salar

Lannea coromendeleca Gurjan

Diosphyros melenoxylon Tendu

Grewia spp. Dhaman

Habitat Most Miscalloneous Forest

Habitat Miscalloneous Forest

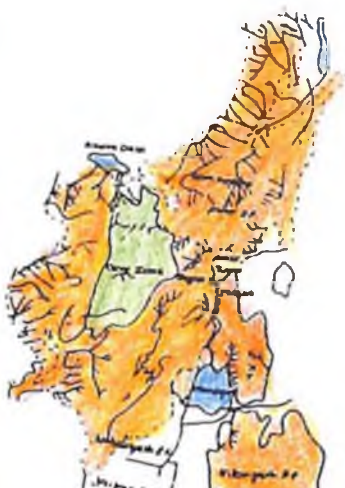
Salvadora persica Jal

Balanites aegyptica Hington

Capparis deciduo Khair

Zizyphus zylopara Ghatbor

Zizyphus spp Jhar ber



Hetrotrophs

Herbivores

Elephant

Bundar

Langur

Nilgai

Wild Boar

Chinkara

Hedge Hog

Sambhar

Blue Bull

Antilop

Black Buck

Hog Deer

Chital

Carnivores

Wolf

Top Cornivoes

Jackol

Striped Hyaena

Jungle Cat

Desert Cat

Leopard

Panther

Tiger

Aves

Blue Rock Pigeon

Common Green Pigeon

Spotted Dove

Weaver Bird

Jungle Crow

Hawk

Bee Eaters

Wood Pecker

Common Babbler

Kite

Indian Right Jar

Gype

White Scavanger
Voltures

Gray Partidge

Jungle Fowl

Sand Grouse

Conservation & Landscape development

JALMAHAL COMPLEX Jaipur

Legend

- Common
- Rare
- Extinct
- Abundant
- Occasional
- Rare
- Constant
- Decreased
- Increased

population of common Babbler, Kite Hawk has become rare. The three species of Vultures found here are KingVultures, Gype and white Scavanger. The popular game birds of family *Gruidae gaulformes* is another which is considerably reduced. Jungle Fowl, Red Spur Grey Quai, common Sand Grouse are seen in the area. The common Peafowl is well preserved as it is the National Bird. Cuckoo is represented in the environs of Jaipur. In the only nocturnal bird found here are Indian Right Jar, Screech Owl and Spotted Owl. King Fisher is commonly seen near lake. the population of common green Bee-eater is reduced because of deforestation. Cattle Egret and Grey Heron are usually found feeding on shallow ponds with cattles. Wood Pecker is diminishing because of interferences in forests.

Mammals

Some of the larger cats from order of Carnivore and family Felidae have almost disappeared. The population of Jungle cat, Sloth Beer, Gerbil, Pangol is extremely rare. These are large number of Cows, Goats, Sheep, Buffalows, Indian Langur, Monkey and Elephants. Striped Hyena is also found around Jaipur, Jackal is rare now. Common Grey Mongoose is still found in the area. Some other common animals are Musk Rat, Hedge Hog, Desert Garbil, Animals disappeared completely are Chinkara, Black Buck etc.

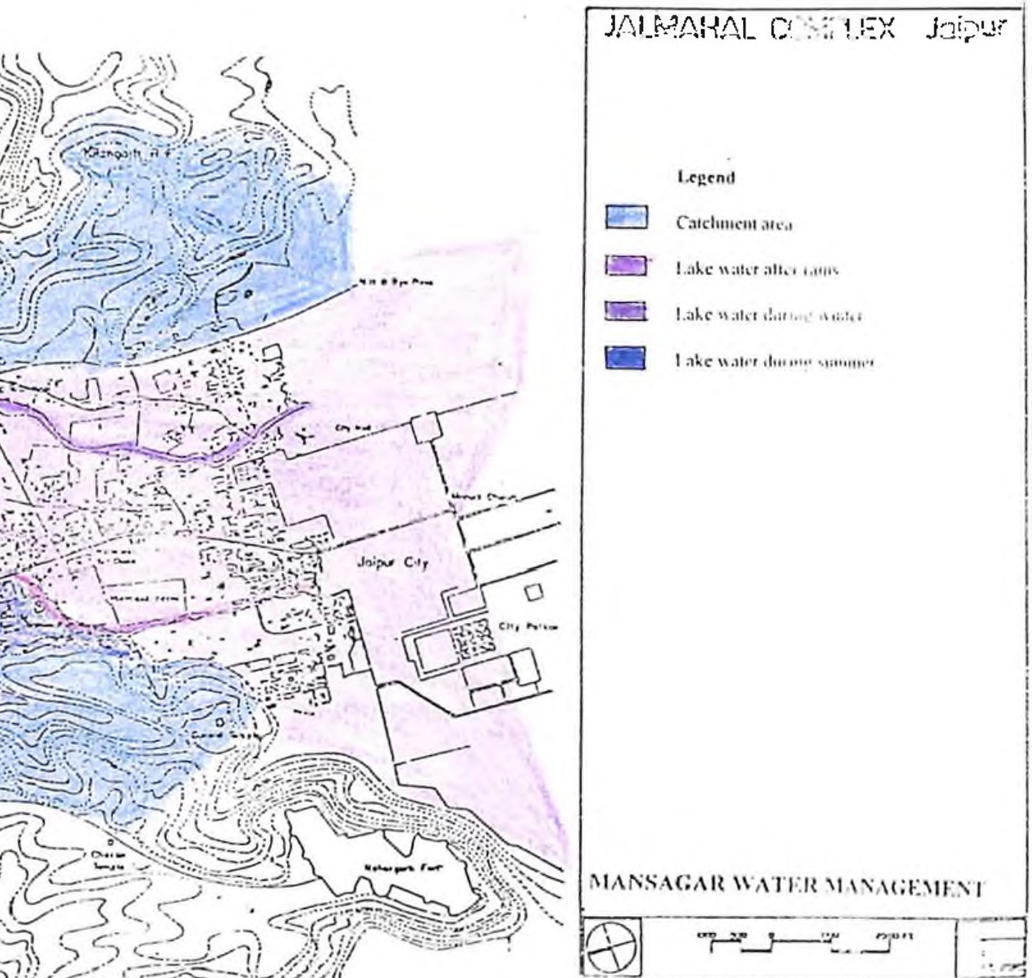
7.2.3 Hydrological Analysis

Mansagar Lake

The catchment area of the Mansagar lake measuring 26.88 Sq.kms. or 9.98 sq. miles contributes through natural run- off from four streams coming from Nahargarh and Kilangarh hills approximately 2.00 million cubic meters of water to this lake annually considering 25" annual rain-fall. This water earlier used to filter through dense forest of hills. The run-off was slowed down because of ground vegetational cover. The water that seeped in ground contributed to ground water storage, while run-off was carried to the lake uninterrupted. The lake capacity was ten times than what it is now. The major losses of this lake water were evaporation and seepage in the ground which were probably in the range of 80 and 30 million cuft. respectively annually. But now most of these seasonal streams especially those coming from Nahargarh hills are intercepted because of construction in the foothill areas, resulting in disturbed natural drainage pattern. Further the quality of rain water deteriorated since it passes through urbanised areas lacking in adequate services. This water thus brought with it silt from denuded forests polluted water as run off. The total run-off is reduced due to increase in concentration time. The other factors responsible now for lack of water recharge to this lake are water coming from sewage treatment plant 25 to 35 lacs gallons daily, from Brahmpuri open drain untreated 19 lacs gallons daily and from Nagtalai open drain untreated 14.00 lacs gallons daily. Thus providing inflow of 5 cuft. per sec. approx. daily to the lake water. However a major utilisation is for agriculture purpose which consumes 179 m cuft of lake water for irrigating 1000 acres land annually. The total capacity of lake has considerably reduced due to heavy silatation in the past resulting in 83 million cuft of water as maximum storage capacity. The lake which has submergence area of 400 acres when water level is at R.L. 116.00 gets reduced to 30 acres approx. during dry season when water recedes to R.L. 107.00 reducing live capacity to 8.00 million cuft. only.

The lake water which has inflow of highly polluted water from **Brahmpuri Nala** having B.O.D. 380 mg/lit., and C.O.D. 980 mg/lit. solids 2850 mg/lit. contributed to pollution of lake water. The other **Nagtalai Nala** made the situation worse by introducing 2772 solid mg/lit. Besides this agriculture in dry season in the immediate catchment area of lake results in drainage of chemical and fertilizers and pesticides into lake water increasing to toxic content. The excreta from grazing animals within the lake area enters lake water. Quarrying on western face of Kilangarh hills carried loose ferrugenous material, to ground water bodies causing water hardness. Thus all these factors are responsible for pollution of lake resulting in increased nutrients gave rise to Algae bloom in form of *Eichhornia spp.* which spreaded on surface causing oxygen depletion (5.5 mg/lit.) in water. High B.O.D. already present with this oxygen depletion and toxic input eliminated entire acquatic life and other Biota disturbing lake ecosystem. *Eichhornia spp.* posed problem of its eradication due to its rapid regenerative growth. Heavy organic matter which enters the


Amber Town
Nahargarh R.F.


JALMAHAL
Jaipur
Legend
Catchment area
Lake water after rains
Lake water during winter
Lake water during summer
Jaipur City
City Palace
MANSAGAR WATER MANAGEMENT

lake from untreated Nalas increases B.O.D. and increases free carbon-dioxide (Co_2) on decomposition which helps in algae bloom although lowers the PH value, leaves more Co_2 in water. Absence of oxygen on denitrification results in loss of Sulphur. High Algae bloom increases PH value and also nitrogen in the water. This high PH precipitate in Calcium (Ca), Carbondioxide (Co_2), and Phosphorous (P). Thus the final analysis shows this water gets highly contaminated and unusable for living organisms. Thus disturbing the **hydrological cycle** of lake ecosystem. The consequences are depletion of Natural Water Resources.

Details of Consumption of Water and Inflow in Mansagar Lake as given in Table 3

Table 3

Salient feature	(ft.)
Road level	118.00
F.R.L.	116.00
Sluice (Canal) level	95.00
Waste weir (Crest)	112.00
Capacity at 105.00	4 Mcft.
116.0	83 Mcft.

Present irrigation with 79 Mcft. of the Mansagar, lake and 100 Mct. inflow is 1,000 acres.

Water received by inflow from	4.8 Cusecs or
Brahmpuri and Nagtala Nala	41 Mcft/day
Irrigation is done in the months	
from Sept. to May/June	approx. 250 days.
Water used from	
(a) Mansagar Lake	79 Mcft.
(b) Inflow	100 Mcft.
	179 Mcft (give 1,000 acres of irrigation or 5.6 Acres/Mcft.
Water available from 116.00 to 112.00	59 Mcft.
at 116.00	83 Mcft.
at 110.00	24 Mcft.

Table 4

Capacity of Mansagar Dam on Different Gauges

Gauge (ft)	Capacity in Mcft.
R.L. 106.00	4.00
R.L. 107.00	8.00
R.L. 108.00	13.00
R.L. 109.00	18.00
R.L. 110.00	24.00
R.L. 111.00	31.00
R.L. 112.00	41.00
R.L. 113.00	49.50
R.L. 114.00	59.00
R.L. 115.00	70.00
R.L. 116.00	83.00

Table 5

Evaporation Losses per day during different months

Months	(mm)
January	2.60 mm
February	3.70 mm
March	5.20 mm
April	7.60 mm
May	9.10 mm
June	9.40 mm
July	5.60 mm
August	5.55 mm
September	5.00 mm
October	4.40 mm
November	3.48 mm
December	2.32 mm

Table 6
Water Analysis of Inflow to Mansagar Lake

S.No.	Sample Site	B.O.D. at 20°C mg. Ltd.	C.O.D mg./ Lit.	Total Solids mg/lit.	Total Dissolved Solids	Suspended mg/lit.	Desolved Oxygen mg. 1 Lit.
1.	Brahampuri Nala	380	980	2856	1342	1514	1.8
2.	Nagtali Drain	18	60	2772	842	1930	7.6
3.	Sewerage treatment Plant	40	96	1092	-	-	7.0
4.	Mansagar	40	215	1718	1460	258	5.5

Source : P.H.E.D

Table 7

Working Table of Mansagar Lake as recorded in the year 1984-85

S.No	Date	R.L. in ft. (approx)	Live capacity in Mcft.	Withdrawal in (Mcft)	Evaporation Losses Mcft)	Other Losses (Mcft)	Suppliment-aring from Sewage(Mcft)	Net Utililisation from Tank
1.	16 Sept.	116.00	83.00	10.00	3.0	2.0	12.50	2.5
2	1 Oct.	115.80	80.50	10.00	2.8	2.0	12.50	2.3
3.	16 Oct.	115.60	78.20	25.00	2.8	2.0	12.50	17.3
4.	1 Nov.	114.10	60.90	25.00	2.1	1.90	12.50	16.5
5.	16 Nov.	112.40	44.40	25.00	2.1	1.90	12.50	16.5
6.	1 Dec.	110.60	27.90	-	1.1	1.30	10.00	(-)7.6
7.	16 Dec.	111.30	35.50	-	1.1	1.30	10.00	(-)7.6
8.	1 Jan.	112.20	43.10	15.00	1.6	1.30	10.00	7.9
9.	16 Jan.	111.30	35.20	15.00	1.6	1.30	10.00	7.9
10.	1 Feb.	110.50	27.30	15.00	2.0	1.20	12.00	6.2
11.	16 Feb.	109.40	21.10	-	2.0	1.20	12.00	(-)8.8
12.	1 Mar.	110.80	29.90	-	3.1	1.20	12.00	(-)7.7
13.	16 Mar.	111.60	37.60	15.00	3.1	1.20	12.00	7.6
14.	1 Apr.	110.80	30.00	15.00	4.5	1.20	13.00	7.7
15.	16 Apr.	109.70	22.40	10.00	4.5	1.20	13.00	2.3
16.	1 May	109.40	20.10	10.00	5.4	1.20	13.00	3.8
17.	16 May	108.70	16.30	10.00	5.4	1.20	13.00	3.4
18.	1 June	107.80	12.90	10.00	5.7	1.20	13.00	(-)3.9
19.	16 June	107.30	9.00	-	5.7	1.20	13.00	(-)6.1
20.	1 July	108.40	15.40	-	3.4	1.20	13.00	(-)8.4

Table 7a

7.4.3 Proposed Water Management of Mansagar Lake

(As recommanded by Working Committee under co-ordination of Mis Rajiv Klanna Landscepe Associates New Delhi in 1984)

S. No.	Date	R.L. in ft. (approx.)	Live Capacity in Mcft.	Drawal in (MCft)	Evoporation losses (Mcft)	Other losses (Mcft)	Supplimentaring from Sewage (Mcft)		Net Utilisation from Tank
1.	16 Sept	116.00 (Max.)	83.0	7.5	3.0	2.0	12.5		-
2.	1 Oct.		83.0	7.5	3.0	2.0	12.5		-
3.	16 Oct.		74.5	16.0	3.1	2.0	12.5		8.5
4.	1 Nov.		66.9	16.0	2.1	2.0	12.5		7.6
5.	16 Nov.		59.4	-	1.1	1.9	12.5		7.5
6.	1 Dec..		67.0	-	1.1	1.3	10.0	(-)	7.6
7.	16 Dec		74.6	-	1.1	1.3	10.0	(-)	7.6
8.	1 Jan.		65.7	15.0	1.6	1.3	10.0		7.9
9.	16 Jan.		57.8	15.0	1.6	1.3	10.0		6.2
10.	1 Feb..		51.6	15.0	2.0	1.2	12.0	(-)	8.8
11.	16 Feb.		60.4	-	2.0	1.2	12.0	(-)	7.8
12.	1 Mar.		68.2	-	3.1	1.2	12.0		7.3
13.	16 Mar.		60.9	-	3.1	1.2	12.0		7.7
14.	1 Apr.		53.2	15.0	4.5	1.2	13.0		7.7
15.	16 Apr..		42.8	15.0	4.5	1.2	13.0		8.6
16.	1 May		34.2	15.0	5.4	1.2	13.0		3.6
17.	16 May		30.6	15.0	5.4	1.2	13.0		3.9
18.	1 June		26.7	10.0	5.7	1.2	13.0		2.7
19.	16 June.	110.00 (Min.)	24.0	10.0	5.7	1.2	13.0	(-)	8.4
20.	1 July		32.4	8.8	3.4	1.2	13.0		

Ramaining Water requirement for irrigatioOn in the month of Sept. 2.5 Mc.ft., Oct. 11.5 M.Cft & Nov. 18 Mc.ft. Schould be met by providing adequate table walls in the down stream for irrigating agricultural land.

The lake water should be maintained maximum at R.L. 116.00 & Minimum R.L. 110.00

It has been observed that the natural inflow within the reservoir (excluding artificial inflow,constituted by domestic and industrial sewage) is conditioned by four factors :-

a. Direct rainfall
b. Evaporation
c. Run off from catchment
d. Percolation losses from the bottom.

(a) Rainfall

The average yearly rainfall in Jaipur is around 765 mm (25"). It was observed that lake gets reduced to 30 acres approximately during dry season when water recedes to R.L. 107 reducing live capacity to 8.00 cuft only.

Table 8 gives the estimate of the monthly rainfall pattern, for an average year, a dry year (1:5 return period) and a very dry period (1:20 return period) respectively.

TABLE 8 :
RAINFALL PATTERN IN JAIPUR (in mm)

MONTH	AVERAGE YEAR	1:5 DRY YEAR	1:20 DRY YEAR
JAN	1.7	1.2	0.8
FEB	11.4	8.2	5.2
MAR	13.4	9.6	6.2
APR	24.1	17.3	11.1
MAY	30.0	21.6	13.8
JUN	107.4	77.3	49.4
JUL	165.0	118.8	75.9
AUG	146.9	105.8	67.6
SEP	163.3	117.6	75.1
OCT	70.8	51.0	82.6
NOV	24.9	17.9	11.5
DEC	5.5	4.0	2.5
TOTAL	764.4 (25")	550.3	354.2

(b) Evaporation

Evaporation losses have been abstracted from the Jaipur development report by Rajiv Khanna & Landscape Assoc.

Table 9 shows that the balance of the direct inflow within the reservoir (direct rainfall less evaporation) is practically always negative.

TABLE 9

DIRECT INFLOW WITHIN THE RESERVOIR

(average year)

Month	Climate conditions (mm)			Direct Inflow $10^6 m^3$/Month	Remarks
	Rainfall	Eva	Balance		
JAN	1.7	78	- 76.3	- 0.09 *	
FEB	11.4	111	- 99.6	- 0.12 *	
MAR	13.4	156	-142.6	- 0.17 *	
APR	24.1	228	-203.9	- 0.24 *	
MAY	30.0	273	-243.0	- 0.29 *	
JUN	107.4	282	-174.6	- 0.20 *	
JUL	165.0	168	- 3.0	- *	
AUG	146.9	165	- 18.1	- 0.20 *	
SEP	163.3	150	+ 13.3		+ 0.02
OCT	70.0	132	- 62.0	- 0.07 *	
NOV	24.9	104	- 79.1	- 0.09 *	
DEC	5.5	70	- 64.5	- 0.07 *	
TOTAL	764.4	1917	-1152.6	- 1.34	+ 0.02

Note: Reservoir area is assumed practically constant: 120 Ha, after dredging.

The total yearly releases are as follows:-

Irrigation	: 6.19 x $10^6 m^3$
Percolation	: 1.68
Total	: 7.87 x $10^6 m^3$

Water Balance in the Reservoir

Table 12 hereafter gives a stimulation of the monthly water balance in the reservoir, based on the following assumption :

- After dredging, the surface area is constant (120 Ha) and the maximum effective storage capacity is 2.4 x $10^6 m^3$.
- It is a normal average year.

(c) Run-Off

It is assumed that when monthly rainfall is less than 40 mm, the run-off co-efficient is nil. During the other months, the run off co-efficient has been estimated as follows:

June	0.20
July	0.25
Aug.	0.30
Sept.	0.35
Oct.	0.30

The catchment area of the lake is around 20 sq.km. (excluding the reservoir area). It is constituted by two main hills (Kilangarh and Nahargarh) and four rivlets, Kadamb Valley, Kanak Vrindavan Ghati, Brahampuri Open drain and Nagtalai Nallah. Water from the two valleys is quite clear. While the seasonal streams coming from Nahargarh hills and Brahampuri drain are intercepted because of construction in foothill area disturbing natural drainage pattern and the silt from denuded forest and polluted water as run of. The total run-off is reduced due to increase in concentration time.

The yearly incoming flow from each river has been estimated as follows (in $10^6 m^3$) :

Table 10

Description	Natural flow	Artificial flow	Total
Kadamb Valley, Kanak Vrindavan Ghati and other small streams	1.88	-	1.88
Brahmpuri open drain	-	8.40	8.40
Nagtalai nala	1.84	-	1.84
TOTAL	3.72	8.40	12.12

The total yearly inflow by run-off (natural and artificial) has been estimated at 12.12 x $10^6 m^3$/year which compares very closely with the figure given in Jaipur Development Report (11.35 x $10^6 m^3$ /year).

(d) Percolation Losses

When the reservoir is full (R L 116 ft., the percolation losses are around 0.14 x $10^6 m^3$/month.

TABLE 11

NATURAL RUN OFF WITHIN THE RESERVOIR

(average normal year)

Month	Rainfall (mm)	Run off co-eff	Run off (mm)	Incoming run off $10^6 m^3$/month
JAN	1.7	-	-	-
FEB	11.4	-	-	-
MAR	13.4	-	-	-
APR	24.1	-	-	-
MAY	30.0	-	-	-
JUN	107.4	0.20	21.50	0.43
JUL	165.0	0.30	41.30	0.83
AUG	146.9	0.35	45.00	0.90
SEP	163.3	0.40	57.20	1.14
OCT	70.0	0.30	21.20	0.42
NOV	24.9	-	-	-
DEC	5.5	-	-	-
TOTAL				3.72

NOTE : Catchment area is 20 sq.kms.

This figure is slightly higher than the one given in the report (6.02 x $10^6 m^3$). This is partly due to the fact that the lake area has been considered practically constant (120 Ha); therefore the percolation losses are higher.

Hydrological Balance

(a) Incoming Flow

The monthly incoming flow from natural run-off is given on Table 3. It can be seen that most of the run-off is most likely concentrated over 3 months: July, August, September.

The total yearly incoming flow may be summarized as follows:

Rainfall less evaporation	:	- 1.34 x $10^6 m^3$
Run off	:	+ 3.72
Artifical inflow (sewage)	:	+ 8.40
		+ 10.78 x $10^6 m^3$

(b) Water Releases:

In addition to the percolation losses as estimated here above, the release for irrigation area based on the figures given in Jaipur Development Report by M/s. Rajiv Khanna & Landscape Associates.

The total yearly releases are as follows:

Irrigation	6.19 x $10^6 m^3$
Percolation	1.68 x $10^6 m^3$
Total	7.87 x $10^6 m^3$

TABLE 12

WATER BALANCE IN THE MANSAGAR LAKE (EXISTING)

(Average normal year)

Month	Rainfall less evaporation	Incoming flow			Water release			Stored Volume	Spill Over
		Run off	Artifical	Total	Irrig-ation	other losses	Total		
JAN	-0.09		+9.70	+0.61	-0.85	-0.14	-0.99	1.49	
FEB	-0.12		+0.70	+0.58	-0.42	-0.14	-0.56	1.51	
MAR	-0.17		+0.70	+0.53	-0.42	-0.14	-0.56	1.48	
APR	-0.24		+0.70	+0.46	-0.70	-0.14	-0.84	1.10	
MAY	-0.29		+0.70	+0.41	-0.56	-0.14	-0.70	0.81	
JUN	-1.20	+0.43	+0.70	+0.93	-0.56	-0.14	-0.70	1.04	
JUL	-	+0.83	+0.70	+1.53	-	-0.14	-0.14	2.40	-0.03
AUG	+0.02	+0.90	+0.70	+1.62	-	-0.14	-0.14	2.40	-1.48
SEP	-0.02	+1.14	+0.70	+1.82	-0.28	-0.14	-0.42	2.40	-1.40
OCT	-0.07	+0.42	+0.70	+1.05	-0.99	-0.14	-1.13	2.32	
NOV	-0.09		+0.70	+0.61	-1.41	-0.14	-1.55	1.38	
DEC	-0.07		+0.70	+0.63	-	-0.14	-0.14	1.87	
TOTAL	-1.34	+3.72	+8.4	+10.78	-6.19	-1.68	+7.87		-2.91

Table 12 gives a simulation of the monthly water balance in the reservoir based on the following assumptions:

- After dredging, the surface area is constant (12049) and the maximum effective storage capacity is $2.4 \times 10^6 m^3$.
- It is a normal average year.

7.2.3 Conclusions:

(a) In a normal average year, the reservoir is kept full during practically four months : July to October. During this period, the losses by spill over area around 2.91 x $10^6 m^3$.

(b) During the dry season, the stored volume decreases down to 0.81 x $10^6 m^3$ which would correspond to a water depth of 70 cmsif surface area is kept constant after dredging. .rm60

(c) In normal year, the water depth will fluctuate by around 2.0 m; this is not acceptable for a lake for recreational activities. This situation will be worse during dry years, when the lake may become practically dry.

(d) To rehabilitate the hydrological balance two actions can be contemplated :

- It seems essential to keep using the artificial inflow (Sewage from urban areas); otherwise the lake will definitely dry up, applying adequate measures in treatment and water management.

- To store part of monsoon spill over to improve the present precarious hydrological balance.

Source: Rajiv Khanna and Landscape Associates,
French Team and Birla Technical Services.

7.3 HYDROLOGICAL ANALYSIS (Refer Map No. 30)

Galta Ghati

The scientific investigation carried out for locating source of water at Galtaji, Jaipur during the year 1991 was carried out with the help of Geological, Hydrogeological, Hydrological and Geophysical studies.

Based on the findings of above studies, subsurface flow pattern has been analysed & with the trend of subsurface water flow, source has been identified. An attempt has also been made to evaluate available subsurface water resource in acquifers contributing to perennial water out flow in the form of spring at '*Gomukh*' at **Galtaji**.

7.3.1 Topography

The hills constitute conspicuous topography in the area. The undulating topography shows relief variation from 450m to 500m above M.S.L. The physiography is mainly controlled by lithology and structure of the area. Massive quartzite stand out as hill and valley portions are filled by a eolian sand. General drainage pattern takes course in the fractured portions of quartzite. Whereas, the main Nala appears to be in the valley portion which is fault controlled. The landscape is composed of varied landforms ranging from hillocks of quartzite to alluvial mounds.

7.3.2 Geology

The rocks exposed in the area belong to Alwar Group of Delhi Super Group. The predominant rock type is quartzite which is at places ferrugenious and at places micaceous. These quartzite show colour banding. The general strike of quartzite is NE-SW. However, swings in the strike are noticed at places due to warping. Dip of the formation varies from 45° to 80°NW. Near the temple, quartzite hill shows scarp face with faint slicken sides.

Probably this scarp face is indication of fault zone. The valley investigated appears to be fault controlled.

Geological observations are depicted below :

Location 1 : 4m west of temple
Strike NE-SW. Dip 55° NW.

Location 2 : To the east of the temple (Near Gomukh)
Strike NE - SW, Dip 80°

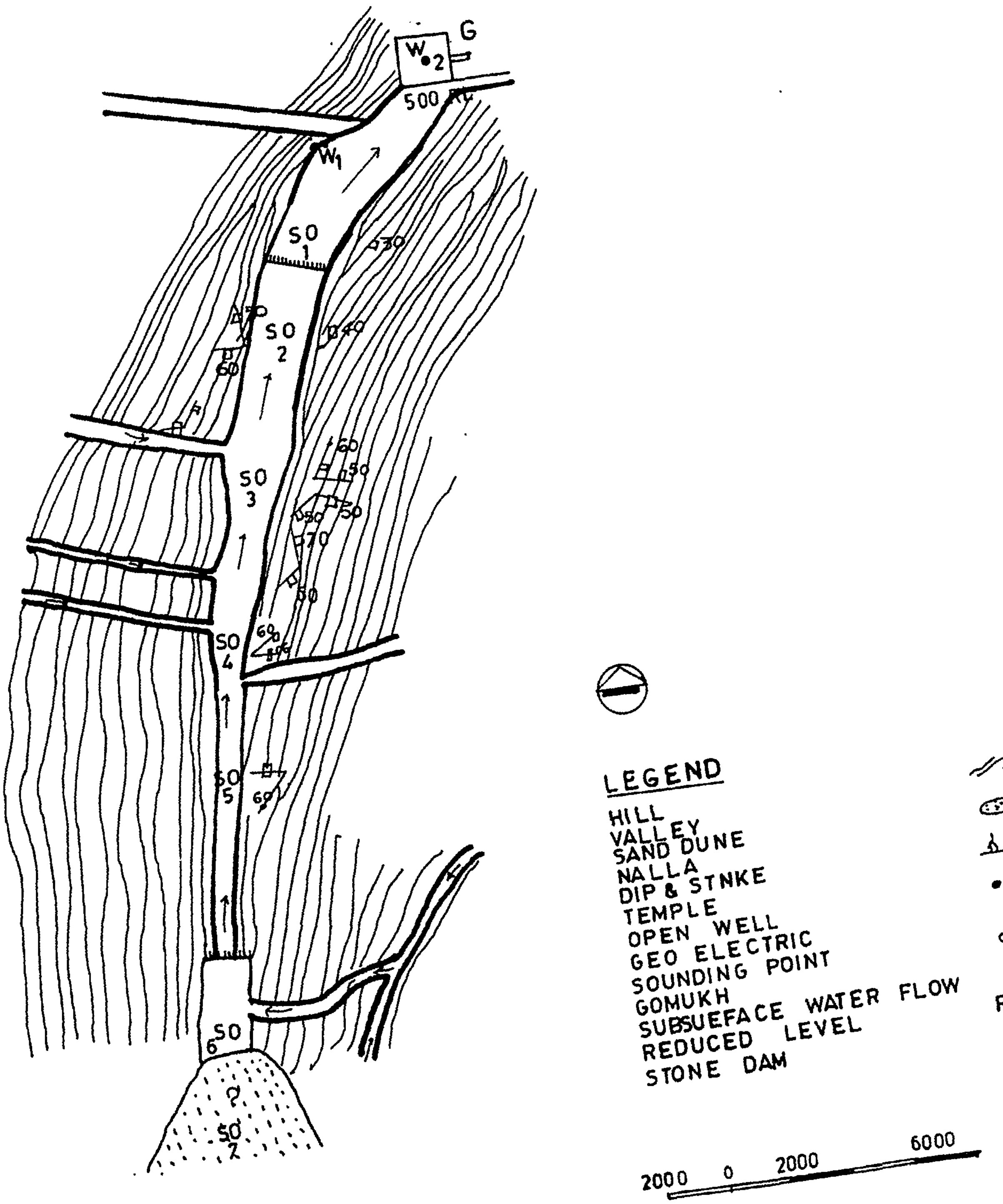
Location 3 : Eastern face of valley near sounding point S_1
Strike NE - SW, Dip 55°
Two sets of joints are observed.
J_1 - Strike NE-SW, Dip 30°
J_2 - Strike N15W - S15E, Dip vertical
The NE-SW joints are generally closely spaced. Spacing of the joint varies from 5 cm to 0.5 m.
N 15 W - S 15E joints are widely spaced & the spacing varies from 1m to 5m. Along the NE-SW joints, quartzite is sericitized at places. Along the western face of Nala, quartzite has strike of NE-SW & Dip 50° NW.

Location 4 : Eastern face near sounding point S_2 strike NE-SW, dip 45° NW Only NE-SW joint is prominent. Joint spacing in in general 0.5m to 1 m. However, occassionally closely spaced joints having spacing of 5cm to 10cm are observed.

J_1 - Strike N-S, Dip 60° W.
J_2 - Strike E-W, Dip 60° S.

GEOLOGICAL MAP

SHOWING AREA OF INVESTINGATION AND LOCATION OF GEOELECTRIC SOUNDING POINTS AT GALTA VALLEY JAIPUR



MAP NO. 24

Location 5 : 53 mts from S_2 towards S_3 quartzite along the eastern face of nala shows strike N15E - S 15 W, Dip 60° Towards N 75 W, two sets of joints are observed.

J_1 - Strike NE-SW, Dip 50° S.E.
J_2 - Strike E-W, Dip vertical.

The NE-SW joints are closely spaced and continuous. Predominant joint spacing is 5 cm to 0.5 mt. E-W joints are in general widely spaced having spacing of 0.5m to 2m. These joints are discontinuous. Quartzite along the western face of Nala shows two sets of joints:

J_1 - Strike N25E - S25W, Dip 40° SE.
J_2 - Strike E-W, Dip vertical.

The NE-SW joints show continuity where as , the E-W Joint are discontinuous.

Location 6 : Near sounding point S_3
Along the eastern face quartizite shows N-S strike with 50° dip towards west. There are two sets of joints.

J_1 - Strike NE- SW, Dip 40° S.
J_2 - Strike E-W, Dip vertical.

Along the western face quartzite shows two sets of joints.

J_1 - Strike NE- SW, Dip 50° S.E.
J_2 - Strike E-W, Dip vertical.

The NE-SW joints are closely spaced and continuous. The E-W joints are widely spaced and discontinuous.

Location 7 : 30 m from S_3 towards S_4.

Quartzite along the eastern face shows two sets of joints :

J_1 - Strike N - 10° W,S10°E.Dip 70° N 80°E.

J_2 - Strike NE-SW, Dip 80° E.

Location 8 : Near sounding point S_4. Along the eastern face strike of quartizite is NE-SW with 60° dip towards NW.

There are two sets of joints viz.

J_1 - Strike NE-SW, Dip 60° E.

J_2 - Strike E-W, Dip vertical.

NE-SW joints are continuous where as E-W joints are discontinuous.

Location 9 : Near sounding point S_5 along the eastern face quartzite shows strike of NE-SW with dip of 60° towards NW. Predominant set of joint is in E-W direction.

Location 10 : 101 mt from S_5 towards S_6.

Along the eastern face the quartzite is highly fractured with E-W fractures continuous and dominating.

A perusal of the data obtained reveals the following :-

(a) The N-S and NE-SW joints are in general continuous and closely spaced. The valley studied is not only controlled by the fault zone but also by these joints.

(b) The general discontinuity of E-W fractures have resulted in the formation of small nalas in E-W direction.

(c) Near location, 10, E-W fractures are continuous and comparatively bigger size Nala is observed near this site.

A few of these data are depicted in the map enclosed.

7.3.3 Hydrology :

The area appears to be pediment region which normally stores rainfed water as part of the ground water. The drainage is of dendritic nature and various small drains appear to flow from higher region to the lower regions. The various small drains and nalas join the main valley depicted in the map. During the period of investigation, no perennial drainage flow was observed except emergence of subsurface water through fractures at Gomukh. However, hydrological parameters of surface flow indicate probable presence of subsurface water along the main valley.

7.3.4 Hydogeology

The ground water occurs under water table conditions in the shallow zone of quarternary sediments, deposited in the valley as well as in the zone of weathering and fracturing quartzites.

A well existing near the temple shown as W_1 in the map shows water table at 6 meters below the ground level, whereas, well W_2 shows water table at 3m. below the ground level.

The NE-SW joints along the eastern face of the valley, dip towards NW. Joints along the western face dip towards SE. The ground water controlled by this set of joint;

therefore, flows towards the valley both from the eastern and western faces and then in turn flows from the sand dune area towards the temple, through the valley.

To confirm delineation of subsurface flow, seven sites viz S_1 to S_7 were selected for geophysical investigation.

Delineation of Subsurface Flow of Water

To demarkate the upper boundary of subsurface flow of water Geoelectric system of Geophysical survey was adopted and geo-electric soundings were taken at sites S_1 to S_7 for depth ranging from 20 mts. to 80 mts. In this investigation, computerised digital resistivity monitor as deployed, through which electric currents were injected into the ground and resistance offered by ground formation were recorded at every meter depth till zone of saturation was encountered. The data was processed by Inverse Slope technique. In this technique, reciprocal of resistance was plotted on ordinate and electrode spacing on the absicca and straight lines were measured with the help of computer using special programme. This programme was devised for the purpose of determining absolute resistivity of underground formation at varying depths, directly from the resistance recorded from the field, for which the formula given below was the basis :

$$P = X/Y \quad X \ 2\pi$$

where P = Absolute resistivity in ohm meters

X = Incremental electrode spacing in meters

Y = Incremental reciprocal of resistance in ohms.

For ascertaining subsurface occurrence of water, resistivity contrast was used as water saturation would obviously show low resistivity. This "Low" was analysized in the light of calibrated data obtained on existing well in the area.

The interpreted results are given as under :

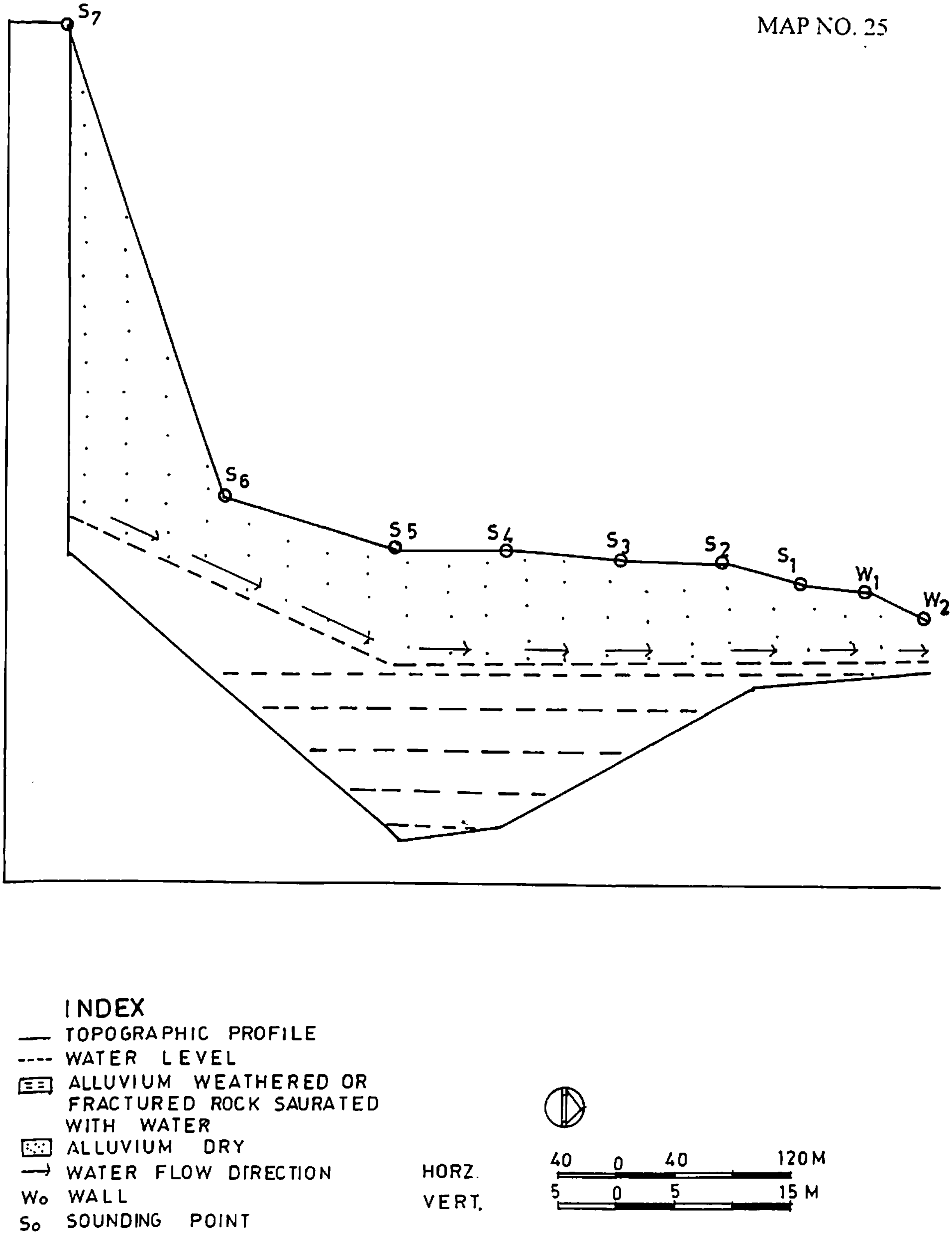
Table 13

Site No.	Interpreted depth of water level below ground level	Saturation zone in mts.	Relief of ground level with reference to temple ground as base level
Calibrated open well(W_1)	6 meters	6.7 m.	0 m.
S_1	6.5 mts.	6.5-8 mts.	0.5 m.
S_2	8 mts.	8-11 mts.	2.3 m.
S_3	9 mts.	9-17 mts.	3.05 m.
S_4	10 mts.	10-24 mts.	4.05 m.
S_5	10 mts.	10-25 mts.	4.05 m.
S_6	8 mts.	8-16 mts.	8.65 m.
S_7	52 mts.	52-56 mts.	58.65 m.

Based on above data, a topographic profile was plotted and saturated zone with it's upper and lower boundaries was demarcated to know the behaviour of ground water reservoir and to know the direction of subsurface flow.

The figure 3 shows that subsurface water is stored in a acquifer having it's maximum depth below sounding point S_3, S_4 and S_5. The direction of subsurface blow is from the sand dune towards the temple. This further indicates that the source of this water is in the vicinity of sand dune.

MAP NO. 25



GEO-ELECTRIC SECTION SHOWING
SUB SURFACE WATERFLOW AT GALTAJI

Source of Present Perennial Water Flow at Galtaji

Hydrodynamic picture obtained from Geoelectric and other studies reveal that the hydraulic gradient of subsurface water is steep between sounding point S_7 and S_6 and becomes gentle towards S_5 where it becomes nearly horizontal. The behaviour of saturated zone indicates storage of water between sounding point number S_3 to S_5 which appears to form ground water reservoir. The thin saturated zones below sounding point number S_1 and S_2 suggest that subsurface water flows through fractures of rock which allows narrow passage.

To know the extent and total quantity of water added to ground water, infiltration studies were carried out both in sand dune area and in the valley. In this study, U.S.G.S. double ring Intilfrometer was used and following results were obtained.

Table 14

Location	Infiltration rate at complete saturation (1hr)	Average infiltration rate per hours
I_1 (between sounding point number S_3 and S_4)	4.45 cm	4.5 cm.
I_2 (Near sounding point number S_7).	4.55 cm.	

As the water column in infiltrometer was nearly 15 cms, the infiltration percentage works out to be 30 per cent. The parameters required for the quantification of subsurface water are :

(a) Catchment area
(b) Rainfall infiltration factor
(c) Average annual rainfall

In the present investigation, catchment area consists of the sand dune and the valley studied. The dimensions of sand dune and the valley are measured as under:

(a) Dimensions of sand dune

length = 120 m
width = 90 m
area = 120 x 90
= 10800.sq.m.

(b) Dimensions of Valley

length = 449 m.
Average width = 20 m.
Area = 449 x 20
= 8980 sq.m.

The rainfall infiltration as per the infiltration studies is 30per cent. Therefore, rainfall infiltration factor works out to be 0.3.

Average annual rainfall on the basis of the mansoon data of last fifty years (1940 to 1990) is 62 cms. Annual volume of rain fed water, which falls on the sand dune would be = Area of sand dune X Average annual rainfall in meters

= 10800 x 0.62

= 6696 Cubic meter.

Quantum of water added to subsurface reservoir contribution from sand dune area. The contribution of water to the subsurface reservoir in the sand dune area:

Volume of rainfed water x rainfall infiltration factor

= 6696 x 0.3

= 2008.8 Cubic meter

Contribution from Valley Studied

Volume of rainfed water x rainfall infiltration factor

= 5567.6 x 0.3

= 1670.3 Cubic meters

Total quantum of water added annually to the subsurface reservoir both from the sand dune area and the valley:

2008.8 + 1670.3

= 3679.1 Cubic meters

This constitutes source of present perennial water flow at Galtaji. This water is sufficient, provided water flow at the point of discharge i.e. Gomukh is not more than 10.08 cubic meters per day i.e. 0.42 cubic meters per hour (420 liters per hour).

7.3.5 Conclusions :

(a) The terrain is highly undulating and it consists of valley and hills. Hills are made up of quartizites of Delhi Super Group and the valleys are formed due to faulting and intense fracturing. The main valley which serves as under ground water reservoir for the present perennial outflow of water at Galtaji is probably formed due to strike fault.

(b) Hydrogeological and geo-electric studies indicate that the subsurface flow of water is from the sand dune towards the temple and this water is stored in acquifer in the center of the valley. This subsurface water appears as surface outflow through fractures at Gomukh.

(c) A total of 3679.1 cubic meters of water is added to acquifer annually. This water emerges in the form of perennial flow at Gomukh because present discharge does not exceed 420 liters per hour. However, this water will be flowing provided, there is no complete drought consecutively for 3 to 4 years and the present catchment area is maintained.

CHAPTER 8

ENVIRONMENTAL CONSERVATION MEASURES

(An Ecological Approach)

The restoration and rehabilitation of historical buildings also requires the development of environment around the historical complexes. Kanak Vrindavan Ghati was rich in flora and fauna as described separately. Due to the various factors as has been already explained the eco-system of the Ghati was severally disturbed.

The eco-system of this area was re-established by the use of the techniques of environmental conservation. The environmental conservation was proceeded with the restructuring the resources, re-establishing the ecosystems, of terrestrial and aquatic regions. Importance was also given to the conservation of natural elements like soil, fauna and flora, surface and subsurface water resources and micro-climate of the region. The vegetation was restored in the Kanak-ghati region by following the basic principles of ecology. Initially the native drought resistant plants of Aravali flora with adaptive regenerating qualities and landscape values of colour, texture, fragrance etc. were selected. Similarly importance to the other qualities of ecological adaptability to other plants was considered as an important criteria for the selection of plants.

8.1 CONSERVATION MEASURES AT KANAK VRINDAVAN GHATI

8.1.1 Vegetation Conservation (Plate CLII 273, 274, 275)

The vegetation conservation involved the reintroduction of the native flora of the Aravalli with ecological considerations and improving micro-climatic conditions. The criteria of selection was based upon understanding the plant associations; within each tier of vegetation, desirable density and to re-establish the degraded eco-system. The lesser important criteria of plantation was to provide aesthetic variations, colours, texture and contrast to accentuate the human emotions of serenity, peace, aghast, etc.

The limitations of each area, i.e. sun exposure, angle of repose of soil, gradient, etc. governed the selection of different plant associations on upper, middle and lower slope and in the Valley area. Plants around water bodies differed in their communities due to micro climatic variations.

It is no longer unusual to see trees like the 'Flame of forest', Amaltas, Kadamb and others, adding colour and fragrance in the ghati which is now popularly called the Kanak Valley.

The other species of plants which presently adorn the valley are *Boswellia serrata* (Plate CLIII, 276) all over the upper hills with SW aspect. *Anogeissus pendula* and scantly plantation of *Mytragyna parviflora* is found in association with *Basewellia serrata. Anogeissus pendula* is the climax vegetation with 80 per cent cover. Some other species are *Acacia senegal, Bombex malabaricum, Sterculia urens* and *Butea monosperma* (Dhak).

Typha Spp. were planted in marshy areas near lake periphery. For ornamentation *Erythrina indica, Anthrocarpus spp.* (Kadamb) were planted all over the valley.

The scrubs constituted the lower tier in the valley. *Adatoda vasica* and *Crypstostegia grandiflora* being the two major varieties. Various ground covers were selected in order to conserve the soil.

273

274

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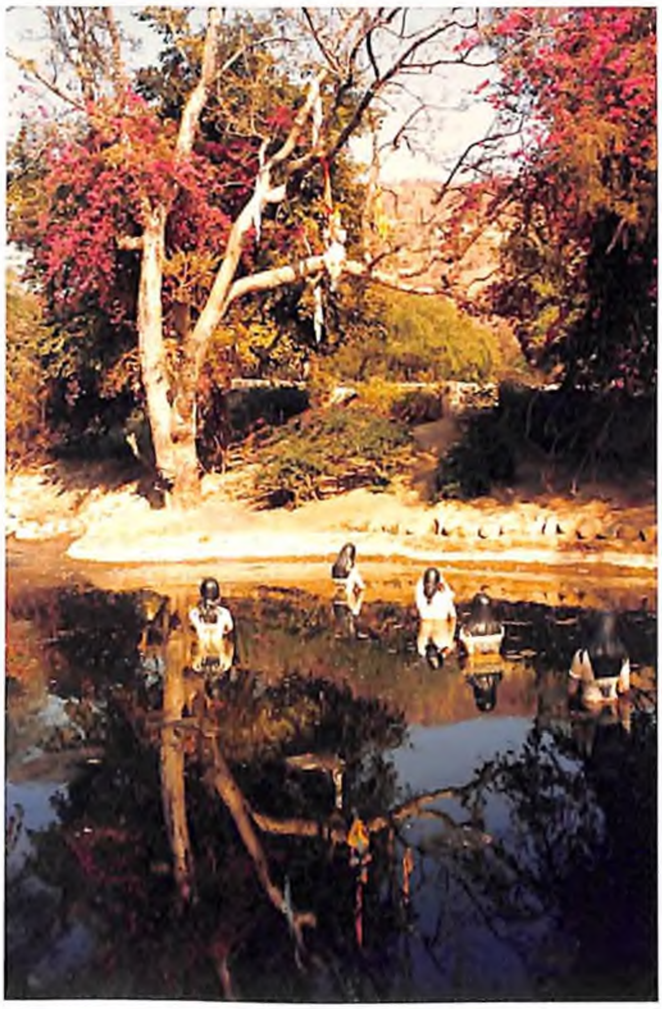

Plant Communities

The following plant communities were restablished around Kanak Vrindavan Ghati for the development of proper eco-systems.

Hill top	-	Anogeissus - Boswellia; Anogeissus - Euporbia; Anogeissus - An individual habitat Euphorbia - Nivulia
Middle slope	-	Anogeissus pendula - Mutenus Grewia, Anogeissus - Holoptelia·
Lower slope	-	Acaia - Prosopis, Euphorbia - Zizyphus, Maytenus - Capparis, Acacia -Zizyphus, Adatoda vasica single community
Open Dry Valley	-	Acacia-Cappraris, Adhadoda vasica, Balanites aegyptiaca
Moist Valley	-	Anogeissus - Prosopis, Holoptelia-Ficus, Acacia-Capparis, Acacia-Prosopis, Saccharum benghalensis

List of other plants which grow favourably with the above mentioned communities are listed as follows :

Acacia senegal, Anogeissus pendula (Dhok), Arsstida mutabilis, Holoptelia integrifolia, Boswellia serrata, Butea monosperma, Commelina benghalensis, Cordia gharaf, Grewia tenax, Sterculia urens, Tecomella undulata, Commiphora wightii, *Abutilon indicum, Boerhavia diffusa, Portulaca quadrifida, Adatoda vasica, Euphorbia neriifolia, Zizzyphus nummularia, Amaranthus spinosus, Ficus glomerata, Holoptelia integrifolia, Cryptostegia grandiflora, Acacia nilotica, Acacia leucophloea, Prosopis spicigera*, etc.

8.1.2 Avifauna Conservation

The large-scale environmental study of the region included technical issues such as, effect of the micro- climate, the lake's hydrological cycle, soil characteristics, the patterns of flora and food habits of fauna were considered.

The avifauna conservation involved careful study of birds visiting the Valley and the plants on which they thrive. This inter-relationship between them and flora was greatly considered while selecting plants, resulting in an increased influx of birds, such as the Blue throated Barbet, White cheeked Bulbul, King Fisher, Cattle egret, and the Spotted Dove. Recently in Jan. 1997 for the first time white crow has been spotted in the Valley (PTI News).

The plant *Bombax malabaricum* which attracts maximum birds was introduced. This plant adds orange colour to the Valley during the months of March and April. Migratory birds flocking over water bodies and trees are a common sight now. A detailed list of Avifauna is given in the Fauna conservation map. Some of the migratory birds which have increased in population are Weaver bird, Jungle crow, Common babbler, Common peafowl, Common green Bee-eater etc.

The Aravalli hills of Kilangarh and Nahargarh have now been declared as the Reserve Forest, as per conservation plan of 1984. This will increase the natural wealth of the region. The area of Kilangarh hill will be developed into the Safari Park for animals like Spotted deer, Blackbuck Sambars, Chinkara, Spotted deer and Nilgai. These animals will be released from the Jaipur Zoo to an open environment adjoining Kanak Vrindavan Valley.

8.1.3 Soil Conservation : A Case Study

The valley had deteriorated considerably when development work was undertaken in 1984. The entire landscape conservation had to be carried out considering the environmental issues and by preserving the integrity of the historic buildings.

The main task was to reclaim the barren rocky terrain with soil cover. The factors leading to the degradation of environment were examined as per the details given in chapter No. 7. The soil of Valley had been drained down the steep barren slopes, which had in adequate density of vegetation cover, in all its three tiers due to biotic, abiotic and environmental factors. Steep barren slopes with speedy winds and run-off encouraged the uninterrupted flow of water out side the Valley discharging into the lake. This resulted in scanty humus and a low water retaining capacity of soil, scarce microbial flora, the absence of carpet vegetation and an inhospitable micro climate in the Valley. An increase in temperature, soil erosion, air pollution, and siltation in the Mansagar lake were main causes for degradation of environment. Soil erosion had been the initial cause for all other factors and therefore has been described below.

Analysing Causes of Soil Erosion

(a) Disturbances of Topography
(b) Unintercepted run-off
(c) Absence of carpet vegetation

(a) The Topographical study revealed that 50 per cent of the area constitutes of steep slopes exceeding natural angle of repose of normal soil, i.e. 30 per cent which allows water to rush speedily down wards, taking the top soil cover along with it leaving

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behind barren rocky surface exposed to the harsh climate. The temperature of the valley thus increased by a few degrees centigrade as compared to the neighbouring city.

(b) The run-off from the upper slopes of Nahargarh hills on the west and Kilangarh hills on the east left a complete barren surface due to total absence of lower carpet vegetation.

(c) The scanty vegetation on the hills and in the valley resulted in depletion of ground and surface water. Extensive grazing and wood cutting and undue interference in the eco-system caused severe problems to stabilize the soil surface.

A large scale environmental study of the region was undertaken. Many alternatives were studied and finally the terracing system of soil conservation was adopted. The availability of loose stone all over the valley and silt in nearby Mansagar Dam was the reason to willingly opt for the **'check bund'** system.

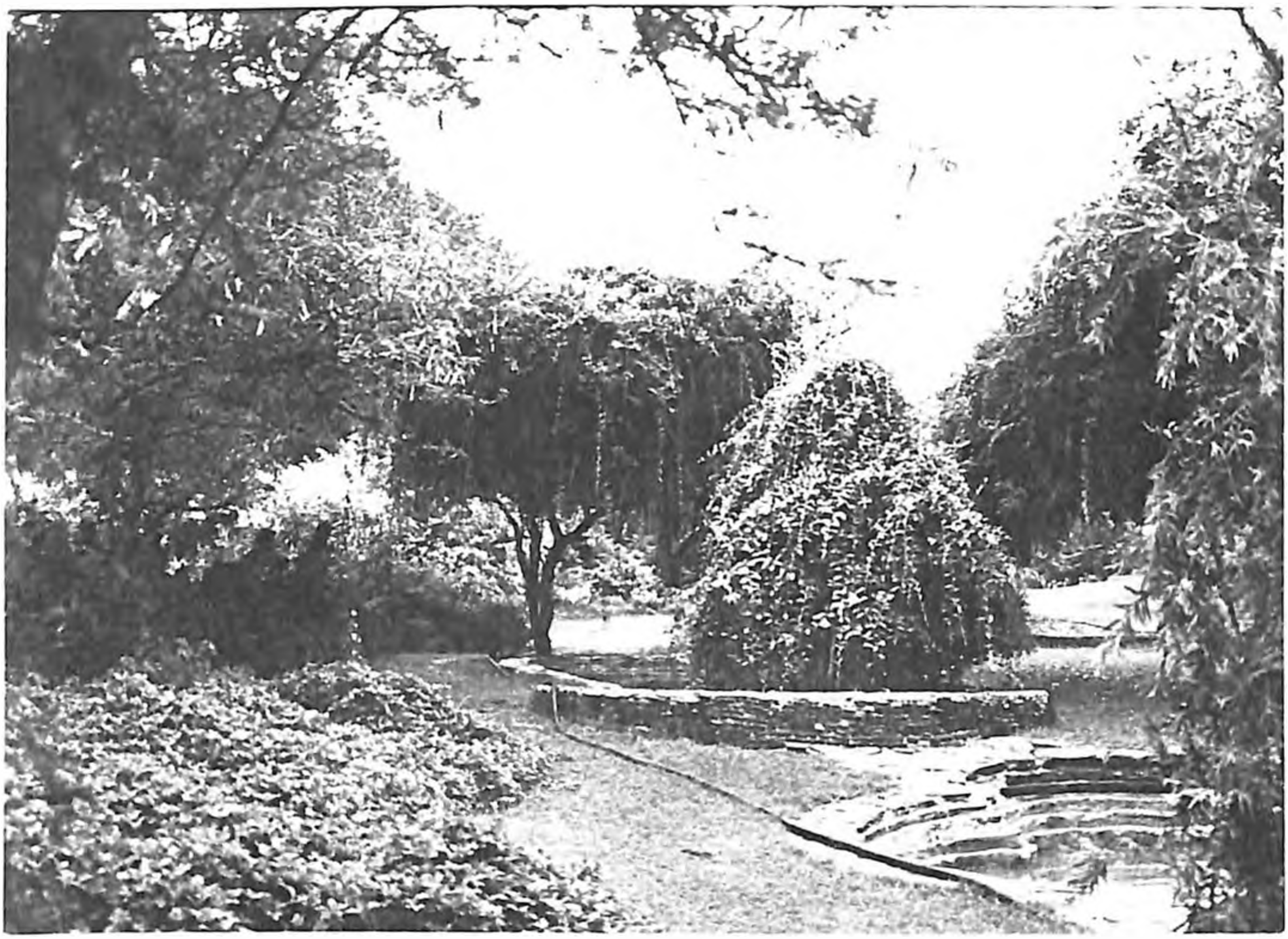
The first step, was to lay the ground into small terraces and create small pockets measuring 4 to 6 feet approximately depends on slope of the terrain and; constructing a series of such pockets by loose dry stones in curvilinear boundaries following the contours of one feet vertical interval. Adjacent to outer boundary ditch or furrows were made about 6 inches to 8 inches deep and the conservation plants such as *Saccrum benghalensis* (munja), and *Agaves spp.* were grown which obstructed the free flow of water and allowed deep penetration of water into the ground. Thus capturing the loose sand and silt flowing during rains and hence reducing the run-off.

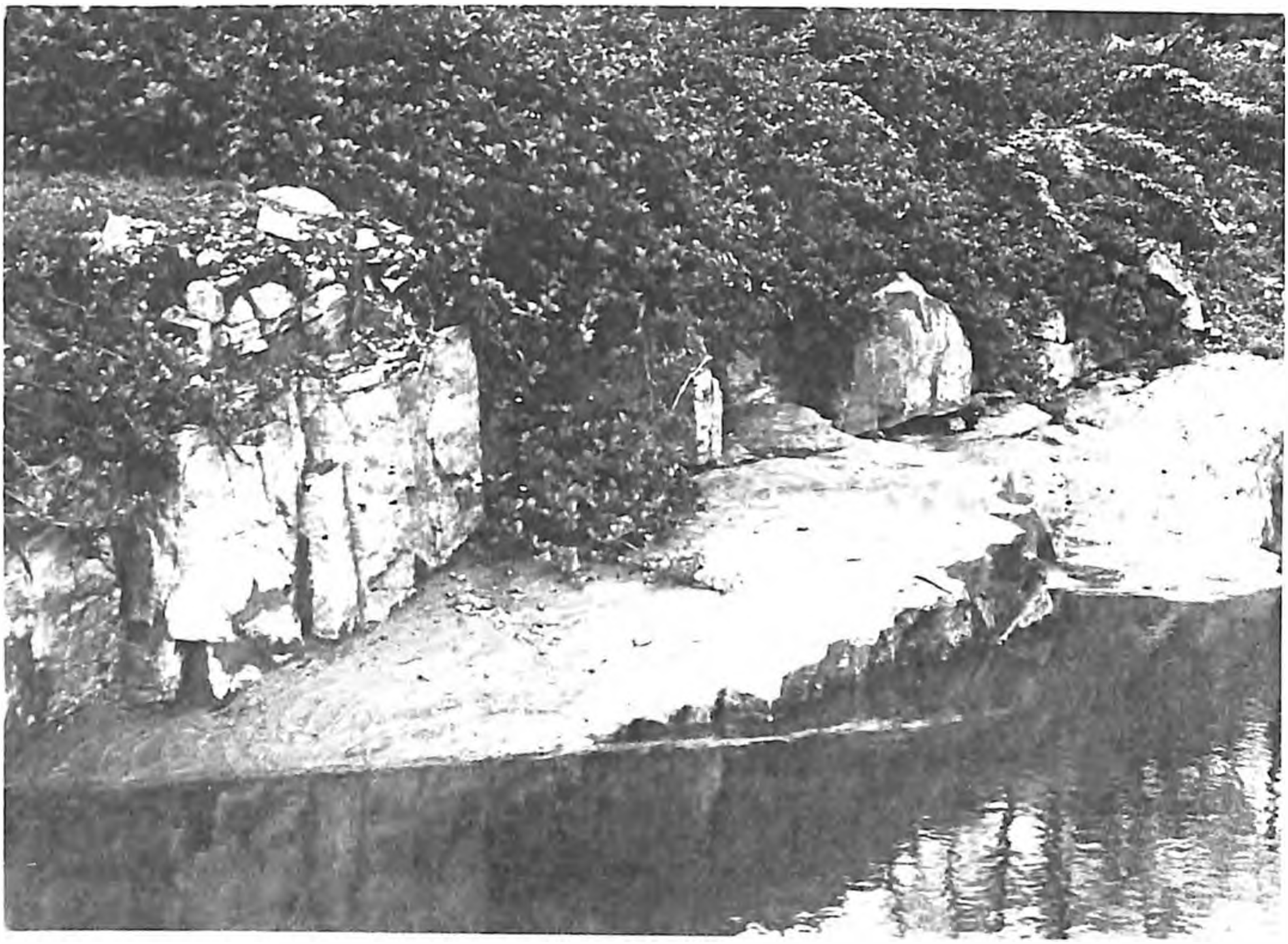
8.1.4 Water Conservation

Mansagar (See Analysis in Chapter 7)

Kanak Vrindavan Valley

The techniques employed for conserving water was by recapturing run-off into series of ponds and local depressions and by recycling them. This proved very useful and





allowed water storage which in turn was utilized in irrigating plantation of the Valley. The recycling of water helped in reducing the water consumption.

The underground sub-surface water was recharged due to water percolation through roots of plants and intercepted channels allowing water to seep into the ground. Thus promoting roots of vegetation to capillarise water from sub surface level as well. The surface water collection and storage helped in accumulation of a large spread of water, providing evaporative cooling and making the environment more conducive to vegetation growth in improved micro- climatic conditions.

The seasonal streams were properly channelised in order to bring inflow of water to the desired catchment basins and provide uniform distribution of water all over the Valley. Another method employed was obstructing these flowing streams with dry stone boulders. This greatly helped in reducing concentration time and thus recharged the sub-soil water.

The use of floating plants like Lotus species over the surface of water were used for reducing water evaporation and simultaneously had added to the overall aesthetics of the landscape. All these methods were used to allow hydrological cycle to operate in more natural environment.

8.2 CONSERVATION MEASURES AT GALTA GHATI

Following measures were taken for conservation of the Galta Valley described below.

8.2.1 Soil Conservation was carried out by following strategies listed below :

- To increase density of vegetation cover by providing suitable micro-climatic conditions.
- To increase population of existing flora within the catchment area.

- To stop grazing of mammals and other biotic and abiotic factors.
- To select plants from communities native to the region and with minimum of competition among themself.
- To afforest the area in three tiers to stop wind and sand erosion. Plants selected are known for their ability for conservation such as *Acacia nilotica, Zizzyphus nummularia, Capparis decidua, Sacchrum bengahlensis* etc.

8.2.2 Vegetation Conservation

Conservation of flora of the area was carried out by creating conducive environment of plant communities existing in the region and introducing more plants of same communities to provide least resistance among themselves. The criteria for selection is based on their ability to resist soil, wind erosion and to improve microclimatic conditions. The plantation is to be carried out in all three tiers to improve ecosystem of the area which will enhance the flora diversity and density. This achieving rich catchment basin for the perennial water sources to *'kunds'* where lacs of pilgrim come to take holy dip.

8.2.3 Water Conservation

To reduce run-off vegetation cover at ground level have been introduced utilizing the existing resources.

Kyara Dam has been reconstructed and provided with adequate water proofing layer to retain water at high sand dune hill and only overflow will come to the Valley. Series of check bunds are constructed in the south Valley to obstruct the flow of sand to lower Valley and to reduce run- off.

The plains are afforested to increase water percolation to aquifers located between the valley portion. Series of restoration work at Kunds, bawaries and wells will ensure capturing of surface run-off between source and temple complex and ensure perennial water flow to the '*Gomukh*'.

All mining activities at **Purana Ghat** area is stopped to avoid air pollution as well as sub-surface pollution.

CHAPTER 9

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

For undertaking conservation or restoration work of historical buildings or monuments it is essential to know the historical background of the building, its setting and the technical details about the construction work.

The above mentioned principles have been followed in this study also. The information gathered for understanding the background of the buildings and sites of Kanak Vrindavan Ghati and Galtaji, in terms of their history, ideology of their designs and techniques of construction, for undertaking the restoration work. This has revealed number of issues about the buildings, sites and techniques. Some of these aspects are important and have been discussed as follows.

9.1 INTRODUCTION

Rajasthan, the land of princes, comprised of many small kingdoms and principalities, ruled over by various clans of Rajputs. The Rajputs did not confine itself to only Rajasthan but during the period of Muhammadin invasions they ruled over the whole of Central India, Malwa, Gujarat, Uttar Pradesh and the whole of North India upto Indus.

The Rajputs basically a martial cast showed courage on the battlefield but lived by a strict code of honour and even in warfares they were bound by rules of chivalry which always distinguished civilization from barbarism. Due to various reasons, Rajputs never united and the internal rivalries prevented any combined defence against foreign invasion and led eventually to their domination by muslims. They, however, retained a measure of independence of allies of imperial power at Delhi till the advent of British rule, when they became figure heads.

Rajput rulers were great patrons of art and architecture, even between battles they found time to indulge their taste and talent in poetry, music, painting and architecture. Their rule saw the zenith of architecture in North India. Many treaties on architecture were written on Nagari or North Indian school of architecture, especially during the rule of Raja Bhoj of Dhar and Rana Kumbha of Mewar. The art and architecture of Northern India do not bear witness to the Arab, Persian or any other influence as generally believed. It is purely and solely Rajput in its concept.

The architectural development in Rajasthan is very rich and every princely state has great architectural monuments. Due to the limitation of this study, emphasis has been given to the architectural development of Amber and Jaipur and detailed analysis of the architectural features of the historical buildings restored has been carried out.

The first Kachawaha ruler of Amber was in the year AD 1017 and the last ruler of Jaipur was during the period AD1922 to 1949. During this period of about 1000 years forty rulers reigned Amber and Jaipur. When we analyse the number and types of buildings as mentioned below with the rulers and their Maharani's (Maji Sahib - after the death of the ruler), who built these buildings, we find a number of issues for discussions as mentioned below:

Category and Number of buildings

Temples	34
Palaces	10
Forts	02
Observatories	05
Gardens	05

Hospitals	02
Barracks	03
Colleges	02
Canatoph	01
Masjid	01
Special Building	04
Ishar Lat	
Hawa Mahal	
Albert Museum	
Ramprakash Theatre	

These buildings were made by 15 Maharajas and 11 Maharani's/Maji Sahiba but the major development took place during the reign of Maharaja Man Singh I (05), Sawai Jai Singh II (20), Jagat Singh (07), Ram Singh II (03), Madho Singh (06) and Man Singh II (10).

Between AD 1217 to 1537, Amber was ruled by twelve rulers but none of them built any significant buildings. Maharaja Man Singh I (AD1589-1614) was fighting in different parts of India for Emperor Akbar but he could builtup a special palace and a temple at Amber and three temples, at Pushkar, Banaras and Brindavan. When we analyse the period in which these buildings were made, we find Man Singh built- up the famous temple of Shri Shila Devi at Amber in AD1604 because he was the Governor of Bengal at that time and brought the idol of Devi from Calcutta. Till the time of Man Singh, Amber rulers use to live in a small palace in the foot hills of Amber built by Maharaja Raj Deo (AD 1180- 1217). During the time of Man Singh, Amber had become an important kingdom and Man Singh took leave from his Military duties of Mughal empire in AD1608, therefore, Man Singh built the Amber palace between AD1590-1615. He built three other temples at the Hindu religious cities of Pushkar, Banaras and Mathura.

Maharaja Sawai Jai Singh II (AD 1700-1743) was also associated with the Mughal kings of Delhi but his contribution for this area is maximum. He developed a new capital of Jaipur (AD1727-1734), five observatories and seven temples, two forts, two gardens and a dome, three palaces, Jal Mahal, Chandra Mahal and Badal Mahal and a number of other important buildings. Sawai Jai Singh II could do all this due to number of factors. The idea of new capital of Jaipur was because Amber was located in a small Aravali Valley and there was no scope of further extension. The Valley had two open sides one towards the north-east was in the direction of Delhi and therefore was not strategically the good direction for further growth, the present site of Jaipur was also not suitable from the military strategical point of view because it was developed in plains, exposed from two sides. But Sawai Jai Singh was a strong person and could take the bold decision and planned a city that had a good source of water from Man Sagar Lake. The second and the most important aspect of developments during his period was the death of Mughal emperor Aurangzeb and the availability of number of good craftsman from the Mughal towns, because Aurangzed discouraged the development of architectural buildings.

Maharaja Madho Singh II (AD 1880-1922) was another ruler of Jaipur who added temples and extended Sudharshan fort and City palace.

The last ruler of Jaipur, Maharaja Man Singh II (1922- 1949) added a number of modern buildings like colleges, hospitals, military barracks etc. but all this was during the period of Britishers and we do not find the development of buildings of architectural importance as they are of recent origin and therefore do not come under the purview of archaeological monuments of importance.

In the chronology of the rulers of Amber/Jaipur we find the name of Maharaja Bharmal, who constructed one Mosque (Masjid) at Amber. No other ruler before or after him built any mosque at Amber or Jaipur.

Maharaja's like Ishwar Singh (AD1743-1750) built up a tower known as Ishwar Lat, the purpose of this tower is not clear while Maharaja Pratap Singh built-up a special palace Hawa Mahal for his Maharani and ladies from the palace. This is an important contribution to Jaipur and even today Jaipur is famous for Hawa Mahal.

The temples of Govind Deoji and Natwarji (of diety Radha-Krishna) of Kanak Vrindavan Ghati have been restored under this study.

The comparative study of the rulers of Amber and Jaipur for their contributions to the architectural development particular to the temples in this area raises the following points for the critical examination of the issues.

1. Why the majority of the temples developed by the rulers of Amber and Jaipur belong to the deity Govind Deoji (Radha-Krishna temple).

2. Why the design of the temples are simple and

3. Basic nature of the design of the temples under study.

Between AD 1007 to 1590 only one temple of Shri Jamwa Mataji was built-up at Jamwa Ramgarh. Maharaja Man Singh I (AD 1590-1615) built up the temple of Shri Shila Deviji at Amber in AD 1604. During the 300 years from the reign of Maharaja Man Singh I to Maharaja Madho Singh II (AD1887-1926) there were 12 rulers of Amber and Jaipur but only six rulers and their Maharanis developed 29 temples in Amber/ Jaipur region and at some other religious places. Out of the 29 temples, 22 temples belonged to Lord Krishna under different names like Govind Deoji, Bihariji, Natwarji, Ghanshyamji, etc. 3 temples beonged to Lord Rama and one each of Shri Shila Deviji, Sun Temple, Ganesh Temple, Temples for Gangaji and Ratneshwarji.

The issue for discussion is that Rajput rulers belong to three clans namely, (1) **Surya Vanshi**, (2) **Chandra Vanshi** and (3) **Agnikula**. Surya Vanshi Rajputs claim to be the descendents of Lord Ram and Kachwaha Rajputs, the rulers of Amber and Jaipur are one of the Rajput class which belongs to the Surya Vanshi group. Now the issue for discussion is that why Surya Vanshi rulers developed more Lord Krishna's temples than the temples of Lord Rama.

There are different theories to explain the above mentioned trend in the change of the cult from Lord Rama to Lord Krishna. One theory suggests that towards the end of fifteenth century there was a wide-spread revival of the Krishna cult, brought about by the preachings of the famous Vaishnava reformer Shri Chatanya Mahaprabhu (AD1486-1534). According to the other local versions/theories, Maharaja's of Amber and Jaipur were highly impressed by the Sants of Galtaji, Important religious centre of North India. Well known Sant of Galtaji, Shri Krishnadas Payohariji was the follower of Ramanuj Sect during the reign of Maharaja Prithvi Raj (AD1503-1527) of Amber; after Shri Krishna Dasji, Shri Agra Swami and Shri Nabha Dasji became the popular sants of Galtaji. Shri Agradasji influenced Maharaja Man Singh I. He developed the first famous Gobind Deoji's temple at Mathura in the year 1589. He also built up temples of Lord Krishna at Pushkar and Banaras. After Man Singh, the next important ruler of Amber was Maharaja Sawai Jai Singh II, who brought the idols of Radha and Krishna from Mathura and made the first temple of Shri Govind Deoji at Gopalpura from there the idols were brought to the new temple of Govind Deoji at Kanak Vrindavan Ghati and later shifted to the Chandra Mahal complex of new capital Jaipur. During the same period Smt. Ranikanwar, sister of Maharaja Sawai Jai Singh built up a temple of Natwarji in the same complex of Kanak Vrindavan. Later the other Maharaja's and their Maharani's built up number of temples of Lord Krishna in different locations of Jaipur and other religious cities of India.

There is one more interpretation about the intermixing of faith between Lord Rama and Lord Krishna based on the famous poetic composition 'Galav Gitam' by the poet

Dwarka Nath Bhat. Poet Bhat sites the episode of the visit of Goswami Tulsidas to Brindavan in the following poetry:

कहाँ कहाँ छवि आपकी
भले बने हो नाथ ।
तुलसी मस्तक तब नवे
धनुष बाण लो हाथ ।

The story narrates that Goswami Tulsidasji was the worshiper of Lord Rama but he went to Brindavan and visited the temple of Lord Krishna. He was fascinated with the grace of the lord but he wanted the lord to come in the form of Lord Ram his diety. The poet says, that lord Krishna was so much impressed with the sincere feelings of Tulsi Dasji that he gave darshan, in the form of Lord Rama with his bow and arrow.

The above mentioned interpretations about the change/ intermixing of the cults, clearly shows that although the rulers of Amber claimed their descendance from one sect of the religion but they were secular in their approach. The history of Amber and Jaipur also supports the above hypothesis.

The architectural designs of Govind Deoji and Natwarji temples are not comparable with the other temples of Amber. The Amber temples are based on the design of the Hindu temples with a tall Shikra, Mandapa and Grabh-Griha, while the Kanak Vrindavan Ghati temples are simple and the similar conditions has been found in Govind Deoji's temple in City Palace Complex.

When we examine the architectural designs of the temples built up during the sixteenth to eighteenth centuries, we find the influence of Mughal ideology on the architectural design of these buildings. Havell(1913) has done the analysis of the Brindavan temples constructed during this period. He has described the architecture of five temples of Brindavan namely, (1) Govind Deo (2) Radha Ballab (3) Gopinath, (4) Jugal Kishore and (5) Madan Mohan.

The largest and most important of the temples at Brindavan is that of Govind Deoji built in AD1590 by Maharaja Man Singh of Amber. Havel says that the principles on which the temple has been designed is similar to those of other large temples in the Indo-Aryan style but the manner in which this traditional arrangement has been treated, shows that during the intervening period the builders had acquired an entirely new orientation in the field of temple architecture. Due to the Islamic domination, a change in the case of the building art, from the aesthetically natural to the ordered conventional type had taken place. The other noticeable change mentioned by Havel is the entire absence of carved figures, which were prohibited by the Mughals. Havell expresses his feelings about the design in these words, "while the Govind Deo temple is an architectural composition of no little formal beauty, consisting as it does of a combination of balconies and loggias, of bracketed archways and moulded buttresses, inside caves and ornamental parapets, all carefully disposed so as to be in perfect accord with one another, there is at the same time an almost complete absence of that quality of craftsmanship, together with a deficiency in that supreme spiritual content which one has learned to expect incorporated in the design of all Hindu temples of the more orthodox type. In this building, more than in any other we see the effect of the imposition of Islamic ideals on those of the Hindus, perpetuated in stone. Even more pronounced is the outcome of this impact on the structural treatment of the interior, which, except for the fact that the entire conception appears to be an anomaly in a very fine architectural effort of great dignity and excellent workmanship".

When we compare the temples of this area built up during this period, we find the influence of Islamic ideology in their design also. Although the rulers of Amber/Jaipur were

Hindus but from the time of Raja Bhar Mal (AD1348-1574), for almost two hundred years the rajas of Amber had been loyal subjects of the emperors. But such a reference to political relations is on its own insufficient to account for the cultural influence. It does not explain, for example, why the marked degree of Mughal influence evident in Jaipur, reached so late. For this first real overwhelming influence of Mughal architecture on the Rajput school - indeed it is not an influence so much as an abandonment of the Rajput style and a wholesale adoption of the Mughal style - occurred only after the beginning of the decline of the Mughal empire. This suggests that the introduction of Mughal ideas was in fact due less to political relations than to the movement of craftsmen. For just when Jai Singh founded the City of Jaipur, craftsmen trained in the Mughal style became jobless due to the policies of Aurangzeb and these craftsmen migrated to the flourishing states of Rajputana like Jaipur. Therefore, the architectural design of Govind Deoji and Natwarji temples are not on the Hindu style but still the plan of the buildings was based on the concepts of Hindu architecture or *Vastu Sastra*.

As described earlier, the two temples of Kanak Vrindavan Ghati are simple in their architectural design but have been developed on the principles of *Vastu Sastra*.

'Vastu Vidya', the science of architecture was a branch of occult in Vedic times. It was handed down orally from father to son and only during the middle age (8th and 9th centuries), the flourishing period of temple buildings the instructions relating to the rules of proportion and constructions were written in the form of the manuscripts on the palm leaves. During the nineteenth century British authors of the 'Archaeological Survey of India' made an attempt to get the vast knowledge of Vastu Sastra translated in English language.

During this century, number of scholars like, Stella Kramrishi (1920), P.K. Acharya (1927, 1939 and 1946) and D.N. Shukla (1995) have dealt with the subject in simple language. Vastu Sastra is a vast subject and it is not possible to summarize the total information available and therefore the only essential aspects of Vastu Sastra have been described based on the above mentioned literature.

9.2 CONCEPTS OF THE PLAN OF A TEMPLE BUILDING

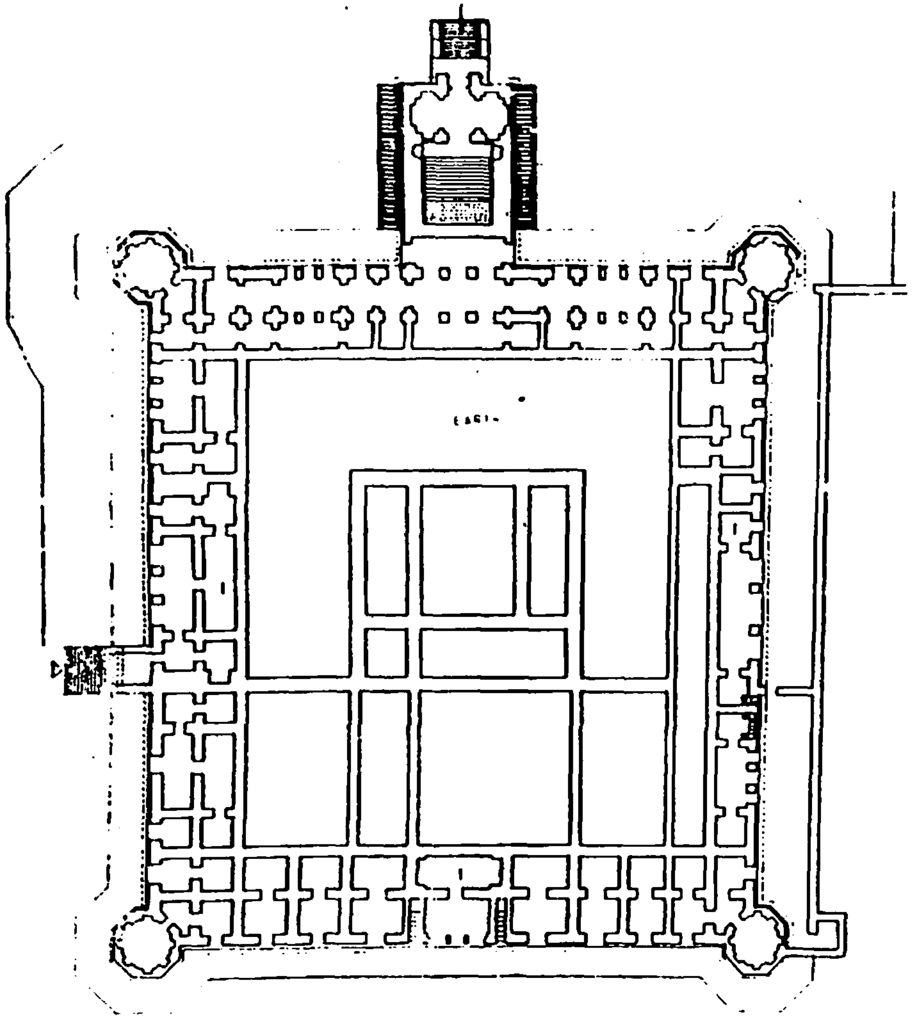
Kramrishi (1920) described the basic concepts for the planning of the temple buildings on the basis of Vastu Sastra as:

"Prthivi, the element and goddess Earth (Bhu), yields her surface; it is the ground (bhumi) of architecture ritual, as it is the realm of manifestation, and of bodily existence; "it is the place where mortals and immortals reside (vas). The following four are considered as Vastu, residences, by the ancients who were experts in architecture: Bhumi, the ground; Prasada, the temple or palace, Yana, the conveyance, and Sayana, the couch. Bhu, the earth, is considered the main Vastu, it is the underlying stratum of existence. Those that originate therefrom, the Prasadas and other works of architecture are Vastu (dwelling places, planned sites, because they are Vastu (existing things) and have their support on Vastu (an existing, concretely real thing)" ('Mayamata', II, 1-3a). Of these four classes, Bhu, the earth, is described first in the 'Mayamata', and the other treatises on architecture because "it is the first of the elemental principles (bhuta) and a support for the existence of the world".

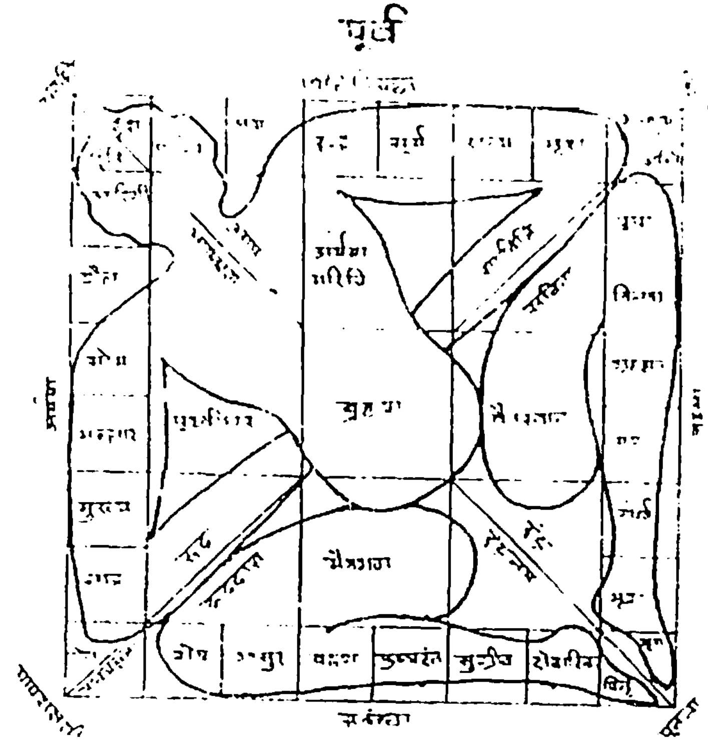
Vastu, is primarily the planned site of the building. Its shape is square as a rule and its full name is Vastupurusamandala. This name consists of three parts, Vastu, Purusa and Mandala.

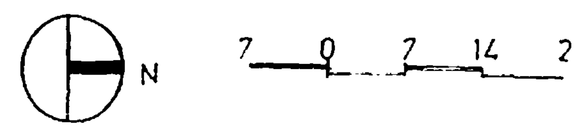
Vastu here, is the extent of Existence in its ordered state and is beheld in the likeness of the Purusa. The image of the Supernal or Cosmic Man, the Purusa, is congruous and identical to the planned site.

Purusa, Cosmic Man, the origin and source of Existence (apara-prakrti), is its instrumental or efficient cause (nimitta-karana) and causes it to be of His substance as its material cause (upadana). This is how he is known in the world, the manifested aspect of



GROUND FLOOR PLAN





MAP NO. 26

GOVIND DEOJI TEMPLE

Himself, the Para-prakrti, the Beyond-Existence, the Avyaya Purusa, the immutable, Supreme One (Uttama-Purusa). In his identity with the 'plan', Purusa is shown in his conditioned aspect. The plan makes the site of the building in his image which is his form. The plan of the building is in the likeness of the Purusa, or of the totality of manifestation.

Mandala denotes any closed polygon. The form of the Vastupurusamandala is a square. This is its essential form. It can be converted into a triangle, hexagon, octagon and circle of equal area and retain its symbolism ('Brhat-Samhita, Ch. LII, 56, comm.)".

The Ecliptic, the great circle on the apparent sphere of the sky which the Sun and the moon seem to traverse, has its symbol in the square Vastumandala. The square compass of the directions symbolizes at the same time the apparent daily movement of the Sun and the apparent monthly and annual movements of the Moon and the Sun. The former is shown by the lunar mansions, the Naksatras, whereas the signs of the Zodiac are not entered in the Vastumandala.

The Ecliptic is drawn in India as a square and this coincides in the Vastumandala with the square compass of the orients and all directions. The square symbol of the Ecliptic represents the different cycles and the enclosures in space that are separately traversed by the celestial bodies and also the number of units of time taken by the bodies in traversing such an enclosure. At present in Indian astrology, the Ecliptic is drawn under the name of Rasi- cakra, the wheel, a closed polygon, of signs, as a square Zodiac. The astrologer bases his calculations and predictions on this square of which he divides each side into four. The position of the heavenly bodies is represented by him on the ground by a sub-division and bordering of the square, the four square in the centre being obliterated. The 12 signs of the Zodiac are assigned to the 12 squares of the border. The 12 signs of the Zodiac are identical in number to the 12 Adityas who are the different manifestations of the one Sun God in the 12 stages of his journey.

In the Vastumandala on which all architecture rests, the order of the square cycle of the ecliptic is not sub- divided into 12 but into 32 units. This original number of the symbolism of space accommodates, within the border of the square of the ecliptic, the "32 waksatras".

The Vastu had come to be the place of the adjustment of solar and lunar cycles. The number 32 of the divisible residing in the squares of the border of the Vashimandala is also the sum of 4 and 28, the number of the regents of the four planets who rule over the equinoxial and solstitial points referred to the cardinal points, and of the regents of the 28 Naksatras. Their location in the Vastumandala shows a reconciliation of the motions of the Sun and the Moon, and they have their nature in their number which is 32; the single divinities who make up this sum act each as a 'locum tenens'. In Vastusastra they are nearly unanimously identified with the divinities whose names are shown in the border of the Figure below.

The identification of the Naksatras with the 32 gods, who are designated as Padadevatas, divinities of whom each occupies a square of the outer border of the Mandala, is made in the 'Visnudharmottara'. There the names of the gods are listed, four in each of the directions and four in the intermediate directions. Then follows, according to the text, the list of the "stars". These are enumerated in groups of eight, in the four directions. Their names are almost in every instance identical to those of the Padadevatas.

9.2.1 The Mandala of 64 Squares

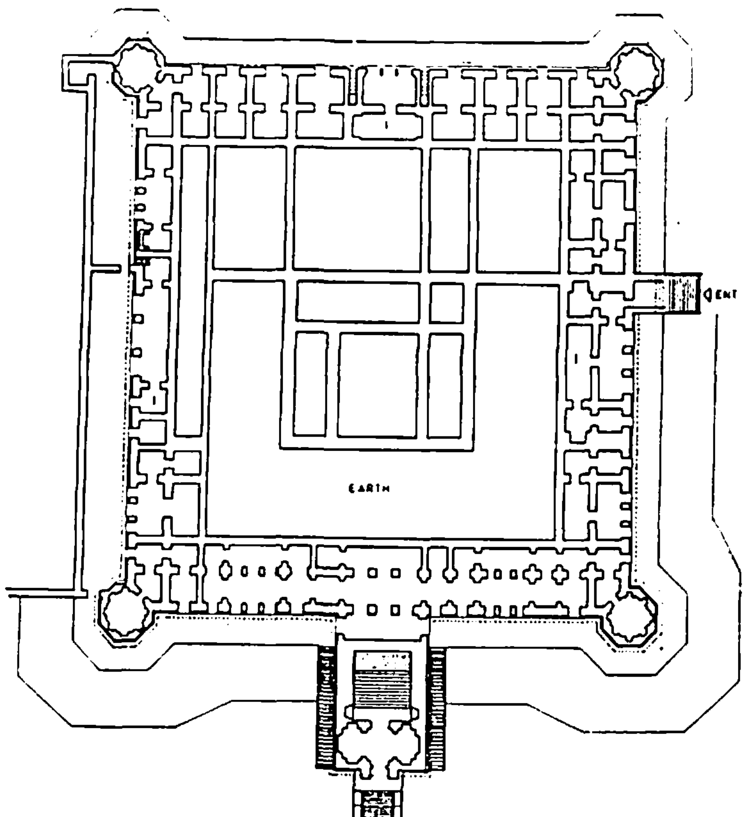
The 'Brhat Samhita' speaks of two types of diagrams, one consisting of 64 equal squares (pada) and the other of 81 squares. The area of the temple should always be divided into 64 squares. Similarly, the 'Hayasirsapancaratra' lays down that the diagram of 64 squares is for the construction of shrines, and a diagram of 81 squares for the construction of houses. The 'Isanasivagurudevapaddhati' makes it clear that a Vastu of 64 squares is for worship by Brahmanas, and one of 81 squares for worship by Kings. These views are not quite the same; but it is obvious that the Vastu of 64 squares is meant for the construction of shrines and for worship by Brahmanas and the Vastu of 81 squares is for the construction of other buildings and for worship on behalf of kings (Ksatriyas); or that the diagram of 64 squares and also of 81 squares are fit for temples, but the first is for worship by Brahmanas, the sacerdotal power, and the second for worship on behalf of the temporal power.

The special sacredness of the Mandala of 64 .squares is stressed in other texts: the 'Vastuvidhana' enjoins that the pedestal (pitha) or hearth (dhisnya) for the worship of Vastu (vastupuja) should have 64 squares, and the Vastumandala in which is situated the body of the Vastupurusa should consist of 81 squares. This is corroborated, for instance, in the 'Prayogaparijata'. There the Vastu of 64 squares is prescribed for the rites of initiation (diksa), the installation of images, (pratistha) and for sacrificial offerings (yaga) whereas it is said that the Mandala of Vastu has 81 squares.

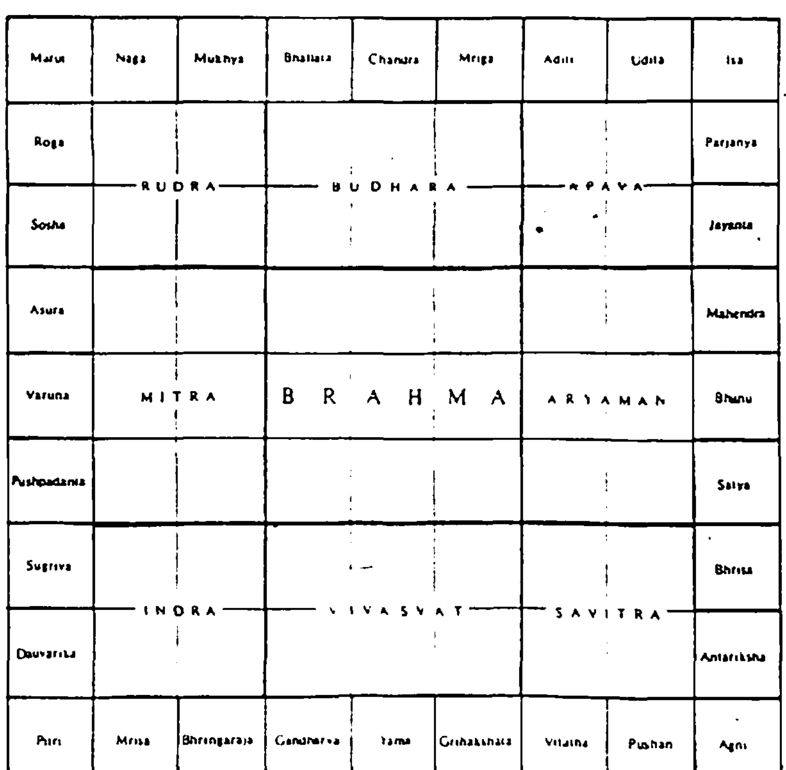
In the ancient Sanskrit text, the Vastu-purusha mandala has been described that something existed that was not defined by name or known in its form. It blocked the sky and earth. When the Gods saw it they seized it and pressed it upon the ground, with face downwards. In throwing it to the ground the Gods held on to it. Brahma had it occupied by the Gods and called it "Vastu-Purusha".

Existence which as yet does not follow any principle is defined by Brahma, who forces it to assume and retain a certain form, with the aid of the gods who are diffused over the Vastu-purusha. This story of the creation is of great significance in Indian architecture. The name given to form is 'Mandala'. Thus the so-called Vastu-purusha Mandala is the form assumed by existence, by the phenomenal world, now that it has been set in order. The geometric form of the Vastu-purusha mandala can be explained by reference to the Vedic sacrificial rite, during the performance of which the Aryans carried braziers from one altar to another. A round altar symbolizes the terrestrial world and a square one the celestial. A circular shape symbolizes movement, the cyclical movement of time. A square cannot be moved of itself, but is a final and unequivocal form. As perfect form, it is used by the

MAP NO. 27



GROUND FLOOR PLAN



Hindus to indicate the Absolute. If one considers the earth merely from its physical, external form it is depicted as a circle; if, however, it is regarded as the manifestation of the supreme principle, Brahman, it is rendered as a square, fixed by the cardinal points (points of the compass). Vastu-purusha is thus pressed into the form of a square. In legends Purusha is also represented as a timid-looking old man, ugly and hunch-backed, and walking with a stoop. His crippled figure fills exactly one square. Each of the gods who keep him captive covers one quarter of his body. Wherever the symbol of Vastu-purusha is marked out on the ground, there he lies. The Vastu-purusha mandala is an image of the laws governing the cosmos, to which men are just as subject as is the earth on which they build. In their activity as builders men order their environment in the same way as once in the past Brahma forced the undefined purusha into a geometric form.

All existence is reflected in this magic square. It is an image of the earth, which is a square derived from a circle; at the same time it is also the sacrificed body of the primeval being, Purusha, Man and earth correspond to one another in this image. Time enters the Mandala by coordinating the signs of the Zodiac, and space does so by orienting the square towards the four (or eight) cardinal points. The quarters or small squares, called 'padas', which are covered by the individual Gods, are grouped around a central Brahma-sthana comprising several such small squares. Important Gods cover the innermost ring, and in the outer rings there follow the Gods of lower rank in the celestial hierarchy. Strangely enough, the central square is no longer assigned to the 'unformed' Brahman, but expressly to the God Brahma.

Kramrishi (1920) has explained the concept of human figure differently as "the Vastupurusamandala is the magic diagram (yantra) and the form (rupa) of the Vastupurusa ('Vastuvidhana' of Narada, VIII 26-32). It is his body (sarira) and a bodily device (sarira yantra) by which those who have the requisite knowledge attain the best results in temple building. It is laid out in tabular notation as man and site (naraprastara, Vastuprastara; ib., 29).

In the Purusa, Supernal man, the Supreme Principle is beheld. Beyond form and non-contingent, it is beyond description. It is known by intellectual intuition as residing in man, the microcosm, and in the universe, the macrocosm. Either is its place of manifestation. Man and Universe are equivalent in this their indwelling centre. Of this equivalence the Purusa is an image. In the Purusa, the relation of the Supreme Principle (Brahman) and of manifestation is seen as coterminous. The Supreme Principle in this aspect is called Purusa because it reposes or dwells in Integral or Supernal man as if in a city (Purusah = puri- sayah or Puri-sadah; Yaska, 'Nirukta', I.13; II.3). The city is drawn as a yantra, a device in which is bound and situated the Supreme Principle. It is a plan of its manifestation and as such it is also the body of the Purusa, itself without substance. It is the site indwelt, and pervaded by the Purusa. Any place where this body lies down, where this plan is laid out by those who know it, exemplifies the presence of the Purusa and is its 'bhumi', the ground on which it rests. By its impress that piece of land, freed of all associations acts as primordial, undifferentiated substance (Prakrti).

In the net of this plan the figure of Man is caught, not by its likeness, but by its proportion and symmetry in its parts, the "head" confronting directly the aim of his being (the East, where the Sun, light of consciousness, arises), the feet at the opposite end, a schematism in which the figure of Man is seen fitted into the square plan of the extended universe. It consists of name and measure. Such a picture or image (pratima) is a workable and not necessarily visible, analogy, not of the human being but of the order by which it is upheld. Its diagrammatic field of coordinates, intersections and diagonals is sensitive to any interference with its order and in this respect it functions like the subtle body of the human being.

Such constructions have wide currency in Indian thought where they signify the universal law as a working entity. For the sake of identification and reference, the whole of it and its parts are placed and named according to the parts and limbs of the human body. Purusa in these 'images' is a term of reference. It affords a means of location of the several parts within the whole; and an identification by transfer of one's own body. The body here means nothing but a place of coordinated activity, each part being the seat of a special function.

Like Vastupursha mandala of North, the designers of temples in South India follow a different concept for designing the plan of the temples given by the temple designers known as Stapatis as described below:

The south Indian mandala differs from the Vastupurusha mandala described in north Indian manuals. South Indian Sthapatis were not familiar with the legend according to which disordered being was confined by Brahma within the orderly form of mandala, nor with the version according to which purusha, the human-backed primeval man (who is at the same time a demon and the cosmos) lies on his stomach under the size of every building. Instead, the Sthapati draws a magic sign, which is outwardly similar but has a different significance, upon the foundations of the temple or upon the tract of land where a new town is to be built. He visualizes the cosmic order as follows: the centre and essence of all Being is Brahma (presumably originally the 'non-created Brahman'); around this, in a ring, is the world of the Gods. At a greater distance from Brahma, in contact with him only through the realm of the Gods, and forming an outer ring around these gods, are the terrestrial phenomena, the world of human beings. At the bottom of this hierarchy are the goblins, demons and spirits. These have no contact with the Gods or with Brahma, and inhabit the fringe of the realms arranged concentrically around Brahmin.

The graphic rendering of this cosmic plan, the so- called 'Sthandila mandala', determines the spatial arrangement of the south Indian temple. Once again there are several designs, the most important of which is the mandala comprising 49 panels. Besides this sthandila mandala, the south Indian texts refer to the 'padmagrabha mandala'. Of its 16x16 panels, 16 are reserved for the Brahma-sthana, 81 for the ring of gods, 96 for that of the terrestrial world, and 60 for the narrow ring of demons and spirits. This padmagrabha mandala forms the structural plan of the cella at Tanjore.

The 16 panels of the Brahma-sthana tally with the interior of the cella; but, as in the case of the ground- plans of north Indian temples, the wall is not erected exactly upon the line of the mandala, but is adjusted in such a way that it does not touch the marmas, in their three-dimensional extension. The wall of the cella and the gallery for processional circumambulation fill the ring of the pantheon; the wall is two padas thick and the gallery one pada wide. Above the terrestrial world rises the outer wall of the cella, which is two padas thick. For the realm of spirits and demons there is no room in the sanctuary. They are allotted the width of that part of the foundation which projects outside the building, far from the sacred lingam of Shiva in the Brahma-sthana.

The open halls ('mandapa') of the cella and the small shrines within the circuit walls of the sanctuary are not incorporated in the original plan. They are the work of later generations, when the occult system of dividing the plane had already been forgotten.

The following ground plan maps of Govind Deoji and Natwarji temples are similar to the figure of Vastupursha mandala as explained earlier.

It has also been found that the entrance of both these temples is in the eastern direction as required by Vastu sastra. The other important feature of the temple is Grabh-griha. The vastusastra prescribes the central position for the Grabh-griha and we find that both these temples have the central raised position for the deities in a special chamber (Grabh-griha). The inner sancture sanctorium is also surrounded by a circumbulatory path known as 'Parikrama' and therefore, both these temples have been designed on the principles of Hindu architecture i.e. the Vastu Sastra.

9.3 THE GARDENS

Discovery of archaeological remains from the agricultural farm near Govind Deoji Temple is a great historical finding. The site of this historical building has been located in a map (21'x21' size) dated AD 1710 of Jaipur archieves preserved in the National Museum, Delhi.

The critical examination of the map with the new finding gives clues of its association (relationship) with the Kanak Bagh of Shri Ranawatiji. The detailed study of the layout plan and architectural components, necessiated a detailed discussion on the historical and structural aspects of this garden with the other gardens of India, planned during this period of Indian history.

The present discussion is based on the study of Mughal garden by Stuart (1913) and the other information collected from different sources about the historical buildings made by various rulers of Amber and Jaipur during the last 1000 years.

Indian gardening, like every other Indian art, is closely interwoven with the history of the country and the artistic traditions and religious ideals of its designers who played a far larger part in planning of these gardens.

There are many references to gardens in the old Buddhist literature and the Sanskrit plays. The sacred groves round the Buddhist shrines were the earliest forms of garden. The Hindus and Buddhists, with their wide sympathies and their simple, joyous love of nature, made much use of flowers in their religious rituals. Their monks and missionaries travelled far and wide and carried the symbol of 'Good law' in the form of lotus. A lotus floating on the cosmic waters is the symbol of the creation of the world. Three species of the flower grow in India: the *Nymphaea lotus*, the white lotus of ancient Egypt, the *Nymphaea caerulea*, the blue species; and the *Nelurubium speciosa*, the rose-coloured or sacred lotus of India. Each colour is sacred to one aspect of Trinity: the rose-petaled lotus that of the Dal Lake (Kashmir) is the flower of sunrise,is for Lord Brahmha's prayer; the blue flower is sacred to Vishnu, upholder of the blue noontide universe; the white lotus of evening is the flower of death and resurrection, the emblem of Shiva, the destroyer and preserver.

Plants with coloured flowers and leaves are preferred in any garden but in ancient Indian gardens flowers with perfume were considered to be as important because flowers were not picked unless they were "acceptable", i.e. sweet- smelling, due to their nature for the offering to the Gods. A favourite temple offering is considered to be a bed of flowers under a little artrour or house of flowers". The bed is made of sweet-scented petals strewn on a sheet, over the petals fine muslin cloth is spread, and this is then considered "a bed fit for the Gods". It is also true for the human beings because working in the morning in a scented environment restores freshness and health.

Like plants with perfumes, Indian gardening system also had preference for trees. According to an old Indian treatise on gardening, five trees should be first planted, as they are luck bringing, phalsa (Grewia casiatira), bhila or marking-nut tree, Punag (Rottlera einctoria), Sirisa (Mimosa sirissa) and neem (Melia azardirachta). The auspicious sides for plannting are: on the east the Bur (Ficus indica) and Karanoda (Carissa carandus on the south gular (Ficus glomerata) and bambu, on the west amaltca (Emiblica officinalis) and bila

(Aegle marmelos) on the north palen (Ficus infectoriae), Bhor (Zizyphus jujuba) and Kaitha (Feronica elephantum). The bur tree was not preferred near the gate or any such part from where its shade would fall on the building. Similarly all large trees were considered as inauspicious within the building/house i.e. in the central courtyard, particularly those of a thorny nature, while Neem tree was considered to be 'lucky' and could be planted around the garden and was thought to greatly benefit the other trees by its influential air.

In India plants were preferred and Maharajas, rich people and temples used to have plants as mentioned above in a place called 'Bagichi' but the splendid garden traditions were introduced by the Mohammedan conquerors into India.

Feroz Shah Tughlak (AD1351-1358) built hundred gardens around Ferozabad but all got perished. Nearly two centuries later in the year AD1526 Mohammed Babar built the first garden Ram Bagh in the banks of Jamuna. The other well known gardens of Mughal period are:

Babar M. Mahum, AD1494-1531. Bagh-i-Vafa, Bagh-i-Kilan, near Kabul. Ram Bagh, and Zuhara Bagh, Agra.

Humayun M. Hamida, AD1531-1556. Humayun's Tomb Garden, Delhi.

Akbar M. Mariam-uz-Zamani, AD1556-1605. Gardens at Fatehpur- Sikri, Sikandarah (built on site of Sikandar Lodi's garden). Nasim Bagh, Kashmir.

Jahangir M. Nur-Jahan, AD1605-1628. Gardens at Udaipur. Dilkusha Bagh (Shah Data), Lahore; Garden tomb of I'timad-ud-Daulah, Agra. Nishat Bagh, Shalimar Bagh, Achibal Bagh, Verinag Bagh, Kashmir. Wah Bagh, Hasan Abdul.

Shah Jahan M. Mumtaz Mahal, AD1628-1658. Shalimar Bagh, Lahore. Gardens in Delhi Fort, Taj gardens. Shalimar Bagh, Delhi. Data Shukoh's garden, Kashmir.

Aurungzeb M. Dilras Banu, Begam, AD1658-1707. Badshahi Mosque and garden, Lahore. Roshanara Bagh, Delhi. Chau Burji Bagh, Lahore. Nawan Kot Bagh, Lahore. Pinjor Bagh.

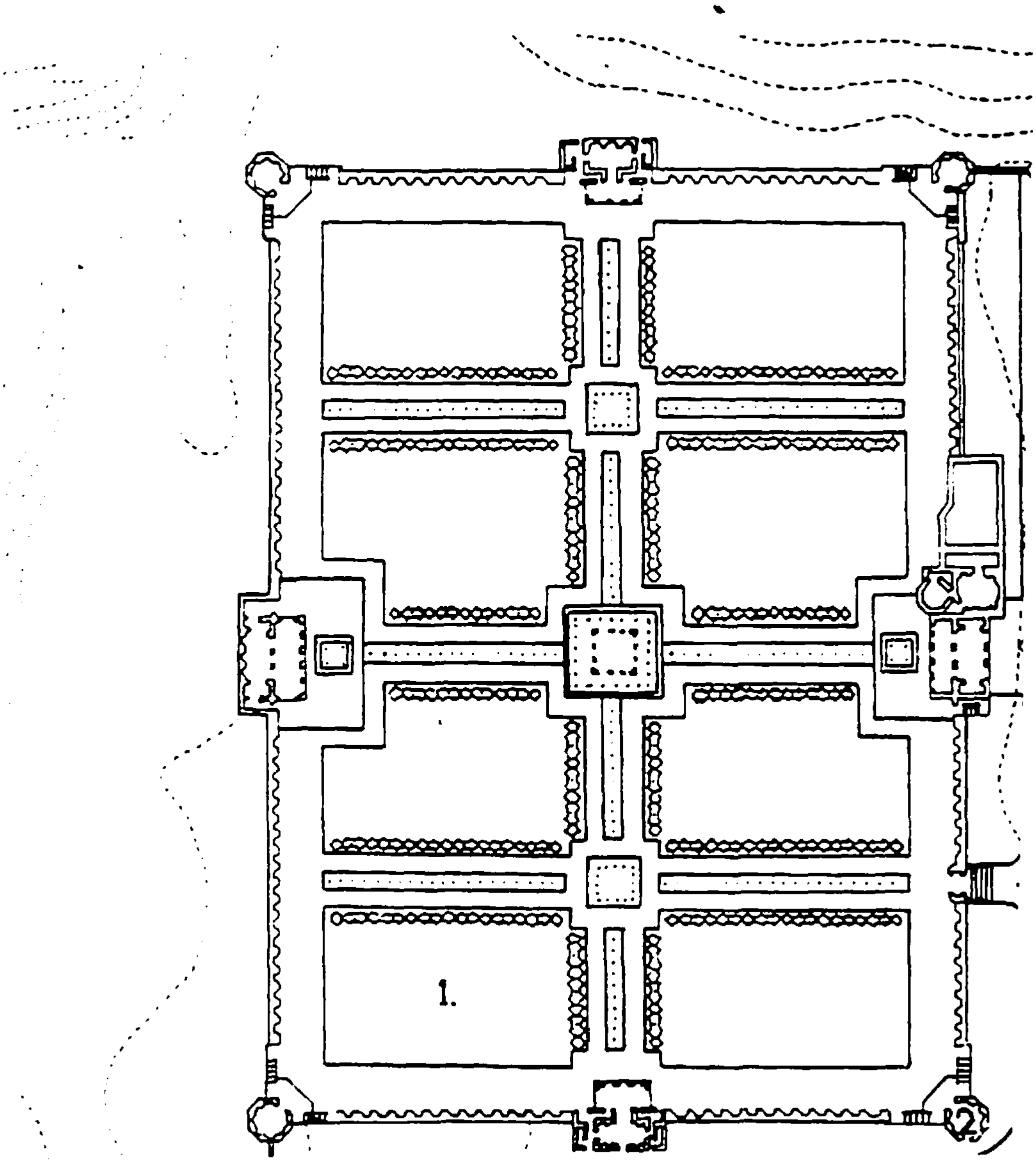
AD1725.Garden-Palace of Deeg, built by Suraj Mal, Maharaja of Bharatpur.

The mughal gardens are normally divided into eight parts. According to Stuart (1913), the idea of eight parts or terraces had been taken from the Paradise-garden of the Koran and was considered ideal for the perfect garden because Prophet Mohammed said that "God Almighty first planted a garden".

"The Mughal gardens, copied from the earlier gardens of Turkistan and Persia, are invariable square or rectangle in shape, their area being divided into a series of smaller square portions. A high wall, adorned with serrated battlements and pierced by a lofty entrance gateway encircles the garden.

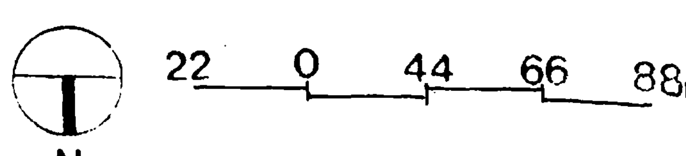
The water runs in a trim stone or brick-edged canal down the whole length of the enclosure. The canal flows from a larger or smaller tank, called a hauz", usually studded with numerous fountains. The principal pavilion was often placed in the centre, forming a cool, airy retreat from the rays of the day sun. In nearly all the larger Mughal gardens, side canals were added, leading out from the principal tanks and terminating in architectural features such as baradaris built into the wall, raised platforms or gateways.

Gardening demands, more than any other art, peace, leisure, tranquillity and patience, and we find that during the reign of Aurangzeb the craft of gardening faced a setback. Aurangzed destroyed the Indian unity and Akbar's dream of empire by the banishment of the Hindu craftsman from the Muslim court, they took refuge with the Hindu Princes of Rajputana and Central Asia. In Rajputana the masons and master builders of the Taj and the Mughal garden/ palaces were welcomed and due to the generous patronage of Rajput rulers these craftsman could built-up the splendid gardens, palaces and fortresses.



1.BAGH
2.CHATTRI

MAP NO. 28



KANAK BAGH

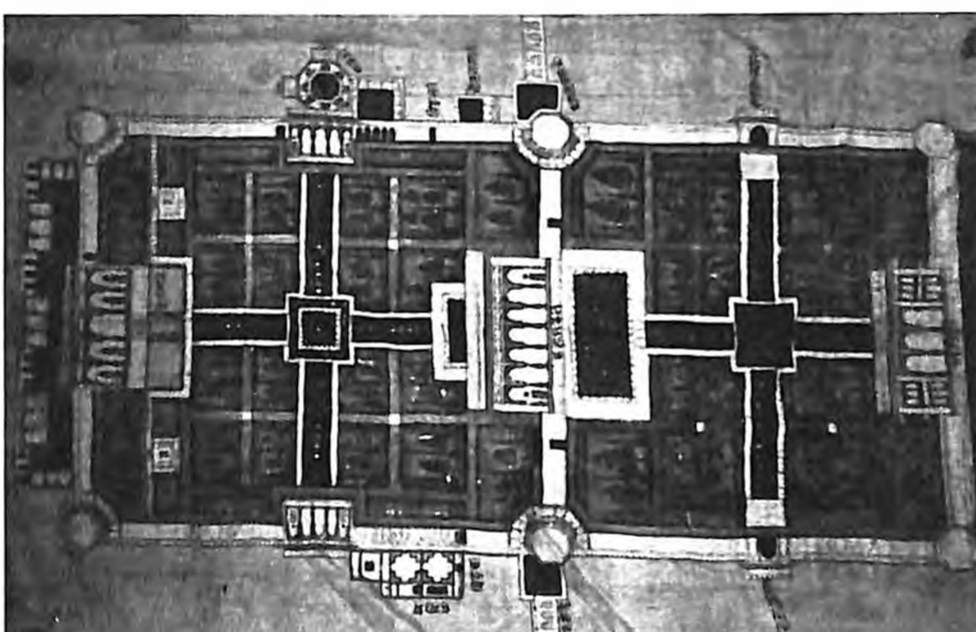
The Indian art has survived the fall of the Mughal empire and is still a living force. The pride of race and the immutable nationality of the Rajputs have combined with the isolation and strength of their rocky and desert bound country to save Indian architecture and its dependent crafts from extinction, although towards the end of the 19th century and beginning of the 20th century garden designs got modified due to the influence of European design of Britishers.

In the history of Amber, we do not find the references to gardens and bagichis before Maharaja Sawai Jai Singh II. Sawai Jai Singh planned the Jaipur city around a hunting lodge and garden known as Jai Niwas (now a part of City Palace), and his Maharani Ranawati developed two gardens, Kanak Bagh in Kanak Vrindavan Ghati and Maji Ka Bagh outside the Jaipur City.

The Kanak Bagh of Maharani Ranawati was based on the Hindu garden style and was divided into sixteen equal parts with different types of trees and flowering bushes as per the prevalent practice. Later, the same Kanak Bagh was redesigned by Maharaja Sawai Jai Singh II (information about the period of development is not available but it is expected that it was built between (AD 1710-1714), on the style of Mughal gardens as per the design described in the Chapter on documentation (Map No. 28).

The design of Jai Niwas Bagh, City Palace Jaipur is on the pattern of Kanak Bagh (Mughal garden style) (Map No. 28), while the other gardens of this period like Maji Ka Bagh (later made into the garden of Residents Palace), Kesar Kyari, Dalaram Bagh and Ram Bagh at Amber (Map No. 30, 31), Sisodia Garden, Raj Niwas Garden (Map No. 29) and Vidyadhar Ka Bagh (CLIXI:284) of Ghat Ki Guni are based on the Hindu style of garden designing.

The Ram Niwas garden and gardens of Ram Bagh Palace, Jaipur built during the reign of Maharaja Ram Singh II (AD1835-1880) are totally different in their style. The



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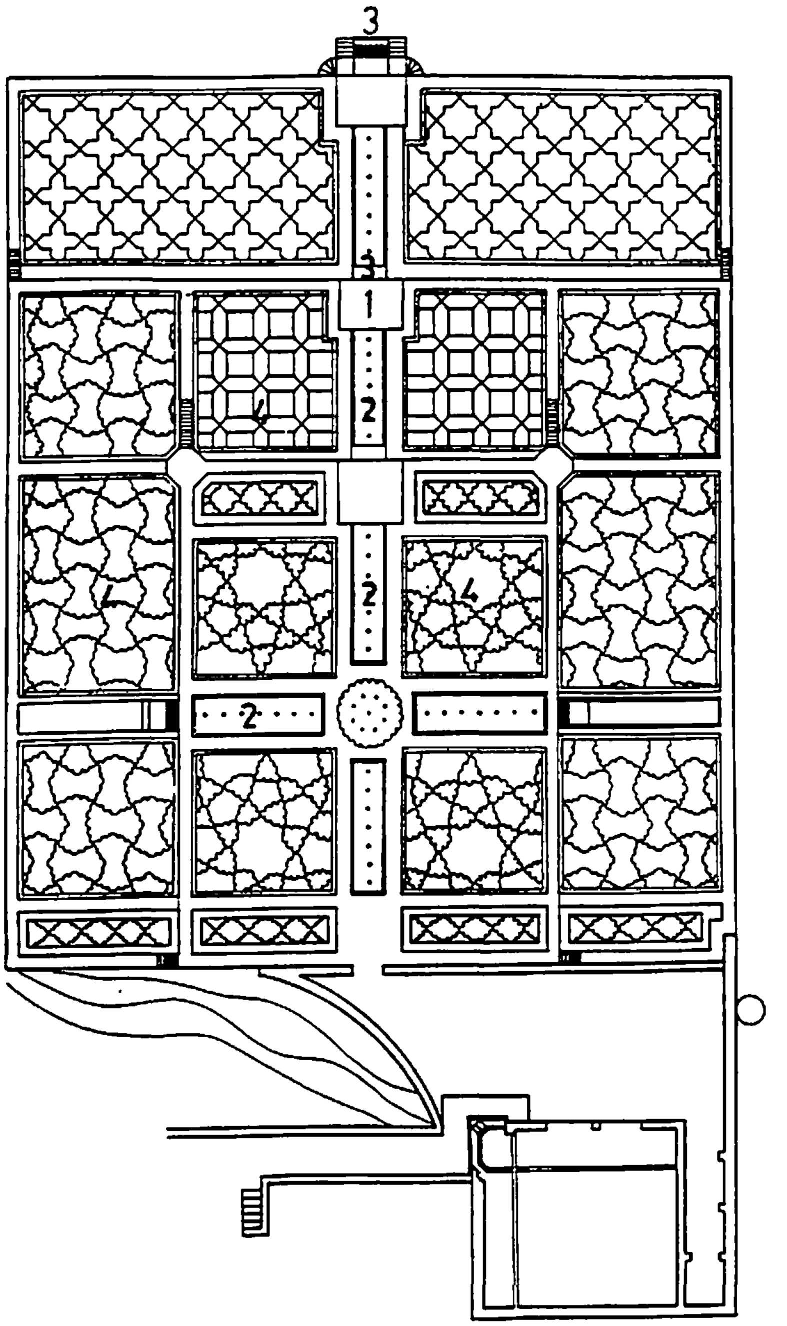


MAOTA LAKE

1 WATER TANK
2 WATER CHANNEL
3 CASCADE
4 KYARI

MAP NO. 30

4 0 4 8 12M

KESAR KYARI GARDEN PLAN
AMBER

design of these gardens is based on the English landscape design. According to Stuart (1913) gardens and classical buildings of eighteenth century were adapted to the climatic conditions of this region but the later gardens on English patterns took all form and the fundamental principles of the relation between the building, garden and the climate of the region.

During AD1977-78 ASI had taken up the project on the maintenance of archaeological gardens of various states of India. In Rajasthan ASI had worked on three gardens, (1) Garden of Annasagar Baradari at Ajmer, (2) Deeg-Palace Garden, Deeg and (3) Chittore Fort Garden, Chittorgarh. Overall approach of ASI was only to improve the water supply and to plant suitable trees and bushes in these gardens. Unfortunately, the condition of number of gardens at Jaipur was also bad but ASI had no project or the plan for these gardens. Only after one decade some of these gardens have been noticed and two gardens of Kanak Vrindavan Ghati have been restored and developed under this study.

In the year AD1954-55, Rajasthan Government attended to the garden attached to the Amber palace but could not maintain that at Mohan Bari (Kesar Kyari), situated on a raised platform outside the palace building by the side of Maotha lake due to lack of water facility as per the report of ASI in Indian Archaeology Journal AD1954-55. Interestingly the above mentioned garden is located on the side of the lake, which is popular for boating and its water is used for the irrigation of the nearby farms.

There was only the need of a water pump for lifting the water to 30 feet height for the irrigation of Mohan Bari garden but in reality the reason of failure could be the unpopularity of the place with the visitors of Amber due to the lack of development of the garden by ASI. Now in the year 1992-94, Jaipur Nagar Nigam and INTACH had taken up the project and the garden is developing as per the plan and hope to become popular in future.

9.4 DECAY OF HISTORICAL BUILDINGS

Nature operates on defined principles. The most important principle of nature for life is that one who is born will undergo the process of aging culminating into death. The aging process also depends on how we nurture the body and the condition in which one grows/lives. Similarly, malnutrition and diseases enhances the process of aging. Now, we compare the normal or specially designed buildings, we find close similarity with the above mentioned statement. The ordinary building or temporary structure stays for a shorter duration while the properly designed building has a long life, but still it is controlled by the factor of time.

When we examine the conditions of the historical buildings, we find that these were designed for a special purpose and constructed with good quality materials etc. The buildings remain in proper shape and good condition due to the maintenance and regular use. Whenever the building or its part is left unused even if the portion is locked, we find a radical difference in the condition of the two parts of the building, one in use and another uninhabitated. The uninhabitated portion gets encroached by some other factors and the inner environment develops factors which will deteriorate the inner components of the building.

The conservators and restorers of the historic buildings have studied in detail the factors which cause decay in the historical buildings. Fielden (1989) has listed number of factors on decay as described earlier. O.P. Agarwal and associates (1989, 1992)have explained the process of decay by various biological factors and Sengupta (1985) has analysed the factors of decay and the condition of the historical buildings, restored or are under conservation by Archaeological Survey of India.

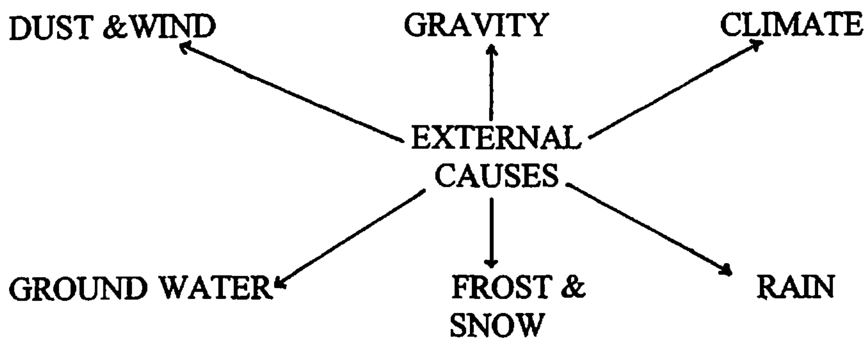
Sengupta, has described the condition of Ajanta and Ellora Caves, Chini-Ka-Rauza, Agra; Qutb Minar, Delhi; Bamiyan Buddha, all these buildings got damaged or their portions decayed by various factors. The same condition has been recorded in the Kanak Bagh and temples of Kanak Vrindavan Ghati, Jal Mahal and historical structures of Galtaji.

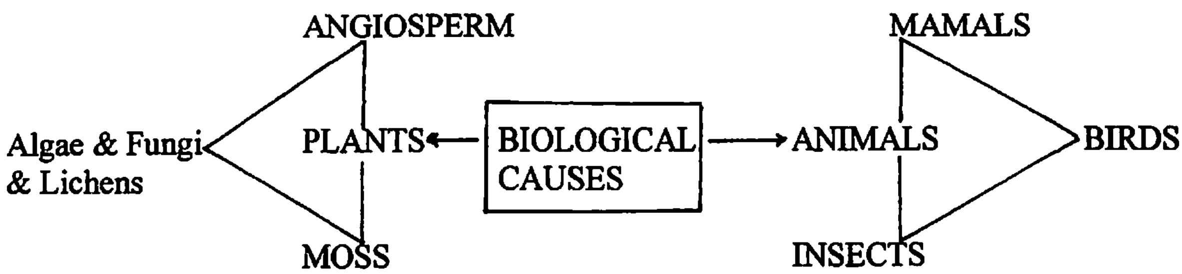
The process of decay due to the common factors has been discussed with reference to the specific buildings restored by A.S.I. and the buildings restored under this study.

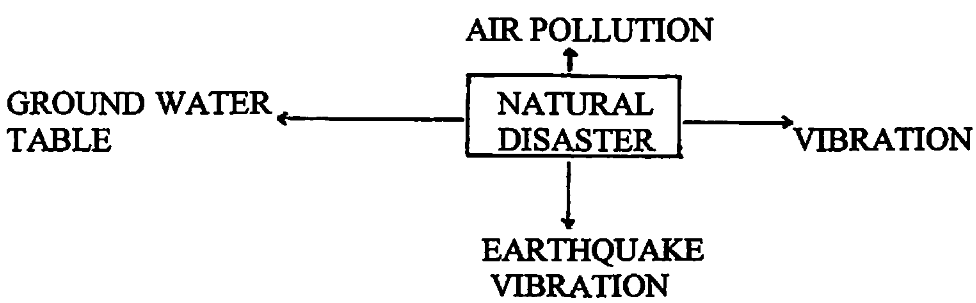
Fielden (1989) identifies the following causes for the decay of the historic buildings:

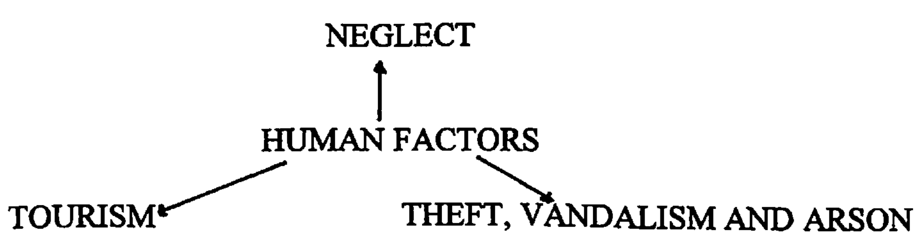
1. External causes
2. Biological causes
3. Natural disasters, and
4. Human factor.

Various factors under the above mentioned causes are as follows:









The impact of some of the above mentioned causes have already been described under documentation of sites. Few factors which are responsible for the decay of the buildings of Kanak Vrindavan Ghati and are not discussed so far, have been discussed in detail as follows:

Neglect

When we go through the historic developments of this area, we find that the temples and Kanak Bagh, were specially designed for transferring the idols of Govind Deoji from Gopalpura to Govind Deoji temple in Kanak Valley. Natwarji temple was developed by the sister of Maharaja Jai Singh and the design of Kanak Bagh of Shri Ranawatiji was modified to the style of Mughal Garden with beautiful architectural components. All these developments took place between AD 1710 to 1727. In AD1727, the foundation of Jaipur city was laid and by AD 1734 the City Palace with Govind Deoji temple and the markets had developed and Maharaja Jai Singh had shifted to his new city, gradually the businessmen and other shifted from Amber to Jaipur. Although it is true that after shifting the idols of Radha-Govind brought from Mathura were shifted to new Govind Deoji temple in City Palace, new idols were put in the Kanak Valley temple of Govind Deoji, while there was no change in Natwarji temple and Kanak Bagh. But when we critically analyse the new situation, thus created, we can visualise that the interest of the Maharaja must have changed and Kanak Vrindavan Ghati was quite far off from City Palace where new Mughal garden was already developed and therefore the buildings and garden of Kanak Vrindavan Ghati got neglected and the maintenance and upkeep of the place must have been reduced. Gradually the place was encroached by other people who had no interest and means to maintain the place. It is also well-known that things deteriorate if not in use.

For the next two hundred years i.e. from mid eighteenth century to mid-twentieth century the deterioration of the place was only due to the neglect but after 1947, the population of Jaipur started increasing and lot of construction activities started in this area.

Similarly, the cattle population was diverted towards the valley region and became the main factor for the degradation of the eco-system of Kanak Vrindavan Valley.

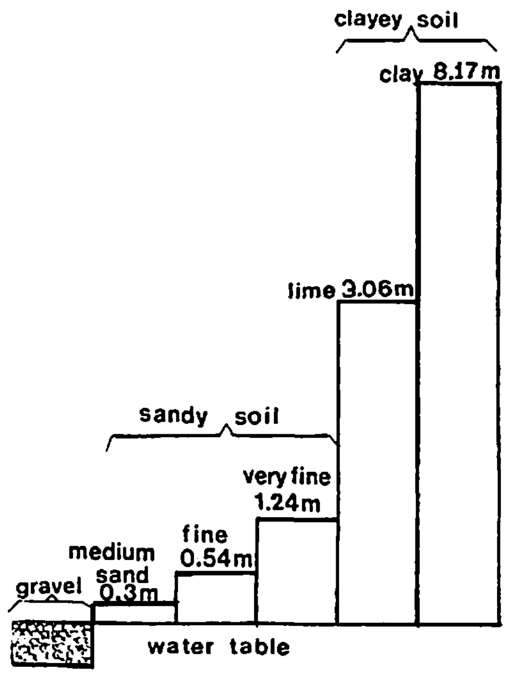
Ground Water

It is universally known that old buildings decay faster due to the dampness of the internal environment and capillary action of ground water. The characteristics of these two situations can be compared as follows:

Characteristics of moisture from the ground (Rising damp).	Characteristics of moisture from the air (condensation of water vapour)
1. Independent of the season.	Appears every year during the same season
2. Does not rise for up the wall, 2 or 3 meters.	Found at any height in the building.
3. Impregnates the entire thickness of the wall from one side to another.	Wets only the wall surface but with liquid water which contains air pollutants.
4. Takes water from the ground, either superficially (seepage from sewers, pipes) or deeply (from water table).	Precipitates water by cooling the vapour in the air.
5. Eliminated in a few years after drainage of all dispersed water or exposing the wall (if drainage is not possible) Does not return.	Eliminated quickly by heat and ventilation but, naturally, returns. Extremely capricious.

Most of the damage in the Kanak Bagh and Govind Deoji temple, as explained earlier is due to the capillary action of ground water.

The capillary action is based on the type of ground and water table as shown in the following figure.



The capillary action can be summarized by the following points:

- The force of capillary action in walls counteracts that a gravity and normally sustains large masses of liquid, sometimes in excess of 300 Kg. of water per cubic meter of wall.

- The more the water is laden with dissolved substances, the higher it rises.

- Water tends to rise more in cold walls exposed to the north, due in part to the increased constant of capillary action, but especially due to reduced evaporation resulting from lack of heat.

- Capillary humidity, apart from creating health hazards by penetrating a wall, produces specific destruction of certain building materials (erosion)

The dampness due to capillary action causes more damage to the plaster of the building.

In porous, plaster of old damp walls the demarcation like between wet and dry is often clearly marked by surface deterioration. This is due to superficial fragmentation caused by the pressure of salts. The salts crystallize in the capillary veins when drying periods (which concentrate the solution) alternate with periods of wetting (which re-dissolve the salt). In other cases, the changing demarcation line is identified by lavish festoons of continuously progressing efflorescence.

The agent for efflorescence is always moisture, which acts as a vehicle for the soluble salts. The principal component of efflorescence in magnesium sulfate (one of the most migratory of salts) the other common salts are sulfates of calcium and sodium. Nitrates seldom appear unless there is a deposit of organic refuse next to the wall.

Soluble salts can either be present as original components of brick, stone or mortar, or absorbed from the ground together with rising damp. In the former case the quantity of salts is finite; in the latter it is infinite.

The principal components of efflorescence can be divided according to their provenance and solubility in water.

Salts Present in the Wall

Very soluble	Magnesium sulfate, sodium sulfate
Not very soluble	Calcium sulfate
Soluble in water only if it contains a certain amount of CO_2	Calcium carbonate

Salts formed with External Supply of Nitrogen or Chlorine

Soluble in water not deliquescent	Potassium nitrate
Very soluble and deliquescent	Sodium nitrate, calcium nitrate, calcium chloride

The efflorescence is mostly responsible for the decay of the mortar and bricks and in some cases even of stone. The decay initially influences the plaster surface and once the plaster becomes loose and leaves the surface the massonry becomes exposed and gradually the stones leave their position. Now due to the weakening the structure, gravity comes in action and the structural load develops cracks in the building which leads to the disintegration of parts or the total structure.

As mentioned earlier the Govind Deoji temple and Kanak Bagh structures got damaged due to the polluted water of the Mansagar.

Sengupta and others of A.S.I. based on the restoration work of Chini-Ka-Rauza and Taj Mahal suggest that for protection of the buildings near the water source should have the retaining wall/s towards the water source so that the seepage of the water is eliminated or reduced. Similar observation was recorded in case of Govind Deoji temple because there was a retaining wall towards the Mansagar in Govind Deoji temple and therefore the damage was minimized but in case of Kanak Bagh deterioration of the buildings like pavilions and external verandas towards the ground were severe due to the following reasons:

1. Irrigation of land under cultivation with chemical fertilizers, raised the dampness of the foundations and erosion or mortar due to the chemical action.

2. Due to the lack of maintenance the parkota walls, had collapsed and during rain, due to the slope towards the dam side, soil got shifted and exposed the foundation.

The damage to the Natwarji temple was less due to its distance from the source of water.

9.5 TECHNIQUES

Additives In Lime Mortar

The historic buildings of Amber and Jaipur are made up of stone and lime mortar and as per the requirements of the archaeological principle, these have been restored also by the use of lime mortar.

Use of Fibres

The chemistry of the lime mortar and the techniques used for restoration have already been explained but the utility of the additives like jute and san fibres, curd, gur (jaggary) and gum in mortar needs clarification. This has been explained with reference to the information available on building material research.

Jute fibres in the form of mesh were used in *'Dar'* preparation while gur and curd have been used in *'Kara'* and Khamira techniques.

Lot of research work has been done on the use of different types of fibres in mortar in recent years. Now a days instead of lime cement is used but the property and utility of the fibres remains the same.

In the present practice plant fibres from different sources like stem (Bast) fibres of jute, flax and kenaf, leaf fibres from Siosal, fruit fibres, coir from coconut and wood fibres from Bamboo and other materials like glass, steel and nylon fibres are also used in cement.

Romualdi and Batson (1963), Shah and Ramjan (1970), Hannant (1974) and Kar and Pal (1972) used steel fibres in cement mortar, while Grimer and Ali (1969) used glass fibres and all of them found that the use of fibres gives mechanical strength to the mortar and development of the cracks gets reduced.

Anon (1974) studied the effect of fibre content and the aspect ratio of fibre on workability of the mortar. It is reported that as the fibre content and aspect ratio are increased, the workability decreases rapidly.

Krenchel (1976) studied the effect of fibre spacing on the behaviour of the composite. The average spacing is calculated from number of fibres crossing a unit area in any arbitrary cross section and to the type of orientation. Lewis and Mirihagalia (1979) and Islam and Alam (1987) have investigated the effect of introducing various percentages and length of different types of chapped fibres of jute and coconut into concrete and their effect on compressive and tensile strength. The result shows decrease in the compressive strength but increase in the tensile strength.

Siddique (1993) has studied the water absorption capacity and the tensile strength of the fibres in natural dry state as well as in the alkaline medium. He found that the jute fibres have high rate of water absorption which increases in alkaline medium and fibres increase the strength of the mortar and cracks do not develop on setting and he also suggests that the mortar should be set by compacting by mechanical vibration. He also found that fibre mix generally requires somewhat greater vibration in comparison to the mortar without the fibres. Now, when we examine the prevalent practice, we find that in the present work also the compaction of mortar of *'Dar'* by the mechanical process by use of manual power as described in the Chapter on techniques.

It has been noticed by reviewing the above literature that in our techniques, although we use the proper materials and techniques but due to the lack of information on the proportion and the procedure, sometimes we use more material and unorganised labour strength.

Use of Casein

In *'Kara'* technique used for *'Aaraish'* work and for the base of fresco paintings and *'Khamira'* technique for surface finish, curd is used in lime for the preparation of *'Putty'*. The use of crude curd from skim or whole milk has been employed as a binding or adhesive material from the earlier recorded periods in fresco work. Now, we know that 'curd' contains the milk protein 'casein' which is the real binding material.

Now a days casein is commercially prepared by the separation of milk protein from skim milk by the use of dilute hydrochloride or sulphuric acids. After the separation of the protein (casein) the material thoroughly washed and dried and now it is available in the market in the powdered form. Theophilus (1934) had described in detail the method of preparation and use of casein. He had also compared the quality of the material prepared by the use of curd and casein separately. He concluded that curd or home made casein contains butter fat and milk sugar and its concentration is not easily controlled, its use as a substitute for modern commercial casein is unwise.

As per the local practice and lack of information, initially curd was used in '*Kara*' and '*Khamira*' preparation. Now it has been realised that the local practice of use of curd is unscientific and not proper.

Use of Gum and Gur (Jaggary)

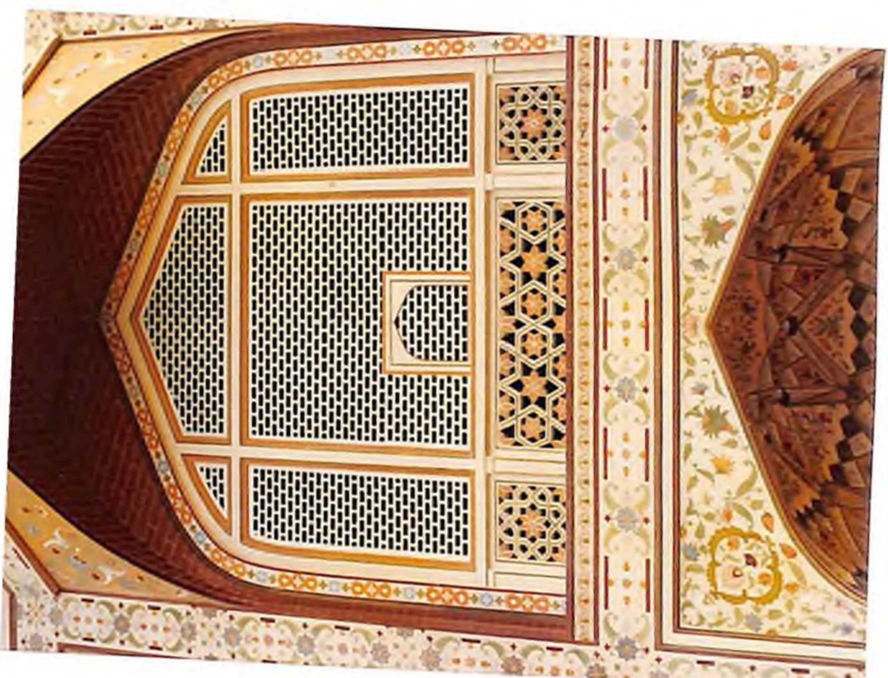
Gum arabica is used in '*Khamira*' preparation. As per the practice 3-5 Kg. of Gum powder is used in 100 litres of slacked lime prepared by the use of 20 Kg. of lime. Chemically gum acts only as a binder for pigments in water media and similarly acts as a binder for lime particles and as per Ralph Mayer (1985) the proportion is proper.

The other additive in '*Khamira*' and ordinary lime wash is '*Gur*'. Gur is the crude form of sucrose or sugar.

In Scientific preparation of water colours, honey water in the ratio of 1:1 or sugar syrup or glucose is used. It acts as plasticity and contributes smoothness for grinding of pigments and painting. '*Khamira*', which contains lime putty and earth colours in water media, develops smooth finish for surface wash/painting. It can therefore be concluded that '*Gur*' is chemically possess the required quality but due to its crude form imparts a yellowish colour to the medium and therefore changes the final quality. It is therefore, suggested that sugar syrup or honey-water should be used in the required proportion instead of '*Gur*'.

Aaraish and Fresco Paintings

Aaraish technique has been extensively used in flooring, Izara and exterior surfaces of *Chatari and Kabanis* of various buildings of Kanak Vrindavan Ghati and Galtaji. The details about the materials and techniques have already been explained.



The history of this art is rich and the techniques are followed in India and Rajasthan for centuries and therefore, it is necessary to know the history of this art in Rajasthan and its comparison with other places.

According to Chakravarty (1993), aaraish work in Rajasthan has a long tradition of about four centuries - commencing from Mughal rule in India. Its lustrous effect was so alluring that the aaraish painting did spread over major erstwhile princely states of Rajasthan with Jaipur as its nucleus. The techniques requires expertise, is strictly time-bound and comparatively expensive and therefore could never flourish with mass base and remained confined to some selected talents with sufficient technical know-how of the work. The technique has been used in historic buildings of Amber and Jaipur, Udaipur and Havelies of Shekhawati region (Three Districts of Rajasthan, namely, Jhunjhunu, Sikar and Churu).

(Shri Nand Lal Bose, the master artist of modern Indian recorded in his diary what he learnt and experienced from Jaipur artist Shri Narasingh Lal who on the invitation from Gurudeva Ravindranath Tagore worked in Shantiniketan twice - first in 1927 and then in 1933).

In Jaipur *Aaraish* work is known by the name of *ala-gila* and is similar to Italian fresco-buono. The word seems to be of Persian origin and introduced to India during Mughal period. From Persia the technique might have travelled to the west (Rome) as well as to India and later to Jaipur region.

The materials and the basic technique of aaraish work is similar to that of fresco-buno as explained in the Chapter on techniques. The only difference in this work is that this technique is used for the floor, ceiling and on the sides of wall (known by term *Izara)* and very little drawing work is done on these surfaces while in fresco paintings, figures are drawn based on a theme by the use of different types of pigments.

This technique can be compared with the fresco technique followed in the famous wall paintings of Ajanta and Bagh.

The ground for the Ajanta paintings was prepared by the application of two coats of plaster on the wall. First the wall was covered with a layer of clay or cow-dung mixed with chopped straw or animal hair. Then it was smoothed by another fine coat mixed with fine rock-powder or sand and fine fibrous vegetable material. Finally a thin layer of lime wash was applied.

On this ground outlines of figures were drawn in black or red tints and afterwards colours were filled. According to Griffiths (1974), Ajanta paintings are the mixture of tempera and fresco techniques.

According to Ghosh the condition of the pigments and the flacking of colours shows that the technique of Ajanta paintings is not fresco buno. Similarly, the close examination of the paintings show that the colours are not diffused in the body of the plaster. The pigments are bound only by the gum or glue and therefore, technique of these paintings is only Tempera. Lady Harringhour has given the details about the process of execution of paintings in Ajanta caves.

According to Haldar (1921) the mural paintings of Ranga Mahal at Bagh are also by the technique of fresco secco. The artists of Bagh paintings had used gum or mucilage form Belo and neem trees and the tarmarind seeds as adhesive substance with paints. The pigments were used on dry plaster and therefore, colours had not penetrated in the lower surfaces.

When we compare the painting technique followed in Jaipur region as explained earlier, pigments in water medium are used before the surface is dried up and therefore the technique of fresco/aaraish work in this region belongs to the category of fresco buno.

Mannovat (Relief Work) or Lime Stucco

Lot of ornamentation work has been done on the inner walls of Gurbh-griha of Govind Deoji and Natwarji temples. These have been explained under mirror work, paani work, paccikari, dak mina, inlay and mannovat work. Most of these techniques have been explained but there is a need for discussion on Mannovat work.

Mannovat or relief work is technically known as lime stucco technique. In this project the mannovat technique has been used for the decoration of parapot walls, cornice portion of the ceiling and the relief work on the walls.

The Italian word '*Stucco*' has been derived from the old High German word '*Stucchi*' which stands for crust or coating. The Italian Master Architect Vitruvius (lst Century BC) has described the qualities of Stucco as:

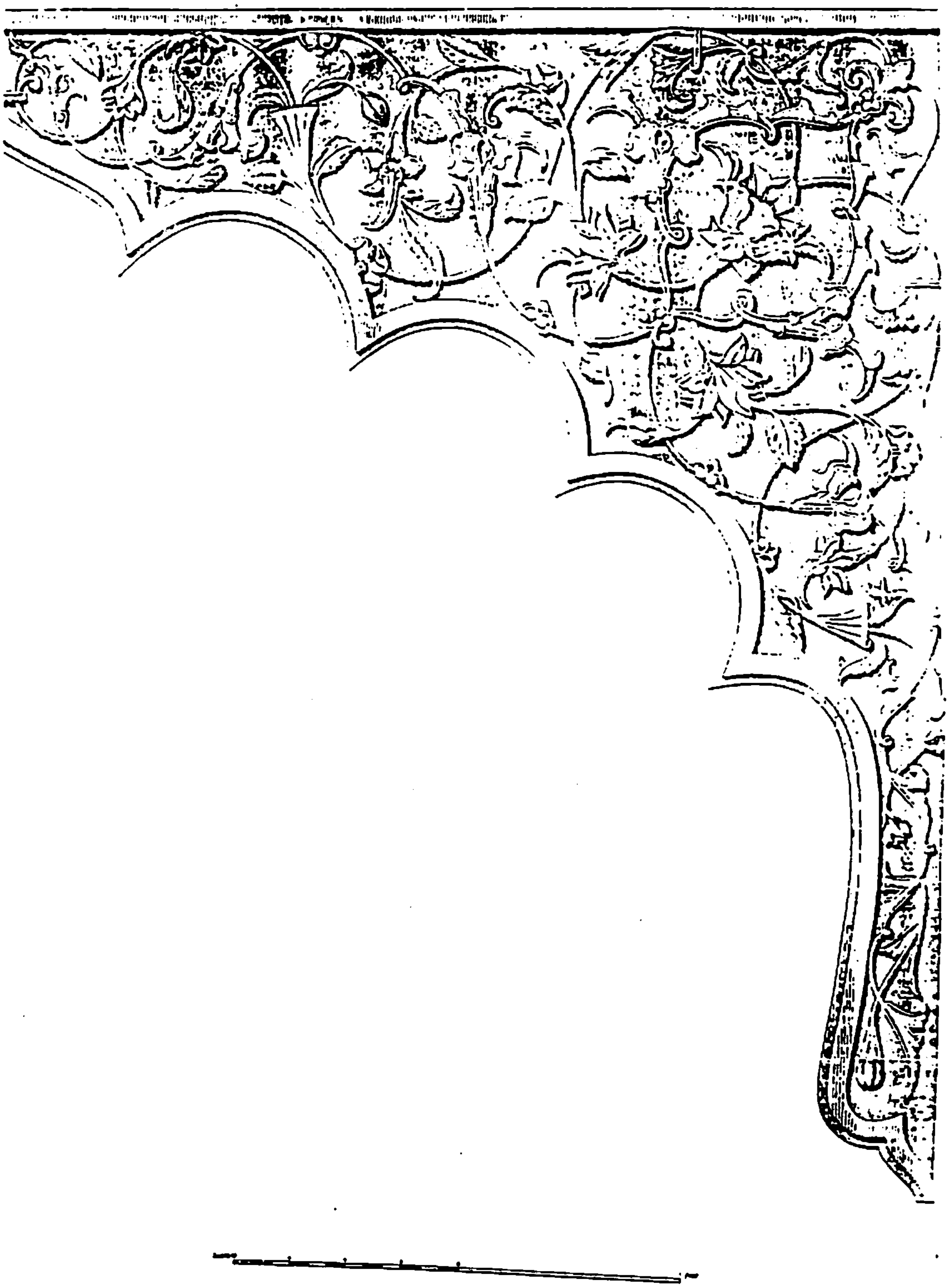
(a) It is a particular technique in which the base layer (one or more) of plaster must be of lime (not gypsum) and sand.

(b) the upper layer (one or more) of mortar must be of powdered marble; and

(c) the surface of the uppermost layer must be highly polished to produce shine or brilliance.

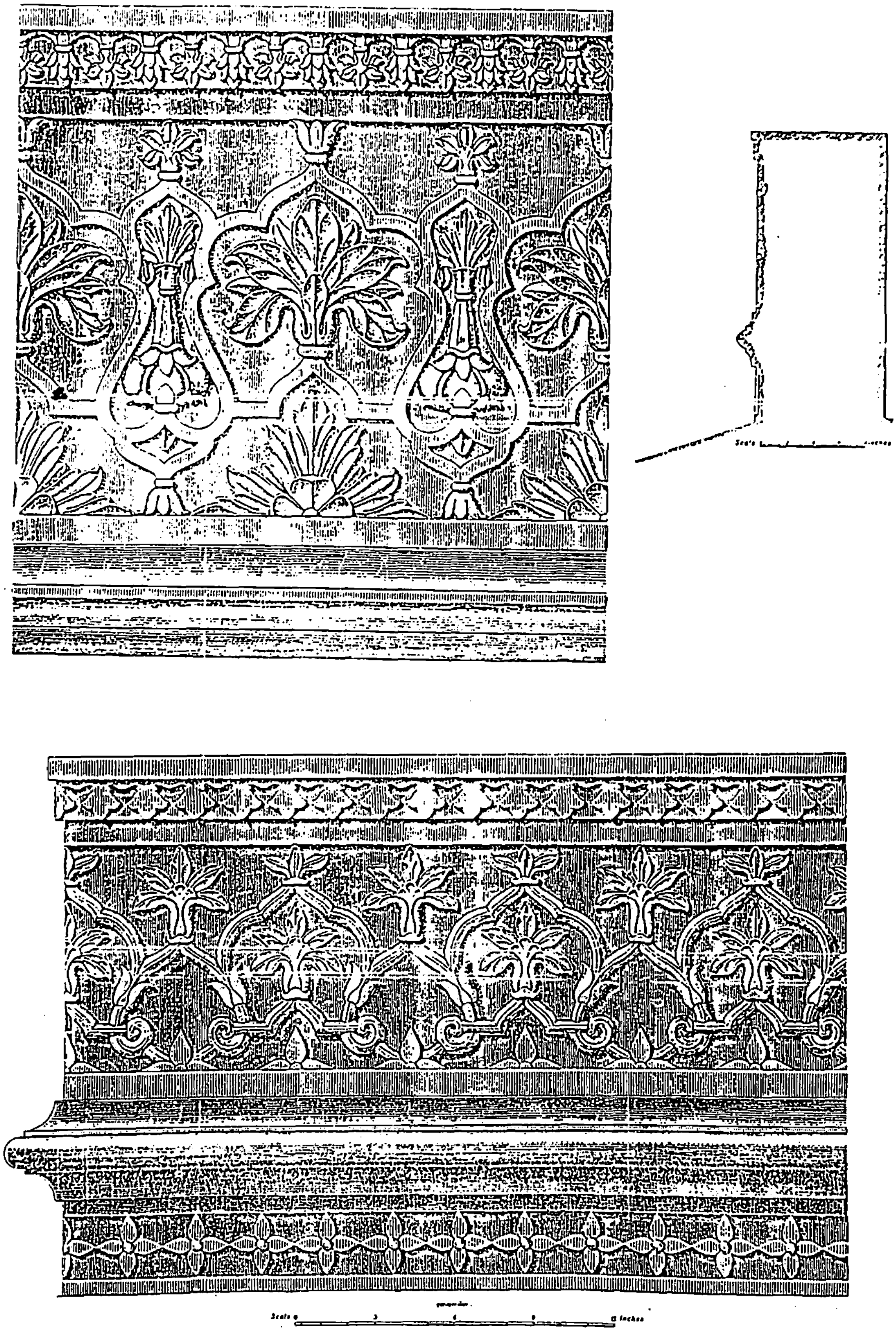
Sengupta (1976) describes the two Buddha Colossi of Bamiyan, scooped out of the rock and the face dome in plaster, as stucco. Similarly, the work done by A.S.I. in 1958 on mutilated painted head of a clay figure, collected from Karakhoto of Mongolok as stucco work.

In some old buildings relief work done with plaster of paris (gypsum) was thought to be the stucco work but as per the definition of Sengupta and based on the work of

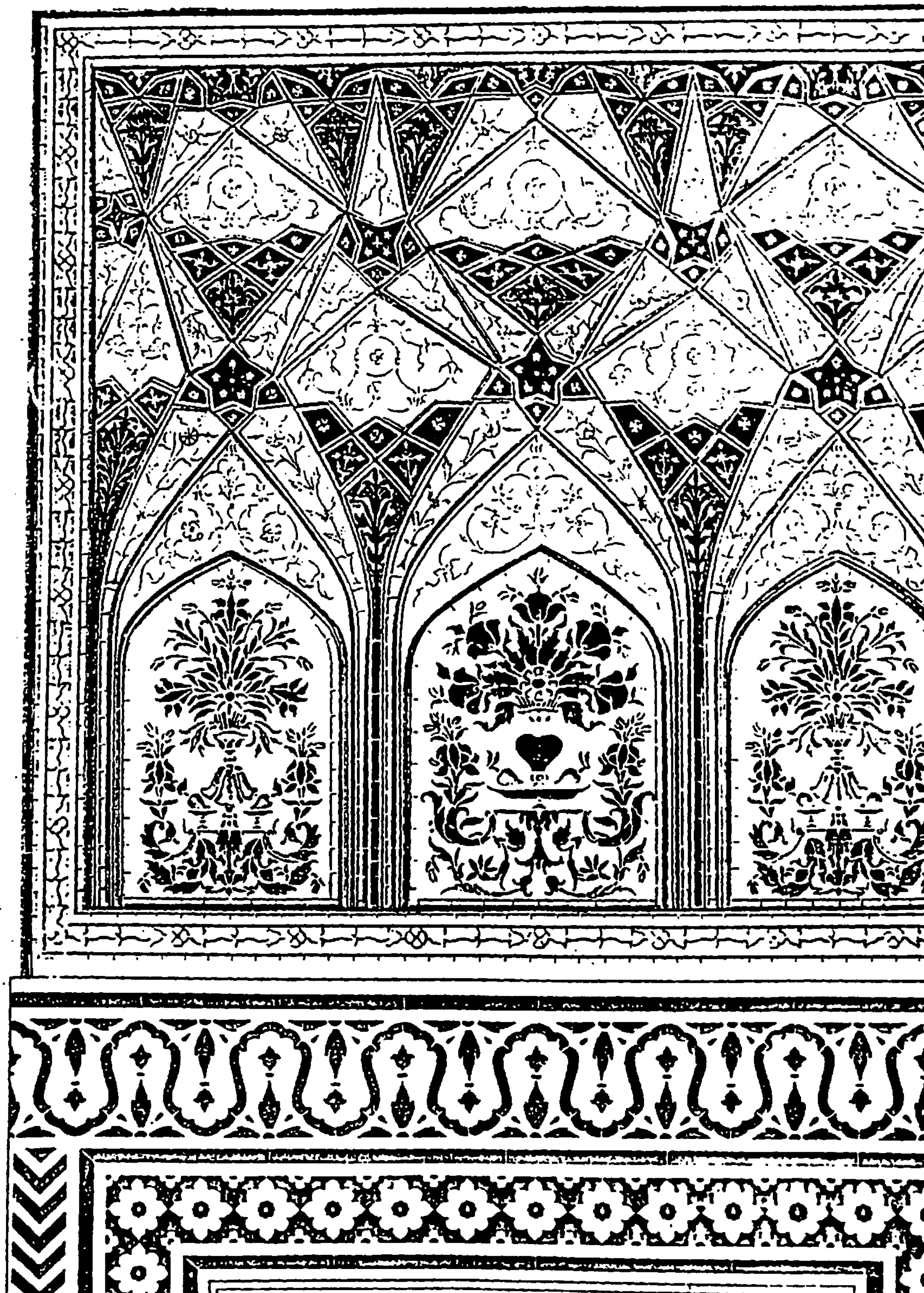


SUKH MANDIR, AMBER

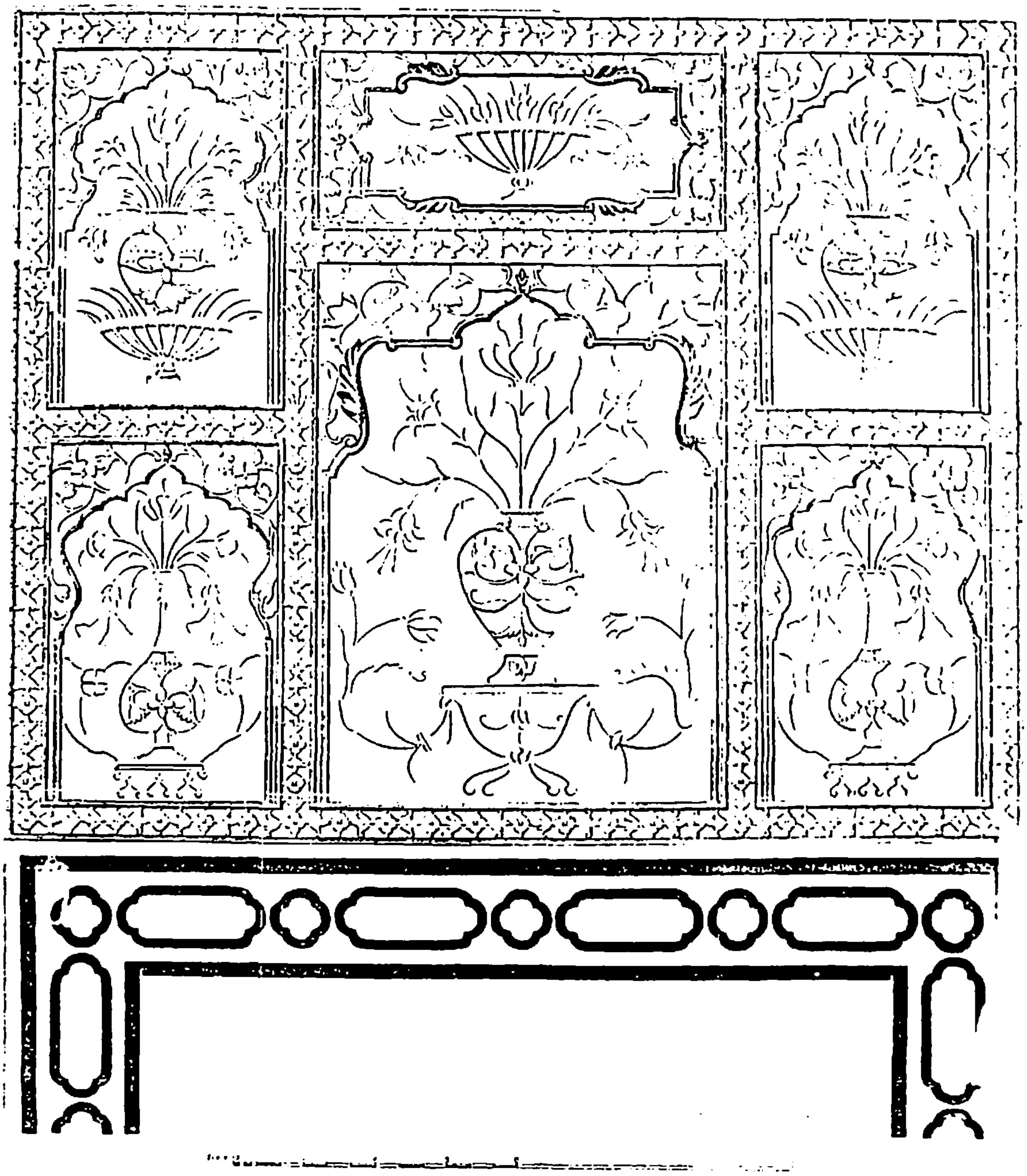
Figure 55



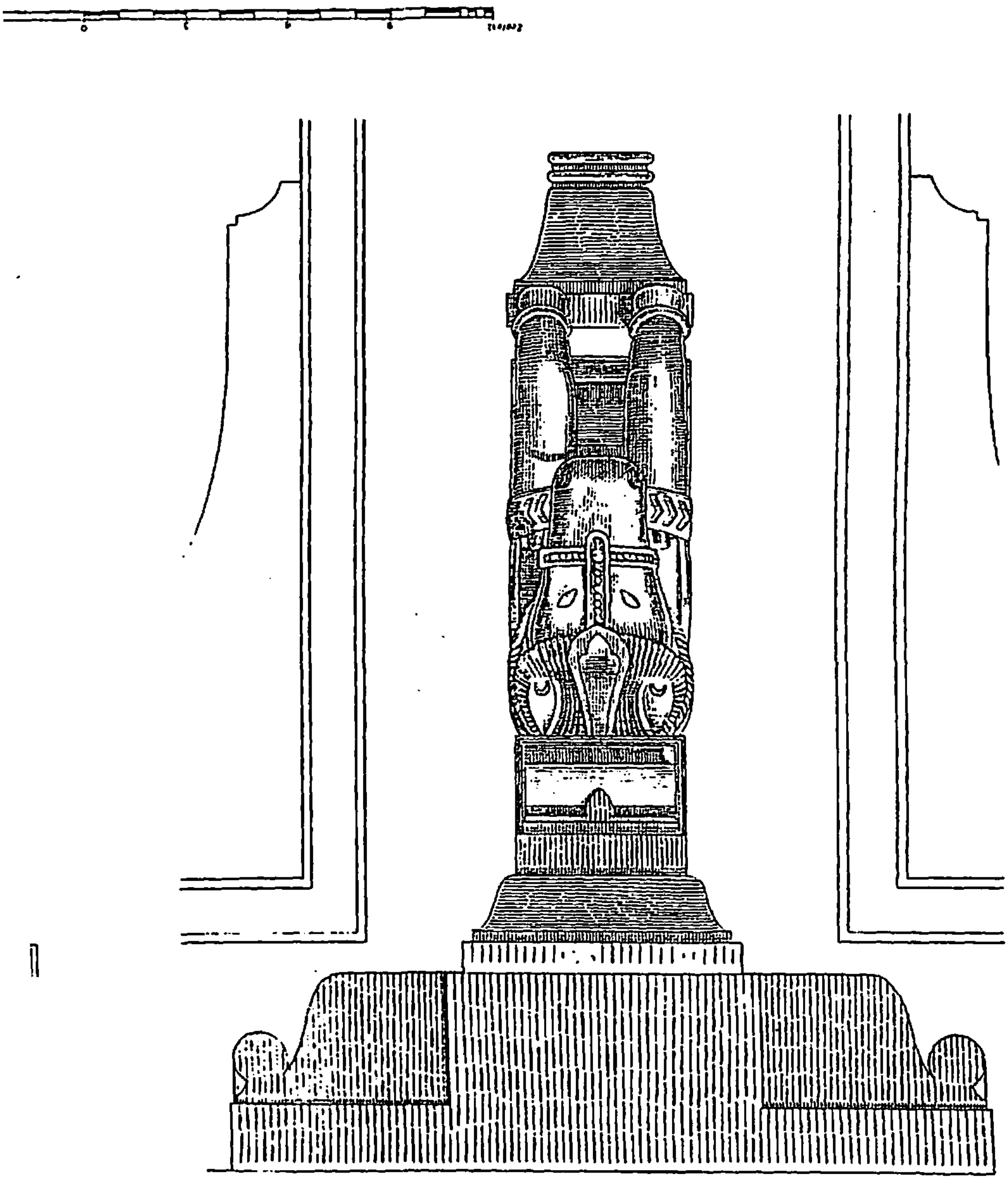
WALL AND SURFACE DECORATION



AMBER PALACE



JAS MANDIR, AMBER



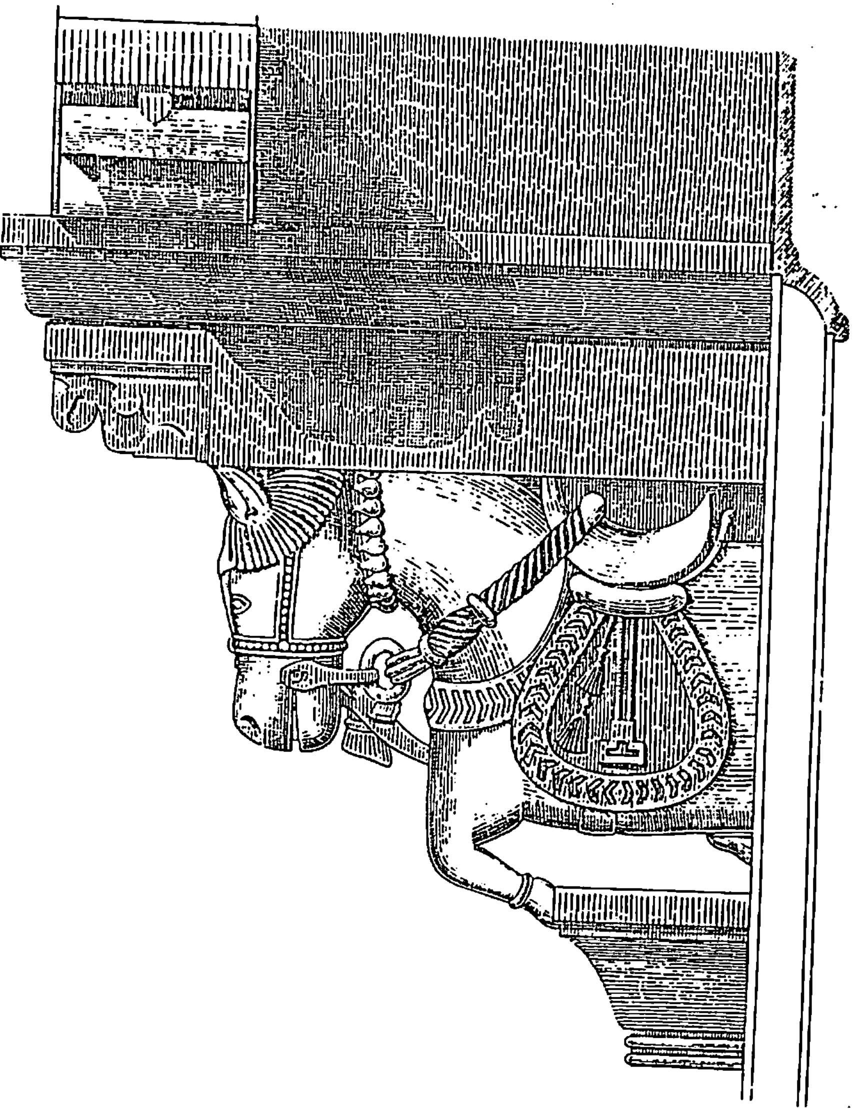


Figure 57

vitruvius the relief work in Plaster of Paris will not be included under stucco work.

The relief work done in lime stucco on parapot walls as shown in the figure 55 and on the cornice (Fig. 56) comes under the category of ornamentation in lime stucco. This improves the aesthetic value and beautifies the large surfaces of mehrab by giving three dimensional effect with light and shade affect as shown in Figure 57.

9.6 ARCHITECTURAL FEATURES (ARCHES, COLUMNS AND BRACKETS)

Structural aspects of architectural components have been dealt in detail in Chapter 5. The chapter contains information about architectural features like, Chatri, Kabani, Arches, Columns, Brackets, Parapit etc., which are prominent in the historic builds of Amber and Jaipur.

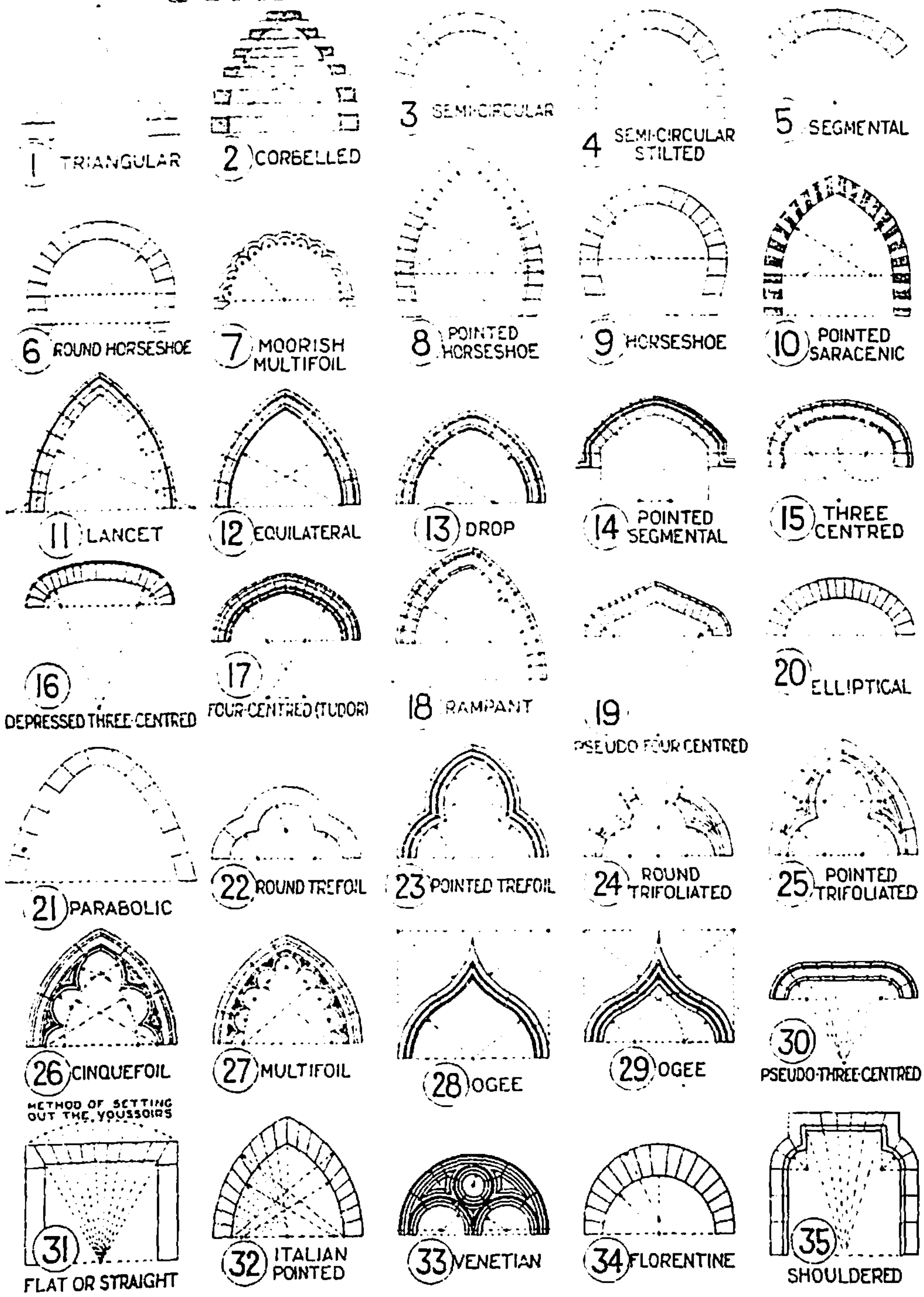
A few of the above mentioned architectural features like Arches, Columns, and Brackets are prominent features of temples and historical buildings and have been designed on sound principles, therefore, some aspects of their design have been discussed.

Arches

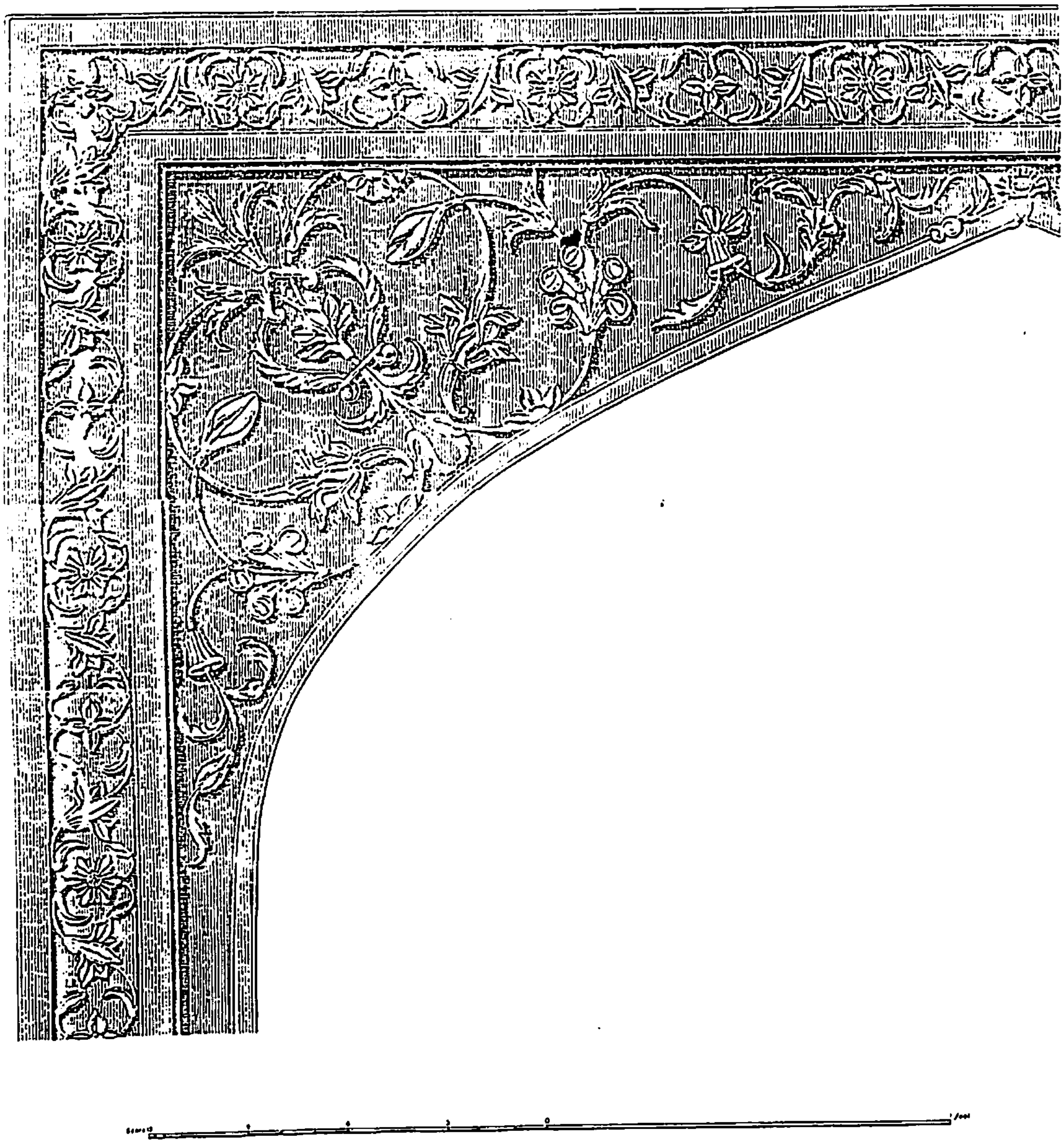
Fletcher (1986) has described thirty five types of arches as shown in the following figure.

The shapes of these arches are different but can be constructed on the simple principle of load distribution on the retaining structures but the shapes of these arches have interesting historical background. Some of these arches namely, Trefoil, multifoil, Ogel and shouldered types are common in Indian buildings and have been designed on philosophical bases as described by Havell (1927).

COMPARATIVE ARCHES



ARCHES



According to Fergusson (1976) the radiating arch is "Saracenic" and the horizontal beam and bracket as "Hindu" and he feels that the former was a great gift of western science to India. It led British archaeologists to attribute every Indian building with radiating arches in it to foreign inspiration without further investigation.

Havell (1927) has analysed the evolution of various important details in Indian architecture, both as regards to structure and symbolism. According to him the trefoil arch originated in Indian Buddhist symbolism many centuries before it appeared in Western art. In India, as in Europe, it was a form which architecture borrowed from the graphic arts, for it originated with the transcendental ideas connected with the Indian conception of the Deity, and with anthropomorphic symbolism.

According to Havell, "the important point in Indian architectural history is that the various forms of foliated arches were associated with the first painted and sculptured representations of the divine Buddha, which began to appear with the rapid spread of Mahayana Buddhism in the early centuries of the Christian era".

Fergusson calls the shape of the arches of Buddhist buildings as "horse-shoe" shaped while Havell suggests that the shape is not like horse-show but is based on lotus leaf, similarly according to Havell the prefoil arch was a compound aureole, or nimbus, made up of a combination of lotus and pipal or banyan leaf.

The structural use of these trefoil arches and their derivatives were introduced in the early centuries of the Christian era, for the niches in the walls of the temples with idols, monasteries or relic shrines.

The design of the arches have developed in different stages. The first stage of development was from lotus-leaf or so-called horse-show arch to lobed or cusped arches or the arches of different shapes as shown in the figure. The other modification took place during the Mughal period during this time, the monotonous shape was enriched by the ornamentation.

Bracket

A very characteristic feature of Indian architectural design from the fourteenth century onwards is the combination of the arch with bracket. The bracket generally plays the constructive part in accordance with Hindu tradition, while the arch being used as a symbolic and decorative element.

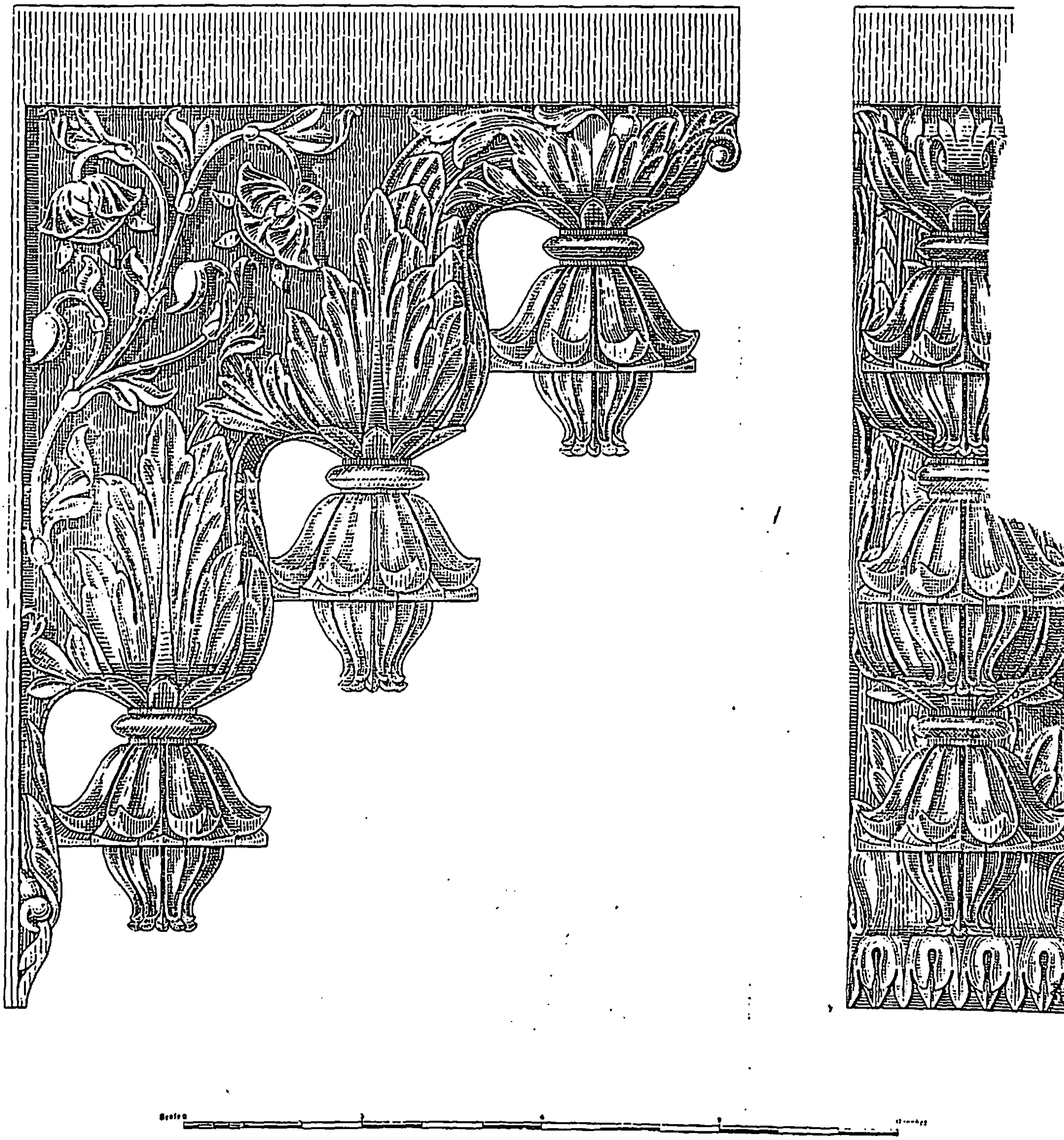
The brackets as the structural components are used for the deep bracketed cornices or dripstones, or as a support for the balconies. But in Hindu architecture of temples, ornamented and sculptured brackets are used as the part of the arches. They also make a part of the shouldered arches as shown in Figure 59.

The Muhammadans commonly used brackets in their buildings but added nothing to the Hindu craftsman's knowledge in this respect. Their smaller arches were very commonly formed of two brackets joined together. The brackets of Mughal buildings were mostly simple or in some cases had a few floral designs only.

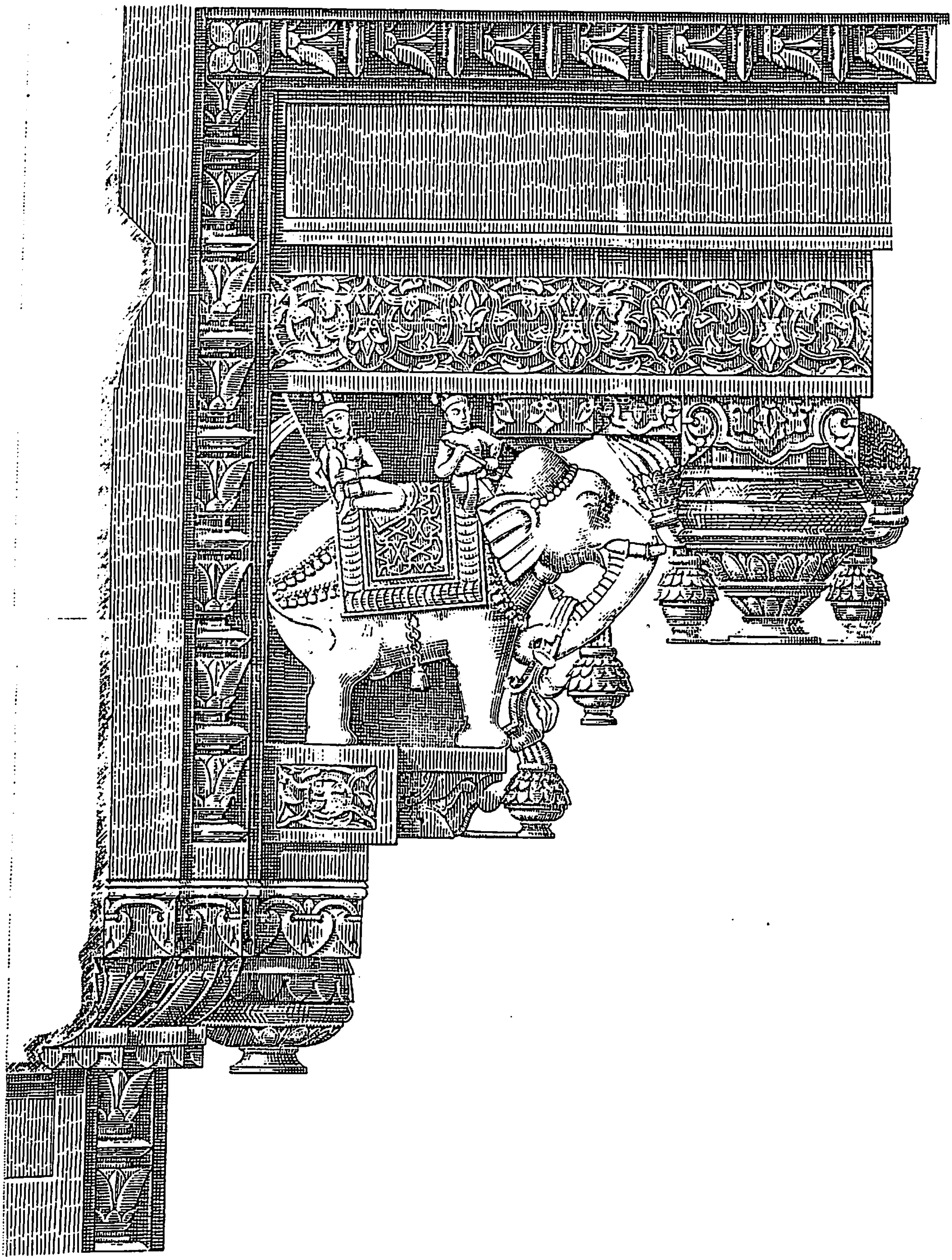
Indian craftsmen were perfect in making the brackets with lavish carvings. The carvings on the brackets were done by sculpturing the designs or by molding the designs with the use of lime stucco or with inlay designs. The brackets in Govind Deoji and Natwarji temples are simple but the other temples at Amber have beautifully carved brackets as shown in Figure 60.

In Rajasthan stone carving is popular and has a long history. We find brackets of various shapes and with different motif designs. The shape and designs of the brackets have correlation with the building architecture and there is a need for detailed study of this architectural component.

BRACKET



ETS.



Column

The column or pillar in Indian architecture is very ancient. The word Stuno which is a synonymn of Pillar in the Manasara is used in Rig Veda and the later literature in the same sense. The word Stambha is not so old but Skamba is used in the Rig-veda for column.

The word upa-mit, not used in Manasara, occurs in the Rig-veda and the Atharva-veda in the sense of Pillar.

According to Macdonall and Keith, in the Rig-veda the word 'Upa-mit' is used in the sense of an upright Pillar. In the Atharva-veda, the word coupled with parimit and pratimit, denotes the beam supporting the upamit. Parimit denotes the beam connecting the Upamit horizontally.

According to Acharya (1927), one feature of Indian architecture which illustrates its rise and progress, as well as its perfection and weakness is Stambha or Pillar/ Column.

In Indian literature of architecture the column has been divided into two types, first type is a component of building structure and the second type is considered to be of free-standing type of pillars.

The standing type of pillars are found in all ages, from the simple and monolithic lats of Ashoka with inscriptions and emblem, were designed in BC250 till seventeenth century. During these 2100 years they were erected first by the Buddhists, then by the Jaini's and occasionally by the other sects in all parts of India.

Buddhists employed these pillars for conveying the message of Buddha, with the Jains there were generally deepandans or lamp-bearing pillars; with the Vaishnavas they are generally bore statues of Garuda or Hanuman; with the Saivas they were flaystaffs but

THE COLUMNS

THE PĀLIKĀ-STAMBHA CLASS

GENERAL PROPORTION —— WHOLE ORDER = 6 PARTS

PEDESTAL – 1 PART

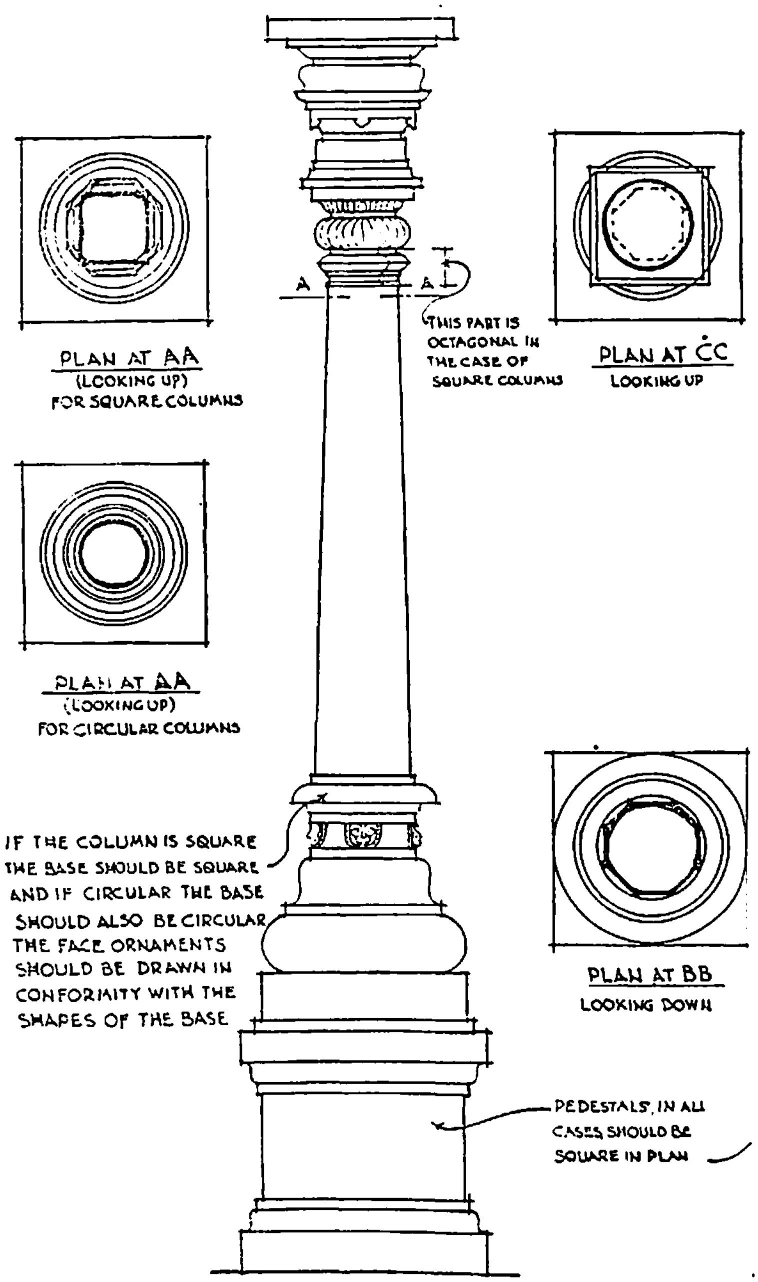
BASE – 1 "

SHAFT – 2 "

CAP – 1 "

ENTABLATURE – 1 "

DIAMETER OF COL: = 1/11 TH HEIGHT

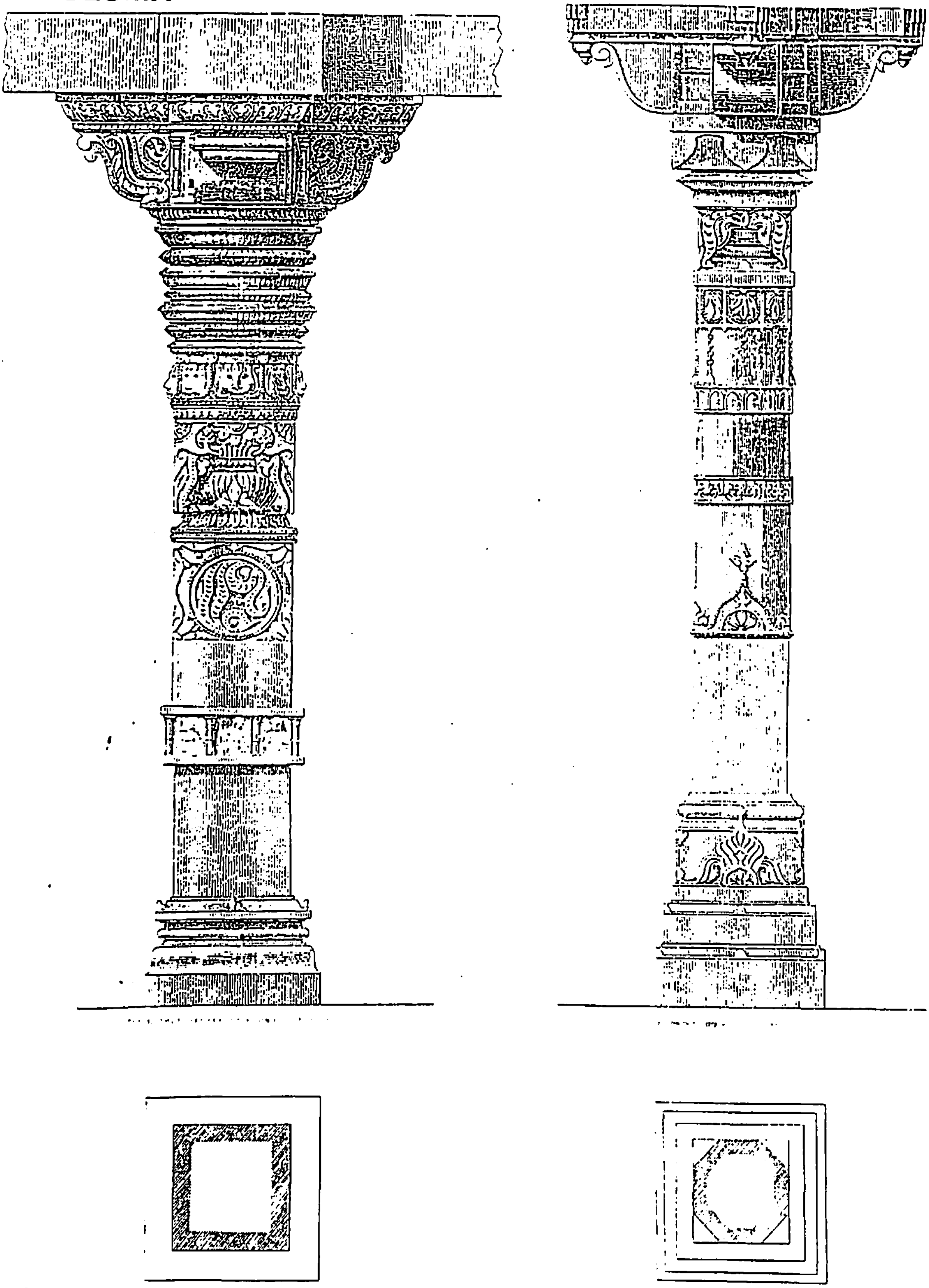


SQUARE OR CIRCULAR

BRAMMA-KĀNTA OR RUDRA-KĀNTA

Figure 61b

COLUMN



whatever their destination may be they were always the most original and frequently the most elegant production of Indian art.

The other type of column is associated with the structural component of the building and in Indian architecture is known as Palika-Stambha. These type of columns have five parts. (1) Pedestal (2) Base (3) Shaft, (4) Cap and (5) Entabulator as shown in the following figure.

According to the Indian architecture, they are classified into four types based on the nature of their shaft. (1) square or circular (Brahma-kanta or Rudra-Kanta), (2) Octagonal (Vishnu-Kanta), (3) Hexagonal (Shoudra-kanta) and (4) Pentagonal (Siva-kanta).

In Amber and Jaipur architecture, we find one more modification in the parts of the pillars. In Natwarji temple, outside pillars have common pedestal, two bases with two shafts and caps and single Entabulator. Similarly the lower portion of the shaft has larger diameter which tappers towards the top.

According to Vastu-sastra, the ratio of the dimensions of various parts follows a specific relation with the height of the column and the load it has to bear.

In the present study the condition of the column was good and no new column was designed for and therefore the above mentioned information has been reached just for the information that in Indian architecture, the column carries an important position and should be studied in detail.

9.7 RESTORATION

The Archaeological Survey of India was established in 1861, but the conservation of monuments was not included in the official activities of the British Government then in power. As a result, various provincial governments carried out conservation work according to their fancy and whims. The Director General of the Survey played an advisory role and could not supervise conservation work. For this reason, the primary duty of the chemistry branch of the Survey, set up in 1917, was to carry out "Scientific examination and treatment and preservation of museum objects and other antiquities recovered in the course of excavations and explorations", but this unit was not authorised to undertake any preservation work on monuments or mural paintings.

In approaching the task of conservation, the main guideline stressed in international norms is caution: the attempt must be to preserve the architectural, historical and artistic identity of an ancient monument. This principle was enunciated in 1916 in a government handbook published in Calcutta, as the Indian Archaeological Policy, which warned of the "deplorable harm that may be done in the name of restoration" and categorically stated that the official policy was, "not to reproduce what has been defused or destroyed, but to save what is left from further injury or decay, and to preserve it as a national heirlom for posterity".

Accordingly, the government declared itself opposed to restoration "except in special circumstances", which were further spelled out to refer to sites "where ceremonial functions are still performed" and where therefore, "there are frequently valid reasons for resorting to more extensive measures of repair than would be desirable". These important caveats, which underline the need for conservators to be trained in the study of ancient architectural and the technology of preserving historical buildings, have confined to function as the underpinnings of official archaeological policy. In the technology of archaeological reconstruction, this principle is translated into anastolysis - i.e., the reassembly of existing and dismembered parts, only from the material available at the particular site.

In the year 1945 the conservation of historic monuments was placed under the supervision of the central government in order to exercise greater control and to maintain the uniform standards in accordance with the archaeological principals. The State Public Works Departments engineering staff, which had been associated with repair work on historic monuments were given a one month training course in conservation and put in charge of the maintenance and repair of monuments. Accordingly, conservation work on Indian national monuments is executed on the departmental level by hired labour under the direct control of conservation assistance and engineers, who are supervised by archaeological officers.

The International and local bodies like, UNESCO, ICOMOS, ICCROM, INTACH and the various charters as described in Chapter two have provided guidelines for the conservation or restoration work of the historical buildings and monuments.

The survey of A.S.I. reports for the last forty years show that mostly A.S.I. has done the conservation work of the archaeological monuments of India.

Sengupta (1984) has reported about the restoration of Small Buddha at Baniyan and about the restoration of Chini- Ka-Rauja, Agra. Sengupta and his colleagues of A.S.I. have done good work on the conservation of historical monuments but in Amber and Jaipur hardly any work has been reported.

In this study the approach and methodology followed is based on the principal of archaeology but instead of conservation the buildings have been restored as per the techniques described earlier.

The objective of this project was to recreate the glory of this region and therefore, along with the restoration of the three main buildings of Kanak Vrindavan Ghati, Kanak Vrindavan and Galta Valleys were also developed.

During seventeenth and eighteenth centuries, the period in which Kanak Vrindavan Ghati developed, this region was rich in flora and fauna but later as described, the ecosystem and the historical buildings deteriorated due to the factors already explained. While restoring the buildings of this region, it was felt essential to develop the Kanak

Vrindavan Valley. The fundamental principles of eco- development have been followed in the selection of plants and the development of ecological environment. The work on the project was started in the year 1984 and now in the year 1997, the achievements are visible.

The Kanak Vrindavan Ghati was a deserted area with few unauthorised encroachments. The buildings were in ruineous condition and although these were religious places but had no public participation and Kanak Bagh was not existing. The Kanak Vrindavan Valley was without the vegetation.Now, after the restoration, the region has become popular place, thousands of tourists and visitors visit the place every day. The religious rituals in Natwarji and Govind Deoji temple have become regular, Kanak Bagh and Kanak Vrindavan Valley provides relief to the people from hot and dry climate of this region. The project has inspired the Government of Rajasthan and the other bodies for under- taking such projects and it is hoped that in near future the historic buildings of Amber and Jaipur will regain their ancient glory.

This type of development will help the new generation to know about the history and the past glory of Amber and Jaipur.

9.8 CONCLUSIONS

1. Like other princely states, Amber and Jaipur are rich in cultural heritage.

2. During the last 1000 years, rulers of Amber and Jaipur have enriched this area by building large number of historical buildings, temples and gardens. This also includes the buildings and gardens of Kanak Vrindavan Ghati, restored in this study.

3. Maharaja Sawai Jai Singh II, developed a new capital Jaipur during AD1727-1734 and shifted to the new City Palace with the Govind Deoji temple and garden.

4. The interest of Maharaja was declined in the Kanak Vrindavan Ghati and this area got neglected.

5. Due to the neglect, poor maintenance and human and other factors, buildings and condition of the garden deteriorated during the last two centuries.

6. State Government and other agencies, due to unknown factors did not do much for the restoration work.

7. Hindustan Charitable Trust took interest in the development of the historical buildings of Amber and Jaipur and entrusted the work to the author of this thesis.

8. The detailed study of the following aspects was undertaken in this study:

   (i) Development of the area and buildings.
   (ii) Documentation of the condition of the buildings.
   (iii) Analysis of the causes of decay, structural composition of the buildings and the chemical analysis of the materials.

9. Restoration of the various buildings, Kanak Valley, Kanak Bagh and Galtaji has been done by using traditional materials, craftsmen and required techniques.

10. The restoration has brought new glory to this area and the place has become popular with the public/tourists.

11. The success of this project has increased the aspirations of the Government and other agencies for the development of the historically important areas in the State of Rajasthan.

9.9 RECOMMENDATIONS

The recommendations have been classified in two categories. The first category of recommendations relates to the maintenance of the restored buildings and sites and the second category refers to the future development of this area.

I. Recommendations for the Maintenance

For undertaking the regular maintenance it is essential to have a detailed plan and proper budget. After fulfilling these requirements the sites/area can be maintained in healthy condition by following these steps:

1. The buildings, garden and Kanak Valley area should be properly used.

2. There should be strict control over the vandalism, which includes the defacement and the destruction of the property.

3. The maintenance should be done by the use of scientific methodology.

4. There should be proper supervision of maintenance work, which can be done by the following procedure:

    i) The staff for the maintenance work should be properly selected and should be given the required training

    ii) The maintenance should be done by proper tools/ gadgets.

    iii) Regular log book should be maintained for routine and periodic maintenance.

5. The various factors for the decay and deterioration should be strictly controlled.

6. The damaged and worn-out components of the structures should be immediately repaired or replaced by following laid down techniques.

7. Due to the movement of large number of visitors the buildings and surroundings will require regular cleaning and checks on the behaviour of the visitors.

8. The plantation in the Kanak Valley, Kanak Bagh and the surroundings of the buildings should be done as per the identified guidelines.

II. Recommendations for Further Development

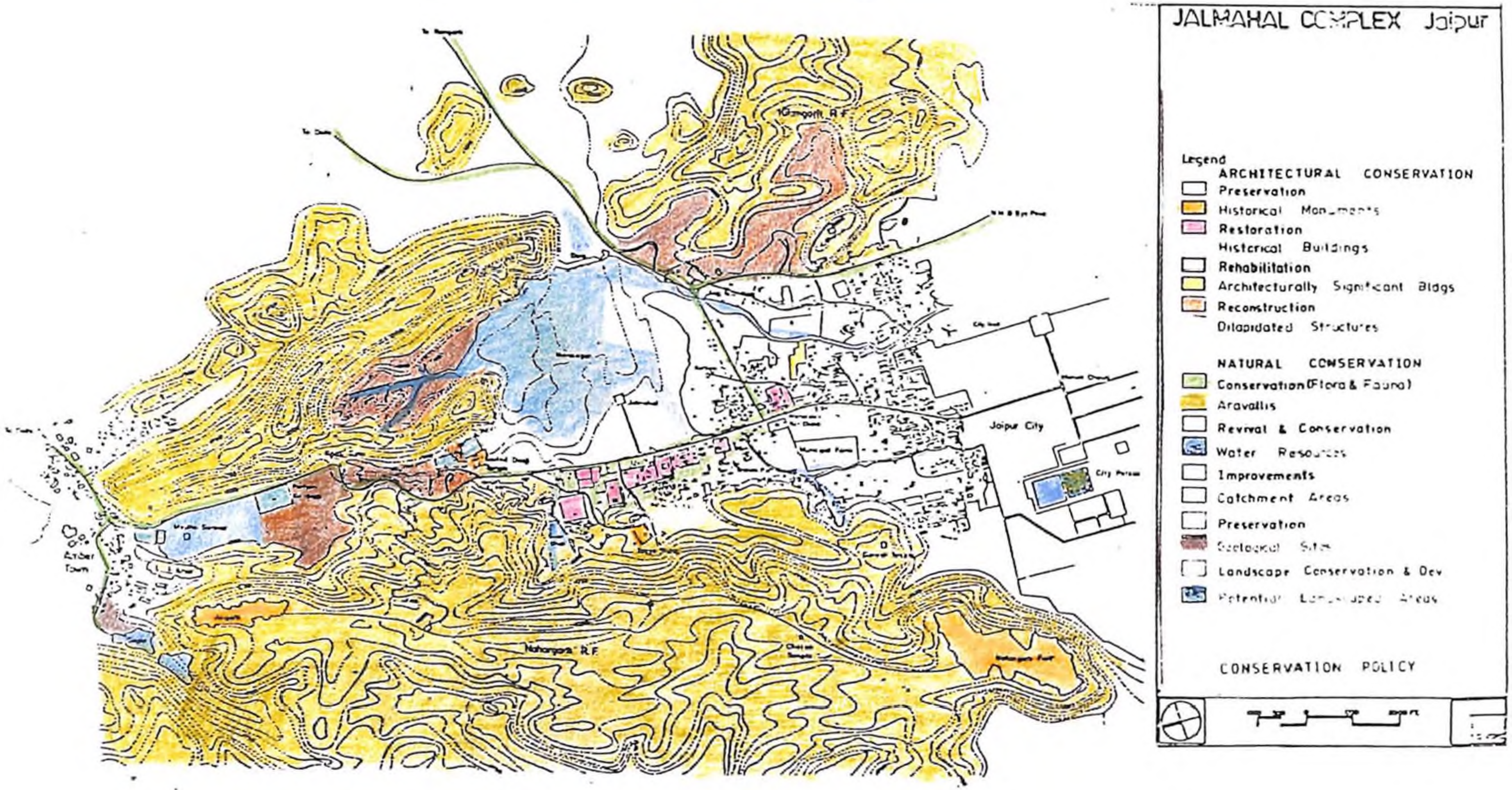
As mentioned in the conclusions the present project has raised the consciousness of the public and a new movement for the preservation and restoration of the historic buildings and for the cultural revival has developed.

The following recommendations have therefore, been made to achieve the success in the restoration and developmental projects.

1. The Master Plan for the conservation of the entire Kanak Vrindavan Ghati should be implemented in phases.

2. Mansagar lake has great potential for beautification as well as water management. The pollution of the lake should be checked by proper planning and use of required techniques.

3. Jal Mahal and new projects like the development of Reserve Forest, Environmental Park etc. can improve the surroundings as well as enrich this area for cultural development and therefore, should be given priority.


JALMAHAL COMPLEX Jaipur
Legend
ARCHITECTURAL CONSERVATION
Preservation
Historical Monuments
Restoration
Historical Buildings
Rehabilitation
Architecturally Significant Bldgs
Reconstruction
Dilapidated Structures
NATURAL CONSERVATION
Conservation (Flora & Fauna)
Aravallis
Revival & Conservation
Water Resources
Improvements
Catchment Areas
Preservation
Ecological Sites
Landscape Conservation & Dev
Potential Landscaped Areas
CONSERVATION POLICY
Jaipur City
Amber Town
City Palace

4. Jal Mahal complex can be developed into a beautiful museum for historical evolution of this region.

5. The encroachment and unplanned development of this area should be immediately checked.

6. The slaughter house, stone cresher and textile factories should be shifted to new sites away from this locality.

7. The growth of the commercial establishments near the historical sites should be avoided.

8. The heavy traffic on the roads of this area is creating conditions for faster deterioration of the old historical buildings and therefore, the vehicular traffic should be diverted by making new bypasses and highways.

CHAPTER 10

GLOSSARY

10.1 GLOSSARY OF ARCHITECTURAL TERMS

Amalaka - Circular ridded motif [derived from a gourd] at the summit of a temple tower or at the ends of the 'storeys' of a tower.

Bangla - hut with a curved thatch roof in Bengal; imitated in brick temples.

Basement - Lower part of walls, usually adorned with decorated mouldings.

Bhumi - 'earth'; refers to a horizontal moulding of a shikhara.

Blind arch, blind door way, blind window - Ornamental arch, doorway or window forming part of a wall or tower.

Bracket - transitional element between a column and beam; initiated in pilasters.

Buttress - wall support.

Capital - Upper part of a column or pilaster shaft.

Chatri - usually takes the form of an open pavillion with dome.

Circumambulation - clockwise movements around a stupa or temple sanctuary constituting an act of worship; in architecture this movement requires a paved pathway or enclosed passage way.

Corbelled, Corbel - Projecting horizontal block or stone course that supports vertical structure or covers an opening.

Cornice - horizontal band at the top of a wall.

Cupola - small dome.

Curvilinear - curved profile, generally of tower.

Darwaza - gateway.

Dharmashala - rest house for vistin pilgrims.

Dome like - hemispherical forms in temple architecture generally created by corbelled stone courses.

Eave - overhang that shelters a port or verendah.

Finial - emblem at the summit of a stupa, tower or dome, also at the end of a parapet; generally takes the form of a tier of umbrella like motifs or a pot.

Foliate, foliation - ornamental design derived from foliage.

Frieze - horizontal band of figures or decorative designs.

Garbh-griha - womb - Chamber; name of a temple sanctuary. (see sanctuary)

Ghat - sacred bathing place, often demarcated by steps, platforms and small shrines.

Intonaco - Plaster or stucco background for mural painting.

Izzra - Literally something exposed; dado.

Kalasha - pot-like finial.

Keystone - central wedge-shaped block in a masonry arch.

Khamba - column.

Kund - water tank or pool.

Lath - column.

Lathe-turned - column with circular shaft decorated with incisionns indicating that the column was placed on a lathe and then carved.

Lintel - horizontal beam over doorway, often adorned with a miniture image of the deity worshipped inn the sanctuary.

Mandala - geometric diagram symbolizing the structure of the cosmos, often used to regulate temple plans.

Mandapa - columned hall preceding the sanctuary in a Jain or Hindu temple; sometimes also an independent structure; used for congregational worship and performances of music and dance.

Mandir - temple.

Merlon - parapet element shaped like a battlement, usually with a pointed top.

Meshed motif - continuous design of archlike motifs.

Multi lobed - multiple concave profite of an arch or circle.

Niche - Wall recess containing a sculpted image or emblem, mostly framed by a pair of pilasters.

Parapet - wall extending above the roof; often elaborately treated with ornamental roof forms.

Pendant - hanging, generfally refers to a motif depicted upside down.

Pier - a short wall or masonry mass sculpted into different elements.

Pilaster - ornamental small column, computer with capital and bracket, usually forming part of the wall construction.

Pinacle - protruding roof element.

Pol - gateway.

Porch - covered entrance to a shrine or hall, generally open with columns.

Pot and foliage motif - decorative motif at the base of columns and pilasters.

Ratha - temple chariot; sometimes also refers to a temple model.

Sanctuary - chamber housing the principal votive image or emblem of the temple deity.

Scroll work - stylized design derived from foliage.

Stambha - free-standing column, often lamps or banners.

Stucco - plaster.

Superstructure - tower rising over a sanary or gateway, roof above a hall.

Talar, tank - reservoir bounded by a dam wall temple architecture a masonry-lined by of water, often with stepped sides.

Terracotta - burnt clay.

Trilobed - with three concave profiles tub, fortified enclosure containing shrinnes.

Voussoir - wedge-shaped block in masonary arch.

Varana; door panel

10.2 GLOSSARY OF TRADITIONAL TERMS

Aaraish : Smooth fine glossy lime finish.

Ala-Gila : Fresco-buono process for mural paintings. Rajasthan Bhitti-chitra; Ghotai Chitra.

Arqal : Luti : Mother of pearl used in mosaic.

Bagh : Garden

Bandh : Dam

Bangaldhar : Hut with a curved thatch roof in Bengal; imitated in lime and stone.

Bangri : Lobe(s) in an arch; curves of arch built by small curves; cuspid arch.

Baradari : Open pavillion supported on columns and arches.

Batkara : Wooden Mallet for planing plastered surface.

Batkari : Small Batkara

Bent : long slender bamboo sticks for beating 'Dar' flooring.

Beldar : Male labour.

Bawri : Step well

Brahma : the creator of universe.

Bhitichitra : Forescoes on wet lime plaster.

Burj : Watch tower usually located on corners of a building.

Chach : Butter Milk

Chajja : overhang that shelters against rain and water some times supported by brackets (todas).

Chatri: usually takes the form of an pavilion built over square, octagonal hexagon or circular plan with dome over it.

Chimti : Foreceps for holding small pieces of cut mirrors.

Chowk : Courtyard

Coolie : Female labour.

Dahi : Curd

Dakmeena : Ornamentation work using coloured glasses embedded in lime concave thin silver/aluminium foil pasted over plain glass to desired designs.

Dar : Special type of lime mortar used for flooring. Impost, upper most stones or courses of a pier, wall or abutment or stones.

Dasa : Stone slab used for distribution of load.

Durmat : Stone piece used for ramming of the uneven surface. **Engrailed Arch** : an arch with multifoils.

Facade : the face, the wall surface of a building. **Frieze** : The middle division of the entablature; the front portion above the arches but below the parapet. If there is a chajja, a frieze can be below and above the chajja, generally for calligraphic or other ornament.

Gardana : Moulding concealing the joint of wall and ceiling in tracery plaster.

Garba Griha : 'womb-chamber', the sanctrum, the most sacred part of temple.

Gajmitti : Fine clay with glue used in mirror work.

Gau Goli : colour pigment prepared from cow urine.

Ghati : Valley

Ghatti : Stone mixer used to ground lime and stone dust.

Gomukh : 'cow's face' source of periwal flow of water at Galtaji.

Geru : Red

Guggal :

Gur : Jaggery

Gurmala : Steel mallet for planning any surface.

Gurmali : Small Gurmala; see Gurmala

Hakik Ka Pathar : Agate

Hathni : a cascade of steps flanking both sides of a stairway.

Haveli : Traditionally designed houses in Rajasthan.

Hirmich : Red colour soil rich in red oxide.

Izzara : Skirting in Aaraish, Dados

Jalee : Filigree in lime or stone, perforated screen, lattice work, Balustades and tracery.

Jharokha : Kind of a projected balcony feature.

Jhava: A type of lime stone with coarse texture used for grinding of kara surface.

Jhikki : Fine marble power, a term popular in Udaipur region. Seive through 600 micron P.I.C. mesh.

Kabani : a curved curvilinear open pavilion.

Kajal: Lamp black, a nearly pure amorphous form of carbon made from the condensed smoke of a luminous flame.

Kalam : An instrument used for carving works.

Kali: Quick lime.

Kangoora : battlement or merlon or crenellation.

Kara: Plastering over lime concrete: Lime putty with marble powder preparation used for surfacing.

Karni : See Naila

Khamira : Mature slaked lime with adatives.

Kund: Tank

Ladav Ki Chat: Corbelled courser of subble work laid in concentric courser to form a flat arch using lime mortar.

Langot: a tool used for rounding edges of 'kara' or 'aaraish' surfaces.

Loi: a smooth lime plaster finish prepared by mixing slaked lime with surkhi or sand.

Mandala: (B,J,H) diagram reproducing the structure of the chiverse; orders deiteir into pantheons.

Mandir: Temple

Mahal: Palace

Mardana : Pertaining to men.

Mason:

Meena work: technique of filling mollen Belgium/coloured glasses in copper or silver depressions forming various designs.

Mehrab: The niche or recess indicating place where the idol is placed inside the sanctuary or in Majjid indicating direction of Mecca used in traditional work.

Methi: Fenugreek used as waterproofing compound.

Mirror work : Ornamentation carried out using convex mirrors as well as plain mirrors.

Mouldings: a projecting continuous element on a wall; a decorative band.

Naila: Tool used to throw plaster as to the wall surface and level the material with the flat metal base, also known as Karni.

Naili: Small tool for filling mortar in tiny grooves and odd corners.

Natwarji: Lord Shri Krishna.

Niche: a recess in a wall, an inset panel. **Nulling**: A form of carved enrichment on friezes.

Ornate: given to decoration, richly decorated, embellished without ornament.

Pacchikari: art of creating designs by fixing stained coloured glasses in lime plaster; originally from Udaipur region of Rajasthan.

Pada: (B,H); foot, mostly refers to a foot Print.

Padmaka: a type of lotus design pillar described by Samrangana Sutradhar.

Panni Work: thin foil used over glass in different colours and patterns.

Pol: Gate

Parkota: Boundary wall

Parikrama: see circumambulation

Pathshala: School; here it refers to Vedic pathshala.

Pinnacle: pointed termination, uppermost part of a spire sometimes ornate.

Ranga: metal used for making thin silver foil.

Rathkhana: place for keeping a chariot.

Ramraj: Yellow ochre latrite soil from Jaipur.

San Fibre: Jute used as reinforcement in 'Dar' flooring and in lime mortar.

Sares: home-made glue.

Saresi: base coat of lime plaster used over a surface.

Silbatta: traditional stone slab on which materials are grounded (Sil) with a round hard stone (Batta).

Shaft: the main part of a column below which is the base above which is the capital, middle element of pillar.

Shikhara: Sanskrit word for a fower, a spire.

Sindur: Red colour for religious use.

Surkhi: Burnt brick bats used in lime mortar.

Talab: Small rain water pond.

Tagar: Talar; Tank

Thapies: Wooden planner used for compaction of Dar flooring.

Tibara: Real portion of a temple comprising of molti functional roomer all round forming a courtyard in between Garba Griha's west face and the rooms.

Tora: Bracket

Tumman: Strengtheningg coat over saresi where packing is done by small aggregate or brick bats in lime mortar.

Vaastu Porusha Mandala: the mystic diagram of the architecture of man.

Vaastu Shastra: (H) treatise on architecture, including temple buidling.

Vedi: platform for performing rituals, scacrificial fiver.

Vrindavan: Abode of Lord Shri Krishna.

Yagya: (H), sacrificial fire ceremony.

Zenana: Pertaining to women.

CHAPTER 11

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APPENDIX-I

HISTORICAL PERSPECTIVE
GALTA GHATI

The published historical account of the Galta Ghati is reproduced here for the references incorporated in the Chapter 2 of Historical Study of this thesis.

The following are the titles of each write up:

1. सरस श्रंगार उपासी मधुराचार्य
2. मधुरोपासक संत अग्रदास और नाभाजी
3. गलता पुरातन तीर्थ मीणा-काल में
4. गालव मंदिर और यज्ञ वेदी कुण्ड
5. गलता की धाटी और सूर्य मन्दिर
6. सात कुण्ड, सात मन्दिर, सात हनुमान
7. गालव गीतम में वर्णित गलता
8. सोलहवें और वर्तमान महन्त
9. गलता जो अब नामशेष है
10. चित्रकूट भी, वृन्दावन भी
11. जयपुर बसने से पहले गलता

धाम।।

'सरस श्रृंगार उपासी' मधुराचार्य

अनन्ताचार्य तथा अग्रदास की शिष्य परम्परा में गलता में मधुराचार्य परम प्रभावशाली हुए। इनका पूर्व नाम रामप्रपन्न था और यह कील्ह स्वामी के शिष्य छोटे कृष्णदास, कृष्णदास के विष्णुदास, विष्णुदास के नारायण मुनि और नारायण मुनि के हृदय देव के शिष्य थे। रामानन्दीय रसिक परंपरा में मधुराचार्य का वही स्थान है जो गौड़ीय वैष्णवों में जीव गोस्वामी का है। जीव गोस्वामी ने भक्ति, प्रीति आदि षट् संदर्भात्मक विशाल भक्ति ग्रंथ का प्रणयन कर गौड़ीय सम्प्रदाय की साधना का दर्शन पक्ष पुष्ट किया था। इसी प्रकार मधुराचार्य ने राम की मधुरोपासना के पक्ष में छह संदर्भों का एक भारी भरकम ग्रंथ बनाया। इसके केवल दो संदर्भ- श्रीसुंदरमणि संदर्भ और श्री वैदिक मणि संदर्भ- प्रकाशित हुए हैं। 'श्रीरामतत्व प्रकाश' नाम से उनका एक और ग्रंथ भी प्रकाशित हो चुका है। इसमें राम की रसिकोपासना अथवा श्रृंगारिक भक्ति का मार्ग शास्त्रादि के पुष्ट प्रमाणों से सिद्ध किया गया है। राम के परत्व और सीता-राम की दिव्य नित्य लीलाओं का इसमें बड़ा मनोहारी वर्णन है और यह भी बताया गया है कि श्रीशुकदेव आदि ऋषि- मुनि भी रामोपासक थे और राम के रसिक अथवा मधुर रूप की ही पूजा करते थे।

मधुराचार्य ने अनेक ग्रंथों का निर्माण किया, जिनमें 'भगवद्गुण- दर्पण' और 'माधुर्य केलिकाद- म्बिनी' श्रीसंप्रदाय मे विशेष सम्मान पाते हैं। ये आकर ग्रंथों की तरह पूजे जाते हैं और इस उपासना- पद्धति के औचित्य और प्रमाण में भी प्रस्तुत किये जाते हैं। जीव गोस्वामी ने अपने पक्ष के प्रतिपादन के लिए श्रीमद्भागवत् को आधार बनाया था। मधुराचार्य ने अपने संप्रदाय में स्थापित मतों के समर्थन में भी वाल्मीकीय रामायण को आधार बनाया है। भक्तों के भाव हैं, आधुनिक तर्क के आधार पर वे भले ही अटपटे लगें, किंतु मधुराचार्य ने जिस प्रकार अपने पक्ष का प्रतिपादन किया है, वह है बड़ा पाण्डित्य पूर्ण। मधुराचार्य के ग्रंथों से आगे चलकर 'रसिक' भक्तों को बड़ी प्रेरणा मिली और सीता-राम की नित्य लीलायें भी राधा-कृष्ण की लीलाओं से होड़ लगाने लगीं।

'श्रीसुंदरमणि संदर्भ' की भूमिका के अनुसार मधुराचार्य की गुरु परम्परा इस प्रकार मानी जाती है-

माधुर्य मूर्ति श्रीराम

आदिशक्ति श्रीजानकी जी

अनन्य सेवी हनुमानजी

ब्रह्माजी

वशिष्ठ जी

पराशरजी

व्यासजी

शुकदेवजी

पुरुषोत्तमाचार्य

।

गंगाधराचार्य

।

श्री रामेश्वराचार्य

।

द्वारानन्द

।

देवानन्द

।

श्यामानन्द

।

श्रुतानन्द

।

चिदानन्द

।

पूर्णानन्द

।

श्रियानन्द

।

हर्यानन्द

।

स्वामीरामानन्दजी

↓

अनन्तानन्द

↓

कृष्णदास पयहारी

कील्हस्वामी	अग्रस्वामी
।	↓
छोटे कृष्णदास	नाभादास
।	
विष्णुदास	प्रियादास
।	
नारायण	
हृदय देव स्वामी	
मधुराचार्य	

इस सम्प्रदाय के एक अन्य ग्रंथ —'रसिक प्रकाश भक्तमाल' (युगल प्रिया रचित) -में मधुराचार्य के संबंध में यह छप्पय दिया गया है -

मधुराचारज मधुर
परम श्रृंगार उपासी।
रंगमहल रसकेलि कुंज
मानसी खवासी।।
निमिकुल जन्य उदार
सुखद संबंध प्रतापी।
पहारी रसि केन्द्र
रूपमाधुर्य अयापी।।
द्वादस वार्षिक रास रस
लीला करि बहु सुख दिये।
विपुल ग्रंथ रच रसिकता
राम रास पद्धति किये।।

जैसा इस छप्पय में संकेत है, मधुराचार्य ने बारह वर्षों तक श्रीराम— रासोत्सव का संकल्प लिया था और इसमें स्वयं ने 'दिव्यअली' के रूप में श्रीललीलालजू का लाड़ लड़ाया। ऐतिहासिक काल— क्रम से देखें तो मधुराचार्य ने स्वामी अग्रदास के उस कार्य को आगे बढ़ाया जो अग्रस्वामी रचित एक कुण्डलिया में निर्दिष्ट है-

रस श्रृंगार अनूप है
तुलवे को कोउ नाहिं।
तुलवे को कोउ नाहिं
सोई अधिकारी जग में।।
कंचन कामिनि देखि
हलाहल जानत तन में।
जावत जग के भोग रोग
सम त्यागेउ द्वन्दा।
पिय प्यारी रस सिंधु
मगन नित रहत अमंदा।।
नहिं अग्र सम संत के
सरलायक जग मांहि।
रस श्रृंगार अनूप है
तुलवे को कोउ नाहिं।।

यह कुण्डलिया रसिकोपासकों का कण्ठहार है। इसमें श्रृंगार रस की महिमा और मर्यादा का वर्णन है। मधुराचार्य ने अपनी प्रतिभा, अनुभव और विद्वत्ता से इसमें बड़े, स्वस्थ और संपन्न साहित्य की सृष्टि की और विक्रम की सोलहवीं सदी के उत्तरार्द्ध में रामोपासना में मधुर भाव की विवृत्ति साफ— साफ सामने आ गई। 'श्रीसंप्रदाय' ने श्रीलक्ष्मी को आचार्य, हनुमानजी को देवता, विश्वामित्र को ऋषि, रामेश्वरम् को धाम, अयोध्या को धर्मशाला, चित्रकूट को सुख विलास, रामनन्दी संप्रदाय के अनुयायियों को वैष्णव, सीता या जानकी को इष्ट, श्रृंगार को प्रधान रस और उर्ध्वपुण्ड्र तिलक को स्वीकार कर इस रससिक्त भक्ति का मण्डान बांधा जिससे कृष्ण की तरह राम की रागात्मक उपासना का मार्ग प्रशस्त हुआ।

मधुरोपासक संत: अग्रदास और नाभाजी

गलता में अग्रदास और उनके शिष्यों तथा उत्तराधिकारियों ने रामोपासना की जो मधुर धारा प्रवाहित की, वह हमारे समाज और संस्कृति को इस आध्यात्मिक पीठ की सबसे बड़ी देन है। रामोपासक रसिक सम्प्रदाय में यह मान्यता रही है कि स्वामी रामानन्द राम के मधुर भाव की साधना ही प्रिय थी। इस सम्प्रदाय में हनुमानजी का मधुर-भाव का नाम चारुशीलाजी है और इन्हीं से इस भक्ति-परम्परा का आरंभ माना जाता है। नाथपंथी कनफटे योगियों या सिद्धों से गलता को मुक्त कराने के बाद रामनन्दी वैष्णव संतों के तत्वावधान में मधुर भाव की उपासना दिनों-दिन बढ़ती ही गई। गलता गद्दी के शिष्यों और भक्तों का विश्वास है कि भक्त कवि नाभादास, उनके गुरु अग्रदास और अग्रदास के गुरु भाई कील्हदास या कील्ह स्वामी मधुर रस के ही रसिक थे। मधुर रस का रसिक भक्त अपने आप में श्रीरामचन्द्र की प्रिया या सखी अथवा जानकीजी की सखी या दासी की प्रतीति करता है। वह श्रीजानकीजी के सुख में सुख मानता है अथवा श्रीरामचन्द्र की प्रीति का पात्र बनकर अपना जीवन धन्य करता है। श्रृंगार रस पर आधारित मधुर-भक्ति मार्ग का अनुगामी 'कंदर्प कोटि किनीय किशोर मूर्ति' मनोहर और मधुरता में सराबोर भगवान श्रीराम की पति-रूप में उपासना और सेवा करता है।

अग्रदास को इसी मधुर-भाव का सिद्ध साधक माना जाता है। अग्रदास या अग्रस्वामी इस साधना के लिए 'अग्रअली' हो जाते हैं। 'भक्त माल' की 'भक्ति सुधा-स्वाद तिलक' नामक व्याख्या में रूपकलाजी (सीताराम शरण भगवान प्रसाद) ने अग्रदास को 'अग्रअली' के नाम से श्रृंगार रस का आचार्य ही सिद्ध किया है और कहा है कि उनके 'अष्टयाम', 'ध्यान मंजरी', 'कुण्डलियां' और 'पदावली' आदि ग्रन्थ उनके मधुर-भाव की ही अभिव्यक्ति हैं। श्रृंगारिक एवं मधुर भाव की इस उपासना-पद्धति के लिए 'हनुमत्संहिता' में भी कहा गया है-

मधुरं मनोहर राम
पति सम्बन्ध पूर्वकम्।
ज्ञात्वा सदैव भजनेत्सा
श्रृंगार-रसाश्रभा।।

इस सम्प्रदाय में यह भी मान्यता है कि श्रीजानकीजी ने अग्रस्वामी की आराधना-उपासना से प्रसन्न होकर उन्हें दर्शन दिया था और अग्रस्वामी ने स्वेच्छा से शरीर त्याग कर साकेत-धाम में प्रवेश किया था। इस प्रकार स्वामी अनन्तानन्द की सम्पूर्ण शिष्य परम्परा को मधुरोपासकों की परम्परा माना गया है। इस परम्परा में स्वामी हर्याचार्य और

मधुराचार्य जैसे संत आचार्य हुए और उन्होंने इस प्रेम-पंथ को आगे बढ़ाया। 'रसिक भक्तमाल' में युगलप्रिया ने कहा है।

चरण कमल बन्दौं कृपाल
हरियानन्द स्वामी।
सर्वसु सीताराम विहांस
दशधा अनुगामी।।
बालमीक वर शुद्ध
सत्व माधुर्य रसालय।
दरसी रहसि 'अनादि'
पूर्व रसिकन की चालय।।

'दशधा अनुगामी' से मधुरोपासक ही अभिप्रेत है। इन अग्रदास के शिष्यों में नाभादास बड़े भक्त और साधुसेवी विख्यात हैं। यह 1600 ई. के आसपास विद्यमान थे, यद्यपि ये बड़े घूमने वाले संत थे, फिर भी इन्होंने बहुत काल तक गलता में ही निवास किया और गोस्वामी तुलसीदास की मृत्यु के बाद तक जीवित रहे।

नाभादास की 'भक्तमाल' को एक चमत्कारिक ग्रन्थ कहा जा सकता है। यह बहुचर्चित और प्रशंसित ग्रन्थ संवत्1642 (1585ई.) के पीछे बना, ऐसा आचार्य रामचन्द्र शुक्ल मानते हैं। 1712 ई.में प्रियादास ने इसकी सर्वप्रथम टीका लिखी। ग्रन्थ में 200 भक्तों के चरित्र 316 छप्पयों में उजागर किये गये हैं। छप्पयों में पूरा जीवन चरित्र तो आ नहीं सकता था, किंतु भक्तों के चरित्र की मुख्य विशेषताओं और भक्ति की महिमा सिद्ध करने वाली बातों को इनमें स्थान दिया गया है। नाभादास के इस भक्त-परिचय-ग्रन्थ का बड़ा व्यापक प्रचार हुआ और भक्तों के प्रति जनता की श्रद्धा और पूज्य-बुद्धि जागी। आचार्य रामचन्द्र शुक्ल का यह कथन सर्वथा युक्तियुक्त है कि आज भी उत्तरी भारत के गांव गांव में साधु वेशधारियों को शास्त्रज्ञ विद्वानों और पण्डितों से कहीं बढ़कर जो मान-सम्मान प्राप्त होता है, वह बहुत कुछ भक्तों की करामातों और चमत्कारपूर्ण वृत्तान्तों के सम्यक् प्रचार के कारण ही होता है।

नाभादास, जिन्हें नाभाजी भी कहा जाता है, 'रामचरित मानस' के प्रणेता गोस्वामी तुलसीदास के समसामयिक थे और 'भक्तमाल' में उन्होंने तुलसी की यह प्रसिद्ध प्रशस्ति की है:

त्रेता काव्य- निबंध करी
सतकोटि रमायन।
इक अच्छर उच्चरे
ब्रह्म हत्यादि-परायन।।
अब भक्तन सुखदैन
बहुरि लीला बिस्तारी।
रामचरन रसमत रहत
अहर्निस व्रतधारी।।
संसार अपार के पार को
सुगम रूप नौका लियो।
कलि कुटिल जीव निस्तार-
हित बालमीकि तुलसी भयो।।

नाभादास का पूर्ण नाम नारायणदास था। इन्हें कुछ लोग डोम बताते हैं तो कुछ क्षत्रिय मानते हैं। 'जात-पात पूछे नहिं कोई, हरि को भजै सो हरि को होई' के अनुसार नाभादास के लिए यह सब जानना आवश्यक भी नहीं। यही पर्याप्त है कि वे अग्रस्वामी के प्रमुख शिष्यों में से थे और 'भक्तमाल' के रूप में उन्होंने भक्तों और साधु-संतों की जिस विरुदावली की रचना की, वह वस्तुतः भक्तों की 'एनसाइक्लोपीडिया' है। इस ऐतिहासिक रचना के पीछे भावना यह है कि 'राम ते अधिक राम कर दासा।' इस ग्रन्थ पर प्रियादास की टीका के बाद अनेक साधु-संतों ने अपनी-अपनी टीकायें लिखीं। यह इस ग्रन्थ की लोकप्रियता का एक पुष्ट प्रमाण है। नाभादास के शिष्य गोविन्ददास ने सर्वप्रथम अध्ययन कर इस ग्रन्थ का प्रचार किया था।

नाभादास ने अपने गुरु के समान राम-भक्ति से सराबोर काव्य-रचना की है। ब्रजभाषा पर नाभाजी का अधिकार था और वे पद्य रचना में सिद्धहस्त थे। 'भक्तमाल' के अतिरिक्त इन्होंने दो 'अष्टयाम' रचे और एक पद संग्रह भी बनाया। कुछ दिन हुए, निम्बार्क पीठ के मुखपत्र 'श्रीसर्वेश्वर' का एक विशेषांक 'भक्तमालांक' के रूप में ही प्रकाशित किया गया था।

गलता : पुरातन तीर्थ मीणा–काल में

गलता के महन्तों की परंपरा और राम–भक्ति की मधुरोपासना के क्षेत्र में यहां के संतों की आध्यात्मिक और साहित्यिक देन के इस संक्षिप्त विवेचन के बाद गलता के इतिहास पर दृष्टिपात करना भी समीचीन होगा। श्री संप्रदाय की गादी स्थापित होने से पहले गलता नाथ संप्रदाय की गादी थी और गालव ऋषि से संबद्ध अनुश्रुति नैसर्गिक सुषमा से संपन्न इस तीर्थस्थल को उससे भी कहीं प्राचीन सिद्ध करती है। 'गलता' किसी दलदली स्थान को कहा जाता है और 'गलिता' एक संकुचित पर्वतीय उपत्यका को। अनेक लोगों का मानना है कि 'गलता' इन्हीं में से किसी नाम का अपभ्रंश है। फिर गालव ऋषि की अनुश्रुति है ही। कहते हैं इस ऋषि ने सतयुग में यहां तपस्या की थी और एक यज्ञ भी किया था जिसका स्मारक 'यज्ञ– वेदी कुण्ड' और पास ही बना गालव ऋषि का मंदिर है। 'गालवाश्रम' नाम गालव ऋषि के पीछे ही पड़ा।

जो हो, गलता 250 वर्ष पुराने जयपुर शहर से बहुत पुराना है। गलता के दक्षिण–पूर्व में पुराने घाट के बालाजी के मंदिर के ऊपर हाल के वर्षों में गुर्जर– प्रतिहार काल के अवशेष पहचाने गये हैं। ये पुरातत्त्वावशेष भी यही सिद्ध करते हैं कि गालवाश्रम अति प्राचीन स्थान रहा होगा।

'मीणा इतिहास' के लेखक रावत सारस्वत ढूंढाड़ प्रदेश में कछवाहा राजपूतों के अभ्युदय के पूर्व छोटे– छोटे मीणा राज्यों की स्थिति बताते हुए कहते हैं कि "आमागढ़ का किला निश्चय ही मीणों का रहा है.... यह किला निवास के लिए न होकर सैनिक दृष्टि से उपयोग के लिए बनाया गया मालूम होता है। किले के अंदर केवल एक जलाशय और दो– तीन पक्के मकान हैं, पर सुरक्षात्मक परकोटे एक पर एक करके तीन बने हुए हैं। अतः मीणों के संघ द्वारा सम्मिलित रूप से इसका उपयोग करने की बात ठीक लगती है। पुराने घाट के नाके पर सामरिक महत्त्व की दृष्टि से

भी यह किला बड़ा उपादेय रहा होगा।

अपने इस खोजपूर्ण ग्रंथ के परिशिष्ट में रावत सारस्वत ने मीणा जाति के जागाओं की बहियों से संकलित कुछ प्रमुख मीणा वंश वृक्ष भी दिये हैं। इनमें नाढला वंश की परम्परा इस प्रकार बताई गई है-

भीम ऋषि- गालव ऋषि- गवाना ऋषि- सोमा ऋषि- माहा ऋषि- वाना ऋषि- टीला ऋषि- मरना ऋषि- नावा ऋषि- मनोप ऋषि- सुन्दर ऋषि- नाढो ऋषि- कालोराव। इस कालोराव में दो शाखायें चलती हैं। पहली- कालोराव- जेटराव (जेटवाड़ा बसाया)- विट्ठल राव- अगनराव- इंदोराव- बालकरण राव- वीसलराव- वछराव- रावगेट और राव तातनसी। दूसरी शाखा: कालोराव- सीगोराव- कीरतसी- जैतसी- महरसी- सांवत सी। सांवतसी के बड़े पुत्र सीगा ने पालेड़ा और कनिष्ठ पुत्र मादल ने रतनपुर को अपना केंद्र बनाया। पहली शाखा के राव तातनसी से भी दो शाखायें चलीं। पहली शाखा में तातनसी के बेटे राव शलणसी ने गेटोराघाटी (जो नाहरगढ़ की पहाड़ी के बीच में प्रारंभ होकर ब्रह्मपुरी, काला हनुमान, यज्ञस्थल, जलमहल आदि स्थानों को समेटे हुई थी) पर अपना आधिपत्य जमाया। दूसरी शाखा में तातनसी के लाखणसी हुआ और उसके बेटे जैतलसी ने समेल बसाई। जैतलसी के भाई करणसी ने जामड़ोली (पुराना घाट के आगे) आबाद की। करणसी के छोटा भाई बीजो था और बृजो के तेजपाल हुआ। फिर रतनसी हुआ जो पालेड़ा का शासक था। रतनसी के गेगा ने लालगढ़ और भोगा ने बस्सी को भोगा। रतनसी के चार अन्य भाई थे- सोला, मीहला, (जो रतनसी और सोला के साथ बृज में बसा), बीखा काणोता रहा और नोप।

नाढला मीणों के इस वंश वृक्ष की पाद-टिप्पणी में रावतजी लिखते हैं कि इस वंश की उत्पत्ति ब्राह्मण वंश से हुई है। इनका मूल स्थान गुर्जर देश में पाटणपुर था। नाढो ऋषि ने गलता में तपस्या की थी। उस समय खोह गंग का मीणा राव चांदा स्नान करने आया था। उसने ऋषि से संतान- प्राप्ति का वर मांगा। ऋषि ने यह वचन लेकर वरदान दिया कि पहली संतान ऋषि के भेंट चढ़ानी होगी। राव चांदा के इला नामक लड़की और मूपेण नामक पुत्र हुआ। इला को वचन के अनुसार ऋषि के भेंट चढ़ाया। ऋषि ने समय पाकर लड़की से विवाह किया। इसी के गर्भ से हुई संतान नाढला मीणा कहलाये। इन्होंने संवत 235 में जामड़ोली, गेटोर घाटी और जेटवाड़ा में राज्य स्थापित किया। संवत 1011 में दूल्हेराय के समय में नाढलों का राज्य गया। गेटोर में राव गालणसी तथा जेटवाड़े में जेटराव बड़े दानी हुए। जेटवाड़े से तात्पर्य है मोटवाड़ा।

जयपुर अंचल में कछवाहा राजपूतों ने मीणों से ही अपना राज्य हथियाया था, यह एक निर्विवाद ऐतिहासिक तथ्य है। इसके प्रकाश में नाढला वंशावली में गलता का यह उल्लेख कपोलकल्पित कहकर नकारा नहीं जा सकता। अति प्राचीन काल से यह पर्वतीय उपत्यका एक तीर्थ के रूप में ही मानी जाती थी और इस भू- भाग पर शासन करने वाले मीणा राजा या सरदार भी इसकी पवित्रता से अपने को पवित्र करते होंगे। वंशावली में गालव ऋषि का भी उल्लेख आया है और नाढो ऋषि को उन्हीं की परंपरा में माना गया है। मीणा लोग मूलतः शैव तथा शाक्त हैं। आमागढ़ में, जो मूलतः मीणादुर्ग माना जाता है, अम्बा माता का मंदिर है। गलता में जहां गालव ऋषि ने गुप्त गंगा प्रकट की थी, शिव मंदिर हाल की बाढ़ की विनाश लीला के बाद भी बचा हुआ है। हम नहीं कह सकते कि मीणों के प्रभुत्व के जमाने से ही यह शिव मंदिर चला आता है या नहीं, किंतु शिव- आराधक मीणों के लिए 'महादेव' शंकर की सौगन्ध सबसे बड़ी शपथ है। कुल मिलाकर यह माना जा सकता है कि गलता एक हजार वर्ष पूर्व मीणों के काल में भी एक जाना- माना तीर्थ था जिसके पवित्र सरोवर में स्नान करना एक पुण्य कार्य था। हां, आमागढ़ की तरह गलता की पहाड़ियों में भी एक पुराना किला है जिसे आमागढ़ और हथरोई के गढ़ों के समान मूलतः मीणों का ही एक किला माना जाता है। [illegible]

[illegible] यह [illegible] सा दुर्ग सूर्य कुण्ड से बांयी ओर की ऊंची पहाड़ी की चोटी पर बना हुआ है। इसकी ऊंचाई गलता की सर्वोच्च ऊंचाई है। जब चारों ओर बादल छाये हों और काली घटायें उमड़- घुमड़ रही हों तो दूर- पास बरसने वाले मेह का दृश्यावलोकन यहां से बड़ा मनोहर लगता है। इस दुर्ग का वर्तमान नाम 'रघुनाथगढ़' यहां श्री संप्रदाय का वर्चस्व हो जाने के बाद ही प्रचलित हुआ प्रतीत होता है। इसके सामने कुछ नीचाई पर कृष्णदास पयहारी की गुफा है और वहीं उनकी धूणी। गलता के पूज्य ठाकुरजी जब सीतारामजी हो गये तो मीणों की इस पुरानी गढ़ी को भी रघुनाथगढ़ का नाम दे दिया गया।

गालव मंदिर और यज्ञ-वेदी कुण्ड

गलता का प्रारम्भिक इतिहास यों जनश्रुतियों, किंवदन्तियों और मीणा जाति के जागाओं (भाटों) की बहियों में उपलब्ध है। वैसे इस तीर्थ का क्रमबद्ध इतिहास आमेर के राजा पृथ्वीराज के समय (1502 - 1527ई.) से ही जाना जाता है। इसी समय से आमेर -जयपुर का इतिहास भी निश्चित रूप से उपलब्ध होता है क्योंकि पृथ्वीराज पहले मुगल बादशाह बाबर का समकालीन था। बाबर के सिन्धु नदी पार कर लेने के तीन वर्ष बाद तक पृथ्वीराज आमेर का शासन कर रहा था। यह पृथ्वीराज मेवाड़ के महाराणा सांगा के नेतृत्व में आक्रामक बाबर के विरुद्ध संगठित राजपूत सैनिक संघ में भी सम्मिलित हुआ था और 1527 ई. में खनवा के उस युगान्तरकारी युद्ध में लड़ा था जिसमें बाबर ने पहली बार राजपूतों के तीरों की बौछार का जवाब बारूद से तोपे दागकर दिया था। महाराणा सांगा के साथ पृथ्वीराज लड़ाई में घायल होकर लौटा था और 1527 का वर्ष समाप्त होते होते वह खनवा युद्ध में अपने शरीर पर हुए घावों के ठीक न होने के कारण ही मर गया था।

आमेर का यह राजा योद्धा होने के साथ साथ बड़ा भक्त भी था। गलता की गादी पर तब नाथपंथी योगियों का अधिकार था और चतुरनाथ (मैंने यही नाम स्वीकार किया है, क्योंकि जयपुर के इतिहास मर्मज्ञ स्वर्गीय पुरोहित हरिनारायण शर्मा बी. ए. विद्याभूषण ने यही नाम दिया है, जबकि अन्य लोग तारानाथ नाम देते हैं) वहां का महन्त था। चतुरनाथ से कृष्णदास पयहारी की मुलाकात और उसे शेर से गधा बनाने तथा राजा पृथ्वीराज के अनुनय विनय पर उसे पुन: मनुष्य शरीर देने की चमत्कारिक कथा इस लेखमाला के आरंभ में ही दी जा चुकी है। जब पृथ्वीराज ने पयहारीजी का शिष्यत्व ग्रहण कर लिया तो चतुरनाथ ने भी पयहारीजी से पूछा कि मेरे लिए क्या आज्ञा है? पयहारीजी ने उससे अपेक्षा की कि वह और उसके शिष्य प्रशिष्य उनकी धूणी में काष्ठ डालते रहें। पयहारीजी की गुफा में धूणी अद्यावधि चालू रखी गई है और इसमें नाथ पंथ के योगी काष्ठ भी डालते रहे हैं।

राजा पृथ्वीराज की रानी बालांबाई, जो बीकानेर के राजभूषण करण की पुत्री थी, परम धार्मिक और भक्तिमती थी। पयहारीजी ने बालांबाई को ही शालिग्राम रूप में नृसिंह और सीतारामजी की मूर्तियां दी थी। नृसिंह की चमत्कारिक मूर्ति का उल्लेख भी हो चुका है। सीतारामजी की मूर्तियां जयपुर के नगर ""स्द के ''ारामद्वारे में आज तक नित्य सेवा श्रृंगार पाती हैं। आमेर के राजा जब भी युद्ध क्षेत्र में जाते थे तो सबसे आगे सीतारामजी का रथ चलता था और इससे वे युद्ध में अपनी विजय को सुनिश्चित मानते थे। गलता में श्रीसीतारामजी की सेवा भी तभी से चालू है। वहां के सीतारामजी के भोग राग के लिए राजा पृथ्वीराज और रानी बालांबाई ने ही पहली बार गांव निकाल कर पट्टे पयहारीजी को अर्पित किये थे और गलता को 'उत्तर तोताद्रि' की प्रतिष्ठा प्राप्त हो गई थी। जयपुर के प्राचीन पट्टों -परवानों में सबसे ऊपर 'श्रीसीतारामजी' या 'श्री सीतारामो जयति' का उल्लेख होना यहां के राजवंश का वैष्णव सम्प्रदाय में दीक्षित होना ही बताता है।

कहा जाता है कि पृथ्वीराज ने अपने जीवन के अन्तिम वर्षों में अपनी पत्नी बालांबाई से भी बहिन का रिश्ता बांध लिया था। इसके पीछे यह आख्यान कहा जाता है कि एक बार दोनों तीर्थ यात्रा पर गये थे। जब दर्शन खुले तो बालांबाई आगे खड़ी झांकी कर रही थी। पृथ्वीराज ने अपनी रानी को न पहचान कर कहा कि 'बाई थोड़ा हट जाओ तो मैं भी दर्शन करलूं'। यह 'बाई' का संबोधन होना था कि पति -पत्नी ने उसी दिन से अपना रहन -सहन का ढंग भाई बहिन की तरह कर लिया।

मेवाड़ के राजकुल में भक्तिमती मीरां को भी जो सम्मान नहीं दिया जाता, आमेर के राजकुल में वह बालांबाई को आज तक प्राप्त है। आमेर के पुराने राजमहल में, जो एक बड़ी सी हवेली से अधिक कुछ नहीं है, एक कमरा 'बालांबाई की साल' कहलाता है। जयपुर के राजाओं के विवाह के पूर्व 'विनायक -पूजा' इसी साल में करने की परम्परा चलती आई है और विवाहोपरान्त भी वर -वधु इस साल में आकर गणेशजी को नमन करते हैं। बालांबाई को पयहारी जी ने जो नृसिंह -मूर्ति दी थी, वह भी इस साल के पास ही एक कक्ष में विराजमान है और इनके कारण पूरे पुराने राजमहल को ही 'नृसिंहजी का मन्दिर' कहा जाता है।

पृथ्वीराज ने अपने बारह जीवित पुत्रों को अलग -अलग जागीरें देकर जयपुर की प्रसिद्ध बारह कोटड़ियां स्थापित की थी। ये बारह जागीरदार ही जयपुर के सर्वोच्च सामन्त माने जाते रहे हैं। पृथ्वीराज की मृत्यु के अनन्तर पूरण मल, भीम, रतनसिंह और आसकरण क्रमश: आमेर के राजा बने। इन चारों ही के

समय में आमेर की स्थिति अनिश्चित बनी रही और 1548 ई. में पचास वर्षीय भारमल (यह पृथ्वीराज का ही पुत्र था जो उसकी एक राठौड़ रानी से जन्मा था) के गद्दी पर बैठने के बाद ही आमेर के दिन फिरे। भारमल ही पहला राजा था जिसने अकबर को अपनी सैन्य -सेवा से संतुष्ट का मान -सम्मान पाया और आमेर को एक महत्वपूर्ण राज की हैसियत दिलायी। यों आमेर की हैसियत बढ़ने के साथ आमेर नगर और गलता में भी अनेक -निर्माण कार्य सम्पन्न हुए। आमेर के राजा और गलता के महन्त गलता की पर्वतीय उपत्यका को सुरुचिपूर्ण स्थापत्य और चित्र कला से सजा कर यहां के नैसर्गिक सौंदर्य को निखारते रहे।

भारमल के बाद भगवानदास और भगवानदास के बाद प्रसिद्ध राजा मानसिंह आमेर के शासक बने। इन सभी के बनवाये हुए धार्मिक स्मारक भारत में अनेक स्थानों पर हैं, विशेषतः मानसिंह के। इस प्रभावशाली और साधन -सम्पन्न राजा ने, जिसने वृन्दावन में गोविन्द देव का भव्य देवालय, गोवर्धन में मानसी गंगा, काशी में मान -मन्दिर और पटना में बैकुण्ठपुरा बनवाया था, आमेर में जगत शिरोमणी का दर्शनीय मन्दिर बनवाया और आमेर के राज महलों को बनवाना आरम्भ किया। किन्तु, किसी निश्चित प्रमाण के आधार पर यह नहीं कहा जा सकता कि गलता में मानसिंह की क्या देन है। मानसिंह के बाद भावसिंह और भावसिंह के बाद महासिंह भी आमेर के विशेष उल्लेखनीय राजा नहीं है, किन्तु जयसिंह प्रथम या मिर्जा राजा जयसिंह ने, जिसने भारत के अनेक भागों में अपने नाम से जयसिंहपुरे आबाद किये थे, गलता में अपना बनवाया हुआ यज्ञ -वेदी कुण्ड छोड़ा है। जयपुर के स्थापत्य के विशिष्ठ अध्येता और भारतीय पुरातात्विक सर्वेक्षण विभाग के अधीक्षक स्वर्गीय वी. ए. धामा स्थापत्य -शैली के आधार पर गलता के यज्ञ -वेदी कुण्ड को, जिसके पास ही गालव ऋषि का प्राचीन मन्दिर भी है, मिर्जा राजा जयसिंह द्वारा ही बनवाया हुआ मानते हैं। यह कुण्ड एक चौरस चौक के ठीक मध्य में है, जिसके चारों कोनों पर चार छत्रियां बनी थी। अष्टकोण -कुण्ड बीच में वेदी की तरह है। इस मान्यता के कारण कि गालव ऋषि ने यहीं जल की आहुतियां देकर यज्ञ किया था और गंगा का प्रादुर्भाव कराया था, इस कुण्ड में स्नान नहीं किया जाता, केवल दर्शन और आचमन करने की परम्परा है। इस कुण्ड के ऊपर बने मन्दिर में ब्रह्मा, विष्णु और महेश के साथ गालव ऋषि की मूर्ति भी है।

मिर्जा राजा जयसिंह का समय 1621 -1667 ई. है।

गलता की घाटी और सूर्य मन्दिर

सवाई जयसिंह ने अपनी नई राजधानी गलता की पहाड़ी के ठीक पश्चिम में पड़ने वाले समतल मैदान पर बसाई। इस नये नगर से गलता उतना दूर नहीं था, जितनी दूर वह आमेर से था। अतः जयपुर की ओर से गलता जाने को नगर के पूर्वी द्वार सूरजपोल से आगे 'गलता दरवाजा' बनाया गया जिसे जयपुर वाले घाटी दरवाजा भी कहते हैं क्योंकि इसी दरवाजे के आगे से गलता पहुंचने के लिए पहाड़ी पर टेढ़ी -मेढ़ी घाटी चढ़नी है। महाराजा रामसिंह (1835 -80ई.) के समकालीन और कृपापात्र कवि दलिचन्द या चन्द कवि ने जयपुर की बसावट का जैसा वर्णन किया है, वह जयसिंह द्वारा बसाये गये नव -निर्मित नगर का ही वर्णन है -

अम्बा जु पुड्डर्रीख जीमुलीन।
जयनगर ताहि दिन नाम दीन।।
बसवा शहर सब सूत फेर।
चहुं ओर कोट रचे सात बेर।।
बणवाया महल पीतम निवास।
चंद्र जुमहल चंद्र ही प्रवास।।
बादल महल बादल प्रमान।
गोविंद महल वैकुण्ठ मान।।
को गनै महल रचना प्रभाव।
मनु इन्द्रलोक पुहिमि सुआव।।
लखि अति विचित्र ताल हि कटोर।
चंद्र और फिरयो तब्लाव ओर।।
रचियो ज बाग तहां जयनिवास।
केतेक महल आराम पास।।
अति विचित्र रचना रचिय,
सकल प्रजा सुख दास।
च्यार वरण सब देश के,
बसे नगर में आय।।
सदन सुरेस के से नरेस
महल रचि रासे,
कंचन कंगूरा कलस
रवी दुति पाई है।
चौपड़ बजारू चार
बंबा नहर मीठासास
जाली झरोखिन की
बहार छबि छायी है।।
कुबेर से साउकार
बैठे दुकानदार,
अगिनत बजाज अर

सराफ हलवाई है।
इन्द्रलोक बात यह
कहबे को बनायो,
देखबे कौ आजि
जग जयपुर सवाई है।।

गलता की पहाड़ी की तलहटी में ही जब इन्द्रलोक को मात करने वाला ऐसा दर्शनीय नगर बस गया तो गलता को भी संवारा गया। इस संपन्न औद्योगिक नगर के नागरिकों ने भी इस कार्य में सक्रिय योग दिया। घाटी की चढ़ाई जहां प्रायः आधी हो जाती है, वहां दो बारादरियां बनी हुई हैं। यह बारादरियां घाटी चढ़ने-उतरने वालों के लिए विश्राम गृह की तरह हैं जिनमें बैठकर 'मन फिर' कर थमाते हुए इस नगर का विहंगावलोकन किया जा सकता है। उल्लेखनीय बात यह है कि इन बारादरियों और घाटी के मार्ग का निर्माण न राज ने करवाया था और न 'कुबेर से साहूकारों' ने। इनके निर्माता थे दो कायस्थ बन्धु जिनके नाम थे श्यामलाल और सुन्दरलाल। ये दोनों ही राज के नौकर थे और जो कुछ कमाते थे, ऐसे ही जनोपयोगी पुण्य कार्यों में लगा देते थे। गलता की घाटी और बारादरियों के अतिरिक्त इन कायस्थ बन्धुओं ने पुष्कर और हरिद्वार में भी कई घाटों और मन्दिरों का निर्माण करवाया था।

इन बारादरियों के ऊपर जो टेकरी खड़ी है, वह नगर के समतल मैदान से कोई साढ़े तीन सौ फुट ऊंची है। टेकरी शीर्ष एक चौरस चबूतरे की तरह है जिस पर भगवान सूर्य का शिखरांत, किन्तु छोटा सा मन्दिर बना हुआ है। सूर्य मन्दिर से जयपुर देखने पर लगता है जैसे सामने कोई 'ब्लू-प्रिंट' या मानचित्र खोलकर रख दिया गया है। जयपुर नगर की रचना की योजना में यह सूर्य मन्दिर बड़े ढब में बैठता है। पूर्व दिशा में जब सूर्य उदय होकर प्रातःकाल जब गलता से ऊपर उठता जाता है तो लगता है जैसे वह अपने ही घर-सूर्य मन्दिर से निकल कर इस गुलाबी नगर को प्रकाशित करने के लिए आया है। फिर जयपुर का राजवंश भी अपने को सूर्यवंशी मानता है, अतः नगर के पूर्व में इस देवता का यह अतुग मन्दिर बहुत उपयुक्त माना गया होगा। भानु सप्तमी के दिन इसी मन्दिर से सूर्य भगवान की मूर्ति को पालकी में लाकर नीचे गलता दरवाजे पर श्वेत घोड़ों के रथ में आरूढ़ किया जाता है, और यह सूर्य का रथ नगर के प्रशस्त बाजारों में घूम कर लौटता है। यह परम्परा सवाई जयसिंह के जमाने से ही चली आती है और कर्नल जैम्स टॉड के अनुसार सूर्य की यह रथ यात्रा गुलाबी नगर के अत्यन्त दर्शनीय दृश्यों में से एक होती है।

यह सूर्य मन्दिर भी सवाई जयसिंह अथवा राज ने नहीं बनवाया था इसका निर्माता था राव कृपाराम। सवाई जयसिंह का वह अत्यन्त कृपापात्र था और दिल्ली के शाही दरबार में वही जयपुर के वकील या कूटनीतिक प्रतिनिधि का दायित्वपूर्ण पद सम्भालता था। राव कृपाराम ने सवाई जयसिंह को बहादुरशाह द्वारा खालसा किये गये आमेर पर पुनः अधिकार करने में निर्णायक सहायता दी थी। पिछले दिनों जयगढ़ के दुर्ग में छिपे हुए या गड़े हुए खजाने की जो खोज हुई थी उसमें भी राव कृपाराम का नाम बार-बार उछाला गया था और उसे 'बीजक' से उसका सम्बन्ध जोड़ा गया था जो इस खजाने की कुंजी कहा जाता है।

राव कृपाराम जैन था और उसका बनवाया हुआ एक विशाल जैन मन्दिर भी इस नगर में है। जिसे 'ढूंढाड़ की नाक' कहा जाने वाला यह जैन कूटनीतिज्ञ वैष्णवों की तरह सूर्योपासक बताया जाता है। कहते हैं, उसने सात सूर्य मन्दिर बनवाये थे। गलता का सूर्य मन्दिर उनमें से एक है। इस सूर्य मन्दिर का मार्ग उन बारादरियों के पास से ही जाता है, जिनका उल्लेख ऊपर हो चुका है। बारादरियों से आगे घाटी क्रमशः नीचे उतरती है। दोनों ओर पहाड़ी चट्टानों पर पहले घना जंगल था जो गालणा तक फैला था और शेर-बघेरे जैसे हिंस्र पशु भी यहां तक आ जाते थे। गलता का वन बन्दरों का भी घर था। लंगूर और बन्दर तो अब भी बहुत हैं जो गलता जाने वाले यात्रियों के हाथों से चने और केले अमरूद ले-लेकर खा लेते हैं।

सात कुण्ड, सात मन्दिर, सात हनुमान

घाटी का उतार जहां समाप्त होता है, दायीं ओर 'कदम्ब कुण्ड' है तथा बायीं ओर 'यज्ञ–वेदी कुण्ड' तथा उस पर गालव ऋषि का मन्दिर। यज्ञ वेदी कुण्ड से गलता की खोह में जो मार्ग उतरता है, वह कोई पचास फुट चौड़ा होगा। इसके शीर्ष पर खड़े होते ही गलता का नैसर्गिक और मनुष्य–कृत स्थापत्य सौन्दर्य क्रमशः विस्तृत होती हुई उपत्यका में प्रकट होता है। यज्ञ–कुण्ड में ही भूमिगत जलधारा पाषाणों को चीर कर गोमुख से बीस–पच्चीस फुट नीचे सूर्य कुण्ड में निरन्तर गिरती और बहती रहती है। सूर्य कुण्ड से कोई तीस–चालीस फुट नीचे गोपाल कुण्ड है, जिसमें दूसरे गोमुख से जल गिरता है। सूर्य कुण्ड के छोर पर और गोपाल कुण्ड के ऊपर पिछले वर्षों में गलता के सुधार के नाम पर लोहे और कंकरीट के खम्भों पर जो सीमेंट की छत डाली गई, उसने गलता के चिर–परिचित सौन्दर्य को बहुत विकृत किया है। 'यज्ञ–वेदी कुण्ड या गोमुख से आगे डेढ़–दो मील तक का जो नजारा पहले देखा जा सकता था, वह सीमेंट के इस भोंडे और भद्दे ढांचे के कारण अब न देखा जा सकता है और न गलता की पूरी उपत्यका का छाया–चित्र ही किया जा सकता है। अब जबकि गलता के पुनर्निर्माण की बातें सोची जा रही हैं, सीमेंट की इस बेमेल तामीर को गलता के दृश्य से हटा देना ही उचित होगा।

गलता के सात मन्दिर, सात कुण्ड और सात हनुमान जयपुर बसने के समय भी ऐसे ही रहे होंगे। हां, नवीन नगर के निकट आ जाने वाले इस तीर्थ का तब जीर्णोद्धार अवश्य हुआ होगा, क्योंकि जयपुर शहर की ओर से जाने वाली घाटी, उसके बीच की बारादरियां और सूर्य मन्दिर का निर्माण जयपुर की नींव लगने के बाद ही हुआ। यहां का सबसे प्रमुख मन्दिर सीतारामजी का मन्दिर कहलाता है। कील्हदास स्वामी द्वारा पाट बैठाये गये सीताराम के विग्रह इस मन्दिर के बीचोंबीच के गर्भ–गृह में हैं। सीता और राम के साथ लक्ष्मण का काष्ठ विग्रह भी है, किन्तु वह कील्हदास के समय का नहीं, बाद में प्रतिष्ठित किया गया है। स्वामी कृष्णदास पयहारी और कील्हदास प्रतिदिन प्रातःकाल 'कामधेनु' (कावड़) लेकर जाते थे और राजा पृथ्वीराज ने इस कावड़ में ही सीतारामजी के भोग–राग के लिए गांवों की जागीर का पट्टा दिया था।

यह सीतारामजी का मन्दिर पयहारीजी के समय से ही वहां था, किन्तु मन्दिर का जो रूप आज देखने में आता है, वह जयपुर बसने के बाद गलता की जीर्णोद्धार योजना के अन्तर्गत ही बना होगा। सीतारामजी सहित इस देवालय में कुल छह विग्रहों की झांकियां हैं। ये हैं–सीतारामजी, रघुनाथजी, रामकृष्णजी, नृत्य गोपालजी, रामगोपालजी और विजय गोपालजी, नृत्य गोपालजी और रामगोपालजी के विग्रह मं से एक राव कृपाराम के ही पधराये हुए बताये जाते हैं। विजय गोपालजी का विग्रह खण्डित हो गया था, अतः वह अब सेव्य ठाकुरजी नहीं हैं। इन छह विग्रहों के एक ही सीतारामजी के नाम से विख्यात मन्दिर के सामने ज्ञान गोपालजी का मन्दिर गलता का दूसरा विशाल मन्दिर है। यों रामचन्द्र और कृष्णचन्द्र को आमने–सामने देखकर गलता के अनेक विदेशी दर्शकों ने भी सगुणोपासना के इस केन्द्र के सम्बन्ध में टिप्पणियां की हैं।

सात मन्दिरों के समान गलता के सप्त–कुण्ड हैं– कदम्ब कुण्ड या राजा कुण्ड, उद्धार कुण्ड, यज्ञ वेदी कुण्ड, सूर्य कुण्ड (यही प्रमुख कुण्ड है जिसमें केवल पुरुष स्नान करते हैं) गोपाल कुण्ड (यह सूर्य कुण्ड से आगे महिलाओं के स्नान के लिए है) राम कुण्ड और लाल कुण्ड जिसे अन्त्यजों के स्नानार्थ सब कुण्डों के अंत में बनाया गया था।

राम के सेवक हनुमानजी भी गलता घाटी में सात स्थानों पर विराजमान हैं। घाटी के हनुमानजी, पापड़े के हनुमानजी, संत नाभादास के आवास हनुमानगढ़ी के हनुमानजी, महन्तजी की हवेली और सीतारामजी के मन्दिर के बीच कोठ्यार के हनुमानजी, जो कील्हदास के पधराये हुए माने जाते हैं, जनाने महल के ऊपर वाले हनुमानजी, परकोटा या दरवाजे के हनुमानजी (यह मन्दिर मूर्ति सहित हाल ही बाढ़ में विलुप्त हो गया है। गलता में मन्दिर–मूर्ति की तो यही एक मात्र क्षति है जो अतिवृष्टि के कारण हुई है।) और सूर्य कुण्ड के हनुमानजी। कोठ्यार के हनुमानजी की चर्चा हम महन्त हरिवल्लभाचार्य के प्रसंग में कर चुके हैं। यह बड़े चमत्कारिक हनुमानजी माने जाते हैं। इनके सामने अखण्ड ज्योति प्रज्वलित रहती है और यहां हनुमानजी के प्रसन्नार्थ भक्त जन सुन्दर काण्ड आदि के पाठ करते रहते हैं।

गलता के आठवें महन्त हर्याचार्य सवाई जयसिंह के समय में ही विरक्त से गृहस्थ हुए थे। सीतारामजी के मन्दिर से लगी हुई महन्तजी की हवेली का जनाना भाग बनाने की आवश्यकता इन्हीं महन्तजी को हुई और उसके बाद जयपुर के निर्माण और बसावट के साथ–साथ गलता का विकास भी होता रहा। सवाई जयसिंह के समय से ही जयपुर में

फिरंगियों का आना-जाना भी बहुत बढ़ गया था और इसके बाद तो सैन्य अभियानों में भी फिरंगियों का दौर-दौरा होता ही चला गया। पुराने घाट में सवाई जयसिंह की सिसोदिया रानी के महल और गलता में महन्तजी की हवेली तथा ज्ञान गोपालजी के मन्दिर की भित्तियों पर युद्ध तथा आखेट के जो चित्र देखे जाते हैं, उनमें फिरंगी भी बहुत हैं। यह कहना तो कठिन है कि ये सभी चित्र सवाई जयसिंह के काल के हैं, हां, यह निश्चित रूप से कहा जा सकता है कि सवाई जयसिंह से लेकर प्रतापसिंह के जमाने तक ये भित्ति चित्र बने थे। प्रतापसिंह का काल जयपुर शैली की चित्रकला का चरमोत्कर्ष-काल माना जाता है। गोपाल कुण्ड के घाट पर बनी तीन छतरियों के चित्र इसी काल के पहचाने जाते हैं।

हर्याचार्य के बाद श्रेयाचार्य ने गलता में आगे श्रेया बाग बनवाया था और उनके बाद जानकी शरणाचार्य ने रामकुमार महल और उसके सुचित्रित द्वार का निर्माण करवाया। परवर्ती महन्त भी कुछ न कुछ परिवर्द्धन करते रहे और गलता को वह रूप मिला जो गत जुलाई के अंत में बाढ़ से इस तीर्थ के नष्ट होने तक बना रहा। गलता के महन्तों के श्मसान में, जो श्रेयाबाग के पास ही है, पहली छत्री भी हर्याचार्य की ही है। उसके बाद अन्य महन्तों की भी कलापूर्ण समाधियां बनती रहीं, किंतु तेरहवें, चौदहवें और पन्द्रहवें महन्तों का कोई स्मारक नहीं बन पाया। इन महन्तों के देहान्त पर उत्तराधिकार की खींचतान लम्बी चली थी और गलता ठिकाने का काम-काज बड़ा अस्त-व्यस्त चल रहा था। किंतु बारहवें महन्त सीतारामाचार्य तक श्री सम्प्रदाय की इस गद्दी का जैसा वैभव रहा इसमें जयपुर रियासत का योग तो था ही, अलवर, करौली, उदयपुर, रींवा और काशी आदि के राज्यों का भी योग रहा था। इन रियासतों की ओर से भी गलता गादी को गांव और जमीनें भेंट की गई थीं।

'गालव गीतम्' में वर्णित गलता

सवाई जयसिंह के समय में और उसके आदेश से ही कवि–कलानिधि श्रीकृष्ण भट्ट ने 'रामरासा' या 'रामगीतम्' की रचना की थी। हम देख चुके हैं कि यह 'गीत गोविन्द' की शैली में राम की मधुरोपासना का एक श्रृंगारिक काव्य है। कवि–कलानिधिजी की मृत्यु विक्रम सम्वत् 1808 (1751ई.) के आसपास हुई। उनके बाद, उनके पुत्र द्वारकानाथ भट्ट ने विद्वता और कवित्व–शक्ति में अपने वंश की परम्परा का अपने पिता के समान ही निर्वाह किया। जिस प्रकार सवाई जयसिंह कवि–कलानिधि का पूर्ण आदर करता था, सवाई माधोसिंह प्रथम द्वारकानाथ भट्ट का सम्मान करता था और उसने उन्हें 'सुरसुति' की पदवी भी दी थी।

द्वारकानाथ भट्ट ने अच्छी आयु पाई और जयपुर के तीन महाराजाओं– माधोसिंह प्रथम, पृथ्वीसिंह और सवाई प्रतापसिंह को उन्होंने देखा और उनसे सम्मान प्राप्त किया। माधोसिंह ने उन्हें 'सुरसुति' और प्रतापसिंह ने 'भारती' तथा 'बानी' के खिताब दिये। द्वारकानाथ के पौत्र मण्डन भट्ट ने अपने पितामह का परिचय इस प्रकार दिया है–

द्विजकुल कवि श्रीकृष्ण भये,
पंच–द्रविड़ तैलंग।
रामायण जिनने कियो,
रामरास पर मंग।।
विद्वत्–कुल के मुकुट–मणि,
काव्य–कलानिधि स्वच्छ।
दिय खिताब जयसाह ने,
सब भुवि में परतच्छ।।
तिनके तिनही से भये,
तनय द्वारकानाथ।
माधवेस महिभानु के,
रहे रैन दिन साथ।।
प्रभु को गर्जी कर लियो,
'सुरसुति' सुकवि खिताब।
जिन के जग में जगि रहे,
सुजस सरस महताब।।
पृथ्वीसिंह परताप को,
किय गुन सों भरपूर।
'बानी', 'भारती' नाम लिय,
जग में रह्यो जहूर।।
कविकुल और कवीन्द्र नित,
नृप मुख बोलें बैन।
पृथ्वीसिंह परताप सों,
पाये निसिदिन चैन।।

कविवर द्वारकानाथ भट्ट का ब्रजभाषा के अतिरिक्त संस्कृत पर भी असाधारण अधिकार था और ये संगीत–शास्त्र के भी मार्मिक विद्वान थे। गलता के प्रसंग में इनका उल्लेख करना इसलिए आवश्यक है कि इनकी एक लघु रचना 'गालव गीतम्' गलता की श्री-शोभा का ही वर्णन करती है। इस स्वतंत्र रचना से यह भी सिद्ध हो जाता है कि सवाई जयसिंह के उत्तराधिकारियों के समय में गलता के कुण्ड और देवालय प्रायः वैसे ही बन चुके थे, जैसे हम आपने देखे हैं। हां, गलता की प्राकृतिक सुषमा एवं नैसर्गिक छटा 'सुरसुति' कवि के समय में अवश्य ही अधिक बढ़ी–चढ़ी रही होगी। इस संस्कृत काव्य का आरंभिक छप्पय देखिये–

क्वचिन्निर्झरनीरनिनद
नृत्यन्मायूरे,
क्वचन कोकिलाकण्ठ
कुहूकलनिः स्वप्न पूरे।
घनतरुलता विचित्र–
शिखरि सुन्दर कन्दर वति,
मृदुतर शाद्व ललसित–
मृगी मृगशावक रुचिभृति।
इति सरस्वती भणति स्फुट
गालवस्य नामाकितं,
इह कस्य मनो नाश्रमपदे
लग्नं भक्तजनाश्रिते।।

'सुरसुति' या 'सरस्वती' कवि कहते हैं: जिस आश्रम में कहीं जल के झरनों की ध्वनि हो रही है और कहीं मयूरों का समूह नृत्य कर रहा है, कहीं कोकिल–कण्ठों से कुहू–कुहू की मधुर आवाजें आ रही हैं, वह घने वृक्षों, लताओं, विचित्र पर्वत और सुन्दर कन्दराओं से सुशोभित और महात्माओं से आश्रित हैं। गालव–नामांकित इस परम रमणीय आश्रम में किसका मन नहीं रम जाता।

पन्द्रह छप्पयों की इस लघु रचना में आगे गलता का वर्णन इस प्रकार है:

"वाणी" के मुख से यह प्रेम भरी वाणी सुनिये कि जिस प्रकार समुद्र पर सेतु बांधने के समय वानरों ने पत्थरों पर राम का नाम लिखकर उन्हें तैरा दिया था, उसी प्रकार इस आश्रम के पर्वतीय स्थलों, वृक्ष, लता, और झाड़ियों, मनोहर पत्तों और खिले पुष्पों पर यहां तक कि निर्झरों और जल–कणों पर भी राम का नाम लिखा हुआ सुना जाता है। यहां स्थावर–जंगम, पशु–पक्षी और मनुष्य, सभी राममय हैं।

इस आश्रम में आम्र–वृक्ष पर कोकिल आलाप छेड़ती है और उससे प्रेरित होकर पवित्र पर्वत पर मयूर भी गाने लगते हैं। पक्षी वाद्य–यंत्रों की सी झंकार करने लगते हैं। गुणज्ञ वायु लताओं में से छन कर 'स्वस्ति' शब्द कहती है। श्रीराम के भजनानन्द में उन्मत्त भौंरे प्रत्येक पुष्प–गुच्छ पर गुंजार

करते हुए जैसे राम मण्डल ही रचा रहे हैं।

इस आश्रम में शुक या तोता कोकिल समूह को उपदेश करता है कि हे मित्र, राम नाम जपो। रोष से वृथा ही आंखें क्यों लाल कर रखी हैं? इस क्रोध से तो तुम्हारा शरीर ही काला पड़ गया है। ऐसे व्यर्थ बोलने से तो मौन अच्छा। हमारा कहा मानो, एक पक्ष में तुम्हारा रंग भी हरा होकर 'हरित्व' को प्राप्त कर सकता है, किंतु कुहू-कुहू के कोलाहल से क्या लाभ, वैष्णवों के यज्ञ-भजन-कीर्तन में मन लगाओ।

गालवाश्रम के बड़े-बड़े वृक्ष अपने झरते हुए मकरन्द से चन्दन लगाते हैं, डंठलों में लगे पुष्पों से पूजा करते हैं, बहते हुए गोंद का सुगन्धित धूप और अग्रभाग में लगी चम्पा की कली का दीपक बनाते हैं, फलों का भोग रखते हैं और भौंरों के गुंजार से सामवेद की स्तुति करते हैं। इस प्रकार बड़े-बड़े वृक्ष यहां रघुपति का पञ्चोपचार पूजन करते रहते हैं और अपना जीवन धन्य बनाते हैं।"

गलता की प्राकृतिक शोभा का यह वर्णन जयपुर नगर बस जाने के बाद का है।

सोलहवें और वर्त्तमान महन्त

अपने जीवन– काल में ही आख्यान बनकर जीने वाले गलता के महन्त हरिवल्लभाचार्य को अपने पूर्ववर्ती महन्त हरिप्रसादाचार्य की भांति यह चिंता हो गई थी कि उनका उत्तराधिकारी कौन होगा। वे अपने भाई के आत्मज दामोदरलाल को अपना पट– शिष्य मानते थे और चाहते थे कि उनके सामने ही यह मामला निबट जाए और महाराजा माधोसिंह दामोदरलाल को उनका उत्तराधिकारी स्वीकार कर लें। इस प्रयोजन के लिए वे महाराजा की वर्ष गांठ के दिन एक बार दामोदरलाल को अपने साथ ले गये थे। उस दिन महाराजा गोविन्ददेवजी के मंदिर में जन्म दिन की मोहरें भेंट करने के बाद सभी राजगुरुओं और सन्तों– महन्तों को नमन कर उन्हें भी भेंट करते थे और प्रसाद के रूप में उनका आशीर्वाद पाते थे। महन्त हरिवल्लभाचार्य के साथ दामोदरलाल को देखकर खवास बाला बख्श और दूसरे लोगों ने आपत्ति भी उठाई थी, किंतु तभी महाराजा वहां आ गये थे और हरिवल्लभाचार्य ने उन्हें आशीर्वाद देकर अपनी मनोकामना उन्हें बता दी थी। महाराजा के 'मूड' को देखकर हरिवल्लभाचार्य यही समझे थे कि उनके बाद दामोदरलाल को उत्तराधिकार मिल जाएगा।

किंतु, ऐसा नहीं हो सका। जब हरिवल्लभाचार्य का निधन हो गया तो गलता का पीठाधीश्वर बनाने के लिए नई जोड़ तोड़ शुरु हुई। हरिवल्लभाचार्य से रक्त संबंध रखने वाले दामोदरलाल को इसमें वंचित

रखने के लिए स्वयं हरिवल्लभाचार्य की पत्नी पार्वती देवी ने पहल की और वह सफल भी हुई। महाराजा माधोसिंह उन दिनों हरिद्वार में थे और पार्वती देवी ने उन्हें वहीं तार भेजकर अपने पति के देहावसान का समाचार दिया और यह पेशकश भी कर दी कि चूंकि हरिवल्लभाचार्य अपने नाना के उत्तराधिकारी हुए थे, उनके बाद भी पूर्ववर्ती आचार्य हरिप्रसादाचार्य की चौथी पुत्री बिरजी बाई के पुत्र ओंकारलाल को गादी पर बैठाया जाए।

दामोदरलाल की ओर से भी तार दिया गया और कहा गया कि स्वर्गीय महन्तजी की हार्दिक इच्छा दामोदार लाल को ही अपना उत्तराधिकारी बनाने की थी और वे अपनी इच्छा से महाराजा को भी अवगत करा चुके थे। ये दोनों तार प्रायः साथ साथ ही हरिद्वार में महाराजा के विश्वस्त अनुचर और सलाहकार खवास बालाबख्श को प्राप्त हुए। अपने- अपने दावे को पुष्ट करने के लिए शीघ्र ही दोनों पक्षों के प्रतिनिधि भी हरिद्वार पहुंच गये।

खवास बालाबख्श ने अपने तरीके से दोनों से बात की। दामोदरलाल के पक्षपातियों को उसने कहा कि स्वर्गीय महन्तजी की इच्छा कुछ भी रही हो, वे यह बतायें कि काम कराने के लिए वे क्या कीमत देने को तैयार हैं? जब कहा गया कि यह तो राजगुरुओं की गादी है और इस गादी पर बैठने वाला तो बस आशीर्वाद ही देता है तो खवास बालाबख्श ने तनककर उनके तार को फाड़ दिया और उसे गंगा की बहती धारा में विसर्जित करते हुए कहा कि ठीक है, आप लोग आशीर्वाद ही देते रहो।

महाराजा के सामने केवल पार्वती देवी का तार ही प्रस्तुत हुआ और खवासजी ने पिछली नजीर के हवाले से हरिप्रसादाचार्य की पुत्री बिरजी बाई के पुत्र ओंकारलाल को गलता का नाम महन्त स्वीकार करा लिया। इसके साथ ही पं. प्यारेलाल गौड़ के पुत्रों ने, जो हरिवल्लभाचार्य के कारण गलता में ही रहे थे, वहीं पढ़े- लिखे थे और कुश्ती व वीणा- वादन जैसे शौक भी सीखे थे, गलता सदा- सदा के लिए छोड़ दिया। ओंकारलाल हरिशरणाचार्य के नाम से गलता के पन्द्रहवें महन्त बने। शिष्यत्व और रक्त- संबंध, दोनों से इस गादी पर अपना दावा करने वाले दामोदरलाल फिर जयपुर शहर में ही रहते रहे। उनकी मृत्यु 1961 या 1962 में हुई।

हरिशरणाचार्य पन्द्रह सोलह वर्ष गादी पर रहे होंगे। इनके संबंध में कुछ भी उल्लेखनीय नहीं है। 1937 ई. के आसपास जब इनकी मृत्यु हुई तो इनके भी तीन पुत्रियां ही थी, कोई पुत्र नहीं था। अतः गलता के उत्तराधिकारी का प्रश्न पुनः विवादास्पद बन गया। कोई छह साल तक कानूनी दांव- पेंच चलते रहे और मुकदमेबाजी से किसी भी दावेदार के कुछ हाथ न लगा। यहां पर उल्लेखनीय है कि हरिवल्लभाचार्य की पत्नी पार्वती देवी अब भी जीवित और सक्रिय थी और उसने इस बार भी इस सारे विवाद में जमकर भाग लिया था।

अब जमाना बदल गया था। महाराजा मानसिंह ने मैसूर के सर मिर्जा मोहम्मद इस्माइल को अपना प्रधानमंत्री बनाया था और उसने इस भारत- विख्यात श्री संप्रदाय की गादी के लिए सारे भारत के उम्मीदवारों से प्रार्थना पत्र आमंत्रित कर चुनाव करने का फैसला किया था। जयपुर रियासत के रेवन्यू मिनिस्टर ने एक अक्टूबर 1942 को इस संबंध में जो सूचना जारी की थी, वह इस प्रकार थी:

"जयपुर राज्य में श्री गलताजी की गद्दी का अधिकार प्राप्त करने के लिए एक सुयोग्य सदाचारी वैष्णव विद्वान की आवश्यकता है- 1. जिसका कि विशुद्ध ब्राहमण कुल में जन्म हो, और जो अपने को श्रीरामानुजाचार्य की तिरुहल शाखा की शिष्य परम्परा में मानता रहा हो। 2. जो श्री गलता गद्दी के प्रतिष्ठापक आचार्य श्रीकृष्णदासजी पयहारी के शिष्य श्रीकील्हदासजी की शिष्य परम्परा में प्रतिष्ठित होने का प्रमाण दे सके। 3. श्री सम्प्रदाय के पूजा आदि धार्मिक सिद्धांतों का और विशिष्टाद्वैत दर्शन का पूर्ण विद्वान हो।"

जयपुर के सचिवालय (अब राजकीय प्रवास भवन) के सर्मित कक्ष में जहां अब कैन्टीन चलता है, नये महन्त का चुनाव करने के लिए प्रधानमंत्री की अध्यक्षता में बोर्ड बैठा। इसमें महामहोपाध्याय पण्डित गिरिधर शर्मा चतुर्वेदी और पं. कन्हैयालाल न्यायाचार्य जैसे विद्वान सदस्य थे, पर असली नकेल तो सर मिर्जा के ही हाथ में थी। महन्त हरिवल्लभाचार्य के चहेते दामोदरलाल, लक्ष्मण द्वारा के नारायणप्रसाद आयुर्वेदाचार्य तथा अन्य अनेक प्रत्याशी आये थे और उनसे चतुर्वेदीजी और न्यायाचार्य जी जैसे परीक्षक विद्वानों ने अनेक प्रश्न पूछे थे। गलता गादी के उत्तराधिकारी के लिए इस चुनाव या साक्षात्कार की चर्चा सारे जयपुर में ही नहीं, समस्त श्रीसंप्रदाय में बड़ी चर्चा थी और इसके परिणाम की उत्सुकता से प्रतीक्षा की जा रही थी।

हम पहले देख चुके हैं कि गलता के आठवें आचार्य और 'श्रीजानकीगीत' तथा 'श्री रामस्तवराज भाष्य' के प्रणेता हर्याचार्य के

गलता, जो अब नामशेष है

पवित्र गोमुख द्वारा गुप्त–गंगा के जल से भरने वाला गलता तीर्थ हाल की बेढब वर्षा में मिट्टी और शिलाखण्डों से भर गया। जयपुर की एक पावन तीर्थ–स्थली नामशेष हो गई और प्रशासन को इसकी खबर भी नहीं हुई। गलता के कुण्डों का यों समाप्त हो जाना नैसर्गिक सुषमा के लिए विख्यात एक दर्शनीय स्थान का लोप हो जाना ही नहीं है, जयपुर के एक ऐसे धार्मिक, सांस्कृतिक और साहित्यिक केन्द्र का सर्वनाश है जिसका एहसास भी आज के प्रशासकों को शायद नहीं है।

गलता 'गालवाश्रम' का अपभ्रंश है। लोक में मान्यता है कि पुरातन काल में गालव ऋषि ने इस स्थान पर तपस्या की थी और इसी के प्रभाव से यहां गुप्त गंगा का आविर्भाव हुआ था। विक्रम की पन्द्रहवीं सदी के अंत और सोलहवीं सदी के आरंभ में जब उत्तर भारत में सगुण भक्ति के आंदोलन ने जोर पकड़ा तो गालवाश्रम का भी महत्व बढ़ा। इससे पहले राजपूताना के अन्य भागों की तरह आमेर में भी कनफटे नाथपंथियों का बड़ा प्रभाव था। आमेर का राजा पृथ्वीराज और उसकी चहेती रानी बालाबाई भी इन्हीं नाथपंथी योगियों में श्रद्धा रखते थे। गालवाश्रम पर भी तब नाथपंथी चतुरनाथ योगी का अधिकार था।

भारत में तब तुर्क साम्राज्य का बोलबाला था और राजस्थान पर भी इसका प्रभुत्व था। विदेशियों और विधर्मियों के समय समय पर अत्याचार होते रहते थे और समाज को मार्ग–दर्शन के लिए किसी महान् विभूति अथवा अवतार की आवश्यकता थी। इसी समय में स्वामी रामानन्द जैसे आध्यात्मिक नेता का प्रादुर्भाव हुआ जिन्होंने 'श्रीराम–तारकमंत्र' के माध्यम से समाज को नई दिशा दी, भक्ति का पाठ पढ़ाया और फिर से संगठित किया। स्वामी रामानन्द का राजस्थान से निकट का सम्बन्ध रहा था। गागरौन के शासक पीपाजी का स्वामी रामानन्द के दर्शनार्थ काशी जाने की बात प्रसिद्ध है। स्वामी रामानन्द ने उन्हें 'राम नाम के मंत्र' का उपदेश देकर विदा किया और उन्हीं के अनुरोध पर स्वयं भी गागरौनगढ़ आये तथा यह उपदेश भी दिया कि "राज योग में भोग–विलास अत्यन्त हानिकारक है। जहां राजा भोग–विलास में लिप्त हुआ कि वह राजा और उसका वंश दोनों ही नष्ट हो जाते हैं।"

स्वामी रामानन्द ने लगभग तीन माह तक राजस्थान के विभिन्न स्थानों का भ्रमण किया और श्री सम्प्रदाय या रामानन्द संप्रदाय का झण्डा गाड़ा। स्वामी रामानन्द के दो ग्रन्थ प्रसिद्ध हैं-श्रीवैष्णव मताब्ज भास्कर और श्रीरामार्चन पद्धति। ये दोनों ग्रन्थ यहां जयपुर में ही बालानन्दजी की धर्म–पीठ से संवत् 1985 में प्रकाशित हो चुके हैं। उल्लेखनीय बात यह है कि 'श्रीवैष्णव मताब्ज भास्कर' की सबसे प्राचीन प्रति (संवत् 1624) भी यहीं प्राप्त हुई। महामहोपाध्याय पण्डित गिरिधर शर्मा चतुर्वेदी और अन्य विद्वानों ने इस प्रति की प्रामाणिकता की पुष्टि करते हुए इसे एक ऐसी धरोहर माना है, जिसके सतत संरक्षण की आवश्यकता है।

स्वामी रामानन्द के बारह शिष्य प्रसिद्ध हैं। आचार्य रामचंद्र शुक्ल ने 'भक्तमाल' के आधार पर इनके नाम इस प्रकार गिनाये हैं अनन्तानन्द, सुखानन्द, सुरसुरानन्द, नरहिरयानन्द, भावानन्द, पीपा, कबीर, सेन, धन्ना, रैदास, पद्मावती और सुरसरी। इनमें अनन्तानन्द या अनन्ताचार्य स्वामीजी के सबसे बड़े और प्रमुख शिष्य थे। स्वामी रामानन्द के आदेश से ये एक बार सांभर गये थे। 'एनसाइक्लोपीडिया आफ रिलीजन एण्ड एथिक्स' भाग दस पृष्ठ 5700 के अनुसार अनन्तानन्द ने मारवाड़ के शासक मालदेव को अनेक चमत्कार दिखाकर अपना शिष्य बनाया था।

इन्हीं अनन्तानन्द के शिष्य हुए कृष्णदास पयहारी। इनका समय सम्वत् 1559–1584 माना जाता है। राजपूताना के ही दाधीच ब्राह्मण कृष्णदास अन्न छोड़ चुके थे और मात्र दुग्ध–पान ही करते थे। इसी से वे 'पयहारी' प्रसिद्ध हैं। बड़े विद्वान और सिद्धयोगी थे यह। गालवाश्रम को नाथपंथी योगियों के प्रभाव से इन्होंने ही मुक्त कराया और इसे उत्तर भारत में श्री संप्रदाय की प्रधान पीठ बनाया। यही पहली और सबसे प्रधान गद्दी मानी गई और रामानुज संप्रदाय के लिए जो महत्व दक्षिण भारत में तोताद्रि का था, वही महत्व रामानन्दी सम्प्रदाय में उत्तर भारत में गालवाश्रम या गलता को प्राप्त

हुआ।

जब सीधे-सादे वैष्णव भक्ति मार्ग का आन्दोलन देश में चलने लगा तो कनफटे नाथयोगियों का इसके प्रति दुर्भाव होना स्वाभाविक था। इस्लाम के प्रचारक सूफी फकीरों और पीरों को भी नाथपंथी योगियों से टक्कर लेनी पड़ी थी और ऐसे उल्लेख भी मिलते हैं कि अनेक सूफियों ने भारतीय योगियों से प्राणायाम आदि की क्रियायें सीखी थीं।

कृष्णदास पयहारी जब पहले-पहल गलता गये और वहां की प्राकृतिक शोभा ने उन्हें मोह लिया तो वहां नाथपंथियों की गद्दी थी और चतुरनाथ महन्त था। पयहारीजी रात भर वहां पड़ाव करना चाहते थे, अतः वे धूनी लगाकर बैठ गये। कनफटे योगियों को यह सहय नहीं था, अतः उन्होंने पयहारीजी को वहां से उठा दिया और रास्ता नापने को कहा। पयहारीजी ने अपनी धूनी की आग उठाकर एक कपड़े में पोटली बांध ली और वहां से हटकर दूसरी जगह आ बैठे। आग को कपड़े में बांधने की सिद्धि का जवाब दिया। कनफटियों के महन्त ने नाहर बनकर हिंस्र पशु के रूप में वह पयहारीजी की ओर झपटा तो पयहारीजी के मुंह से निकला 'कैसा गदहा है न।' बस वह महन्त गदहा बन गया। फिर तो कनफटे योगियों ने अपने कानों के बड़े-बड़े छेदों में पहने हुए स्फटिक के भारी-भारी कुण्डल उतारकर पयहारीजी को समर्पित कर दिये। चतुरनाथ के सिंह और फिर गदहा बनने की बात आमेर भी पहुंची और राजा पृथ्वीराज ने अपने गुरु की यह हालत देखकर पयहारीजी से उसे पुनः मनुष्य बनाने के लिए बहुत अनुनय विनय की। पयहारीजी ने चतुरनाथ को उनका पूर्व स्वरूप लौटा दिया और राजा पृथ्वीराज तभी पयहारीजी का शिष्य बन गया। गलताश्रम भी तभी रामानन्दी वैष्णवों के अधिकार में आ गया।

पृथ्वीराज की रानी बालाबाई बड़ी भक्तिमती थी और उसने भी पयहारीजी को गुरु स्वीकार किया। कहते हैं, बालाबाई के अनुरोध पर पयहारीजी ने आमेर में भी एक बार अपने पदाघात से गंगा उत्पन्न की थी। उस स्थान पर आज तक उनके चरणों की पूजा होती है। पयहारीजी शालिग्राम रूप में नृसिंह की पूजा करते थे। उन्होंने यह अपनी निजी और चमत्कारी मूर्ति भी बालाबाई को दे दी थी और राज्य कुल के रक्षक के रूप में यह मूर्ति महल में ही प्रतिष्ठापित की गई थी जहां आज तक इसकी पूजा होती है। सोने में मंढी इस मूर्ति का सोना निकालने के लोभ में एक बार यह मूर्ति चोरी भी चली गई थी और सारा जयपुर जानता है कि उस समय लोगों को यह मान्यता याद आई थी-

> जब तक नरसिंह देहली में,
> तब तक राज हवेली में।

चोरी तो पकड़ी गई थी, किंतु कुछ ही महीनों बाद राजस्थान का निर्माण भी हो गया था और नृसिंह के देहरी बाहर चले जाने के परिणामस्वरूप आमेर-जयपुर का राज भी कछवाहा नरेशों के हाथ से निकल कर राजस्थान में विलीन हो गया था।

चित्रकूट भी, वृन्दावन भी

उन्नीसवीं सदी के आरंभ का गमता वर्णन सूर्यकुण्ड और गोमुख का चित्र इस प्रकार प्रस्तुत करता है-

सुकृत समयमधिकृत्य
समागतशिष्ट नृदेवम्
स्नान दान जपहोम
मानित श्रीपतिदेवम्।
क्वणित रणित भणितेषु
यस्य शब्दितमतिमधुरम्
नामध्वनि कलितं नु
मन्यते कलकलविधुरम्
नित्यं निसर्ग निर्गतजलं
यत्र गोमुखं राजते
केनापिकृता मालेव
यत्परितः पदवी भ्राजते।।

'गालव गीतम्' के रचनाकार कवि द्वारकानाथ भट्ट कहते हैं कि पुण्य समय पर यहां शिष्ट और राजा लोग आते हैं। स्नान, दान, जप और हवन द्वारा यहां विष्णु भगवान को मनाया जाता है। यहां गोमुख से सदा स्वतः ही जल प्रवाहित होता रहता है. जिसकी कलकल ध्वनि ऐसी मधुर और मनोहर है कि अन्य ध्वनियां भी इसे नहीं दबा पाती। ऐसा लगता है जैसे यह जलधारा भी नामध्वनि में लीन है। इस गोमुख के चारों ओर का मार्ग ऐसा लगता है जैसे इसे किसी ने माला पहना दी हो।

"चारों ओर के मार्ग की यह माला गालव ऋषि के मन्दिर के रूप में सुमेरू की कान्ति से सुशोभित है। भित्ति रूप सूत्र के सहारे चलते हुए नगरवासी ऐसे शोभायमान होते हैं जैसे यह माला मणियों से जटित है। स्वच्छ, सुन्दर और उफनता हुआ गोमुख का जल प्रपात ही इस माला की कान्ति किरण है। पुराने पुण्यों के प्रताप से यह अलौकिक माला गूंथी गई है। चारों ओर फैली माला के बीच सरोवर की स्थिति ऐसी है जैसे उसमें मध्यमणि या धुगधुगी की लटकन हो।

"गालवाश्रम का उत्तुंग और मनोहारी पर्वत मन्दर पर्वत का अनुकरण करता प्रतीत होता है। दर्पण के समान स्वच्छ शिलायें इसकी कान्ति को प्रतिबिम्बित करती हैं। यहां की भित्तियां भी वन श्री, वृक्ष लता गुल्म, मोर, सारस, चिड़िया, टिटहरी और कोयल जैसे पक्षियों से सुचित्रित हैं। प्रतिध्वनि के बहाने गर्जना करता हुआ गालवाश्रम का नैसर्गिक सौष्ठव मानों काल को जीतने के लिए उठ खड़ा हुआ है। आकाश में वायु के झोंकों से फहराती ध्वजाओं द्वारा यह मानो आते हुए कलियुग को ललकारता है।

"हीरों से जड़े स्वर्ण-किरीट से जिनकी कान्ति चारों ओर फैल रही है, कानों में शोभायमान कुण्डलों की कान्ति से जिनकी केशराशि भरी हुई है, वक्षस्थल में पुष्पमाला

धारण कर रखी है और सुन्दर जामा पहन रखा है, कृपा करने वाले कटाक्ष जिनके नेत्रों की शोभा है, ऐसे श्रीकृष्ण यहां कल्पवृक्ष की छाया में मणि वेदिका के ऊपर रत्नसिंहासन के मध्य में विराजते हैं और अपने भक्तों उपासकों को मोक्ष प्रदान करते हैं-

सुरतरुच्छायमणिवेदिका
रत्नपीठमध्यम्भरि:।
भुवि सकलसतां निर्वाण दो
धनुर्बाण हसतो हरि:।।"

'गालवगीतम्' के कवि का यह वर्णन जिसमें 'गोपाल रूपधारी रघुपति' और 'धनुर्बाणहस्तो हरि:' के विहार की बात कही गई है, गोस्वामी तुलसीदास की वृन्दावन यात्रा के उस प्रवाद की याद दिलाता है जब कृष्ण ही कृष्ण के मन्दिर देखकर उन्होने चुनौती के रूप में कहा था-

कहा कहौं छवि आपकी
भले बने हो नाथ।
तुलसी मस्तक तब नवे
धनुष बाण लो हाथ।

यह प्रवाद नाभादास और तुलसी की भेंट के प्रसंग में इस लेखमाला के आरंभ में दिया जा चुका है। गलता के विशिष्टद्वैत वाद में यही विशिष्टता है कि यहां राम रघुनाथ कृष्ण कन्हैया के रूप में और गोपाल धनुर्बाण धारी रामचन्द्र के रूप में विराजते और अपने भक्तों को दर्शन देते हैं। गलता साकेत भी है और ब्रजधाम भी, चित्रकूट भी है और वृन्दावन भी। राम में कृष्णभाव का और कृष्ण में राम भाव का ऐसा आरोप अन्यत्र दुर्लभ है। गलता की मधुरोपासना और मधुरा भक्ति का यह चरम उत्कर्ष है।

'गालवगीतम्' के अन्तिम दो छन्दो का भावानुवाद इस प्रकार किया जा सकता है-

"श्रीकृष्ण के रूप सागर में उनके कर और चरण तो रक्ताभ कमल के समान हैं, केशराशि सिवाल के समान है, मुख चन्द्रमा, नेत्रयुगल मछलियां, वचन अमृत और अधर कुरुविन्द के पुष्प जैसे हैं। यहां कौस्तुभ ही सूर्य है जो चारों ओर अपनी किरणों का प्रकाश बिखेरता है। भगवान की शरीर रूपी श्याम मेघमाला उल्लसित होकर यहां माधुर्य रूपी फुहारें बरसाती रहती है।-

तत्रैव कौस्तुभोभानुमान
किरतित रां परित: करान्
उल्लस्य तनु: कार्वाम्बनी
धर्षति मधुरिमसीकरान्।।

"नख से सुन्दर भगवान रामचन्द्र के चरण इस प्रकार शोभित हैं मानों वैर छोड़कर चन्द्रमा से युक्त दो कमल खिले हैं अथवा कामदेव के जन्म लेने पर अपने स्वामी की सेवा करने के लिए अंगुली रूपी पांच बाणों से युक्त दो तरकस पड़े हैं। कवि 'सरस्वती' यह प्रिय बात कहना चाहते हैं कि भक्तों को भवसागर से पार उतारने और सुख का विस्तार करने के लिए दो ही नौकाएं हैं और वे यही हैं, यह बात वे भली भांति जानते है।"

कोई आश्चर्य नहीं कि जयपुर जैसे धर्मपरायण, श्रद्धालु और रूढीवादी नगर में गलता तीर्थ का असाधारण महत्व रहता आया है। चाहे कोई चार धाम की यात्रा कर आये, सप्तमहापुरियों के येहरे ढोक आये और कितने ही तीर्थों के दर्शन पाले, जयपुर में गलता स्नान के बिना न यात्रा का अथ होता है और न इति। गालव गंगा में डुबकी लगाना तो आरंभ में भी आवश्यक है और समापन में भी अनिवार्य। इसीलिए कहावत है-

अड़सठ तीरथं पुष्कर गुरु
गलता नहायां होसी शुरू।

गालव ऋषि की इस तपोभूमि में स्नान ध्यान, भजन कीर्तन, दान दक्षिणा और यज्ञ हवन करने से सहस्रगुणा फल स्वत: ही मिल जाता है। मांगसिर कृष्णा प्रतिपदा को गलता स्नान का विशेष माहात्म्य माना गया है।

जयपुर बसने से पहले गलता

आमेर का मिर्जा राजा जयसिंह विश्वप्रसिद्ध ताजमहल (आगरा) और संसार की विशालतम मस्जिद जामा मस्जिद (दिल्ली) के निर्माता शाहजहां का समकालीन था और वह भी एक महान् निर्माता था। आमेर के महलों में दीवाने-आम के स्तंभों पर हाथी के सूंडाकार की टोंडियां आज भी यह जताती है कि आमेर का यह राजपूत राजा अपनी बनाई हुई इमारतों में हिन्दुत्व की छाप रखवाता था। गलता का यज्ञवेदी कुण्ड तो सर्वथा हिन्दू स्थापत्य है क्योंकि यह एक तीर्थ स्थान पर बनवाया गया था। मिर्जा राजा गलता के माहात्म्य से भी सुपरिचित था, क्योंकि इसके पौराणिक महत्व पर प्रकाश डालने वाला एक संस्कृत ग्रन्थ 'गालवाश्रममाहात्म्यम्' -जयपुर के पोथीखाने के खास मोहर संग्रह में आज तक सुरक्षित है।

मिर्जा राजा के बाद गलता के निर्माण और विकास का वास्तविक दौर सवाई जयसिंह के समय में जयपुर नगर की बसावट के साथ आया। वैसे जयपुर बसने से पहले भी गलता का महत्व आमेर के राजाओं के लिए कुछ कम नहीं था। सवाई जयसिंह के समकालीन कवि आत्माराम रचित 'सवाई जयसिंह चरित' का यह दोहा दृष्टव्य है-

कूच कियौ आमेरि तै
महाराज भुवमान।
गलता व्है कै आइ भी,
साहीदार मिलान।।

सवाई जयसिंह तब मथुरा का सूबेदार था और बादशाह का फरमान मिलने पर वह कई दिनों तक आमेर में रहने के बाद आगरा प्रस्थान कर रहा था। आगरा के लिए तब भी पुराने घाट, दौसा और बसवा होकर रास्ता जाता था। इसी कूच के बाद जयसिंह ने मथुरा में अपनी बड़ी राजकुमारी विचित्र कुमारी का विवाह जोधपुर के महाराजा अजीतसिंह के युवराज अभयसिंह के साथ किया था। यह विवाह 1724 ई. में सम्पन्न हुआ था। इस शुभ कार्य के लिए जाने से पूर्व जयसिंह का गलता और फिर बसवा के झामकुण्ड पर ठहरना अर्थपूर्ण है। वैदिक संस्कारों में परम आस्थावान सवाई जयसिंह अपने गलता गुरु और गलता के श्रीसीतारामजी के दर्शन करते हुए गया होगा। आमेर से गलता आने का मार्ग भी वही रहा होगा जो जयपुर की छह कोसी और बारह कोसी परिकमाओं में आज भी अपनाया जाता है। आमेर के मथुरा दरवाजे से राजगढ मार्ग में बन्ध के दरवाजे से लगाकर जयनिवास बाग तक का क्षेत्र तब 'कनक वृन्दावन' कहलाता था और यहीं श्री गोविन्ददेव का मन्दिर था। बाद में जब यहां अधिक जल प्लावन होने लगा तो जयसिंह ने अपने नव निर्मित नगर के जय निवास बाग की बारहदरी या 'सूर्य महल' में गोविन्ददेवजी को विराजमान किया।

सवाई जयसिंह ने आमेर की गद्दी पर बैठने के बाद से ही वैदिक यज्ञों का आयोजन कराना आरंभ कर दिया था। आमेर के श्याम बाग में, जिसे अब परियों का बाग कहा जाता है और जो मावठा सरोवर के दक्षिणी तट पर स्थित है, वाजपेय यज्ञ जैसे बृहत यज्ञ को उसने मात्र बीस वर्ष की आयु में सम्पन्न किया। इसके बाद जयसिंह ने अन्यान्य यज्ञ कर इस वैदिक परम्परा को पुनर्जीवित किया और अपनी नवनिर्मित राजधानी को एक हिन्दू संस्कारों से परिपूर्ण नगरी बनाया। इनमें अश्वमेध भी था और राजसूय यज्ञ उसका उत्तराधिकारी युवराज ईश्वरीसिंह तब कर रहा था जब जयसिंह मृत्यु शैया पर था। यद्यपि प्रामाणिक रूप से कुछ कहना संभव नहीं, किन्तु गलता गादी की परम्परा को जानने वाले पुराने लोगों का मानना है कि अश्वमेध यज्ञ के अवसर पर ही महाराजा ने गलता के महन्त हर्य्याचार्य को विवाह कर गृहस्थ बन जाने के लिए प्रेरित किया था। कारण यह था कि इस यज्ञ के कर्ता यजमान को पूर्णाहुति पर आशीर्वाद लेने के लिए सपत्नीक गुरु की आवश्यकता थी।

इस बात की परोक्ष पुष्टि इस तथ्य से होती है कि सवाई जयसिंह ने निहंग सन्त महन्तों को, जो विवाह के इच्छुक हों, अपनी अपनी जाति में विवाह करने की स्वतंत्रता देना वांछनीय समझा था (1971 ई. में दिल्ली से नेशनल आर्काइव्ज आफ इण्डिया द्वारा प्रकाशित जयपुर के कपड़द्वारा के दस्तावेजों की विवरणात्मक सूची, भाग I)। जयसिंह ने उसी अवसर पर ब्राह्मणों की छह जातियों गौड़, गुर्जर गौड़, सनाढ्य, पारीक, दाधीच और खाण्डल को एक साथ बैठाकर 'छन्यात' के सामूहिक भोज की प्रथा भी आरंभ की थी। तर्क यह था कि सब ब्राह्मण सृष्टि के प्रतिपालक विष्णु के स्वरूप हैं। उनमें कोई छोटा बड़ा नहीं है और सबके साथ बैठकर एक चौके में भोजन करने से उनका ब्रह्मत्व

या ब्राह्मणत्व नष्ट नहीं होता।

आमेर के राजाओं के लिए गलता की श्रीसम्प्रदाय की गादी पृथ्वीराज (1503–27 ई.) के समय से पूज्य बनी थी, किन्तु इसके बाद राजा मानसिंह ने बंगाल और बिहार की अपनी सूबेदारी के दिनों में गौड़ीय वैष्णवों से गाढ़ासम्पर्क साधा था और चैतन्य के शिष्य रूप गोस्वामी की प्रेरणा से वृन्दावन में गोविन्ददेव का विशाल और भव्य मन्दिर बनवाया था। राजा भारमल की रानी का 'सती बुर्जा' भी मथुरा के विश्रान्त घाट पर आज तक विद्यमान है। मथुरा में सीतारामजी का मन्दिर भी जयपुर नरेश का ही बनवाया हुआ है। इससे यह निष्कर्ष निकलता है कि आमेर के सीतारामोपासक राजा क्रमशः कृष्ण भक्ति की मधुर और सरस धारा से जुड़ते चले गये। 'राम रासा' के संबंध में सवाई जयसिंह और उनके राजकवि कवि कलानिधि श्रीकृष्ण भट्ट का प्रचलित प्रवाद दिया जा चुका है, जिसके परिणाम स्वरूप ही 'गीत गोविन्द' की शैली में 'रामगीत' की रचना हुई। सवाई जयसिंह राम की सगुण भक्ति में मधुरोपासना के प्रमाण जानने का जिज्ञासु अवश्य था। गलता में स्वामी अग्रदास, नाभादास, मधुराचार्य और हर्याचार्य ऐसे आधारग्रन्थों का प्रणयन कर चुके थे, किन्तु जयसिंह संभवतः और भी प्राचीन और प्रामाणिक आकर ग्रन्थों का पता लगाने के लिए उत्सुक था।

राष्ट्रीय अभिलेखागार, नई दिल्ली द्वारा प्रकाशित कपड़द्वारा अभिलेख सूची (1971 ई.) से पता चलता है कि स्वामी वृन्दावनदास ने जयसिंह के संशय निवारण के लिए एक पत्र भेजकर सूचित किया था कि शंकराचार्य, निम्बर्काचार्य, बालकृष्ण और नन्द सरस्वती द्वारा प्रतिपादित सिद्धान्त समान ही हैं, एक दूसरे के पूरक, अतः इन पारस्परिक मतों में विरोध नहीं मानना चाहिए। स्वामी बाल्मीकि के शिष्य एक कल्याणदास ने सवाई जयसिंह को सूचना दी थी कि उसने द्वारिका के मार्ग में 'भुशुण्डिरामायण' की प्रति देखी है और क्या महाराजा चाहेंगे कि यह प्रति उनके लिए लाई जाये? यह 'भुशुण्डि रामायण' राम की मधुरोपासना का ही एक प्राचीन आधार ग्रन्थ माना जाता है।

यह सभी संदर्भ गलता के प्रति सवाई जयसिंह के गहरे लगाव के द्योतक हैं। जब 1727 ई. के 18 नवम्बर को जयसिंह ने जयपुर या जयनगर की नींव डालदी तो गलता के विकास का एक नया अध्याय आरंभ हुआ।

11.2 Rates & Specifications

Rates & Specifications for Traditional Construction & finishing Items for Restoration with approved rates by P.W. D. as on March, 97. This has been Listed below

S. No.	PARTICULARS	UNIT	RATE	REMARKS
1.1	Lime Sand Mortar 1:2 (1 Lime Putty : 2 Sand)	Cum	413.86	(Rates are for Group Hoor upto 4m Height only)
1.2	Lime Surkhi Mortar 1: 2 (1 Lime Putty : 2 Surkhi)	Cum	588.28	
2.1	Lime Surkhi Plaster 1 : 2 (1 Lime : 2 Surkhi) for Patch Repair including preparation of Mortar by traditional practice (by hand grinding) in 3 course for base coarse and subsequent course & Loi, tamping, beating, till the shrinkage cracks are disappear. The work is doen to all leads and lift as the sork is of restoration nature as per Jaipur practice.			
	(a) 33mm thick (4 coats)	Sq.mt.	60.00	
	(b) 45 mm thick (6 coats) each coat not more than 8mm and allowing each coats after 3 days	Sq.mt.	81.00	
	(c) 75 mm thick (in 9 coats) each coat should not be more than 8mm	Sq.mt.	134.50	
2.2	Add extra in 2.1 © for tuman by bricks bats in lime surkhi plaster for thickness above 75mm.	Sq.mt.	18.50	
2.3	Mime Sand Plaster 1:2 for repair work :			
	(a) 33mm thick (4 coats)	Sq.mtr.	50.00	
	(b) - do- 45mm thick (in 4 coats)	Sq.mtr.	64.00	

S. No.	PARTICULARS	UNIT	RATE	REMARKS
2.4	Making Mehrab's Arches Pillars, Highly decorative creepers, flower of small sizes etc. in lime mortar 1:2 as per traditional practice.	Sq.mtr.	335.63	
2.5	Making Kangura's as per design in lime mortar 1:2 of size 0.30 X 0.15 cms at the top of the parapet wall including making mortar by hand grinding as per practice with flower design.	Sq.mt.	309.00	
2.6	Stucco (Nanovat) work in Lime Mortar 1:2 as per design, the mortar should be prepared by hank grinding only. The thickness varies from 10 mm to 20 mm as per the design.	Sq.mt.	1137.8 1	Looking to the nature of work and varying thickness 10 mm to 100mm it is difficult to assess correctly hence rate proposed by AVS accepted for approval
2.7	Araish Plaster (as per Jaipur Practice) 1:2 (1 lime : 2 Zikki) on lime plaster or plane back ground including preparation of lime for 6 months by slaking of lime with curd as changing the water every week. The Kara plaster of not more than 6mm thick is to be left the maximum of 3 months to appear the shrinkage & temperature cracks. Over the Kara plaster 2mm layer of grinded lime putty is to be done and is to be rubbed Gently by Akik stone. Then adding Khoppra & Ghee and inserting the design of colour boarder all around.	Sq.mt.	704.50	
2.8	(a) Providing Araish Plaster (as per Udaipur Practice) at all vertical Flat surfaces at ground floor excluding lift.	Sq.mtr.	128.00	
	(b) -do- for flat ceiling surfaces at ground floor excluding lift.	Sq.mtr.	154.00	
	(c) Providing lime kara on curved, decorative stone, pillars, Meharabs (as per Udaipur Practice) as per decorative ornamental design as per old existing carving on stone surface highly pracise.	Sq.mtr.	768.00	Actural curved area to be measured (this work is highly ornamental it has been taken 6 times the plain surface area as visualised at site)

S. No.	PARTICULARS	UNIT	RATE	REMARKS
2.9	Removing of Central dome over defective ornamental plaster and redoing entire plaster in lime sand mortar (1:2) in three layers as per old traditional pratices including all lead & lift for complete work (ornamental work) at Bikanet (Size 14'7 x 3'4 x 13") Job work.	Each	33810.00	Job work
2.10	Lime Plaster on Chhattiri Dismentling the complete old plaster from Chhattri and redoing complete new plaster in lime sand mortar 1:2 in 3 coats upto 7.5 Mtr. Ht. (ornamental work) (Size 8'3' x 4'0" x 11'6") Job work.	Each	12650.00	Job work
2.11	Removal of old flush pointing from existing Ashalar masonary joints of stone cladding, chajjas, jali etc. with neat cement & colour at arious places at stages for repairs only incouding all leads & lifts.	Sq.ft.	5.45	
2.12	Refixing of loose stone cladding by removing, redressing as per patches repair in white cement araldite by adding the pigment to match the colour	Sq.ft.	5.39	
2.13	Lime Surkhi Jali 2" to 4" thick as per traditional practice cast in site in lime mortar 1:2 , mortar is hand grinded.	Sq.ft.	202.00	
3.1	Removing of 75 mm thick old lime plaster in patches upto 4.5 mtr. In bt. With all case	Sq.mt.	8.60	
3.2	Scraping & Removing of white wash/distemper/oil paints/algli etc. from plain plaster and surfaces gently with care to keep intact the old designs.	Sq.mt.	6.35	
3.3	Scraping & removing of white wash/distemper/iol paints/algai on lime plaster work, highly decorative ornamental & stucco work with at most care by using fine sand paper under the close supervision. The old design to be kept intact white carrying our scraping.	Sq.ft.	21.81	

S. No.	PARTICULARS	UNIT	RATE	REMARKS
3.4	Rubbing/Removal of lime wash from stone work by abrasive method woth all care as these may be some decorative carving etc. under the lime plaster which have to be keep intact.	Sq.mtr.	8.00	
3.5	Removal of lime wash/algai/oil paints etc. from pannel of stones walls/chajja by abrasive method with all care to protect if any decorative piece of work with atmost supervision.	Sq.mtr.	283.49	This rate is applicable for ornamental work available under neath only
3.6	Cleaning of Araish by Teepol and other alkaline acidic chemicals with care, by gently rubbing & washings under the close supervision.	Sq.ft.	23.10	
	-do- Marble stucco work	Sq.ft.	12.70	
3.7	Cleaning of stone surfaces lime stone pillars, beams stone walls & all decorative stone work ceiling patties, kanguras, pan by carbovandum stone. The stone are cut & make to the size and shipe of groove or carving and pasted on wooken stick by araldite to reach the required point. Work carry out very slowly, gently and under close supervision so that patina of stone does not distorted very much	Sq.ft.	70.17	Rate analysis is not possible. The rates should be arrived as per actual expenditure because area dannot be identify. Hence rates proposed by AVS are accepted for approval
3.8	Cleaning of marble wall surface as per 3.7 in three course with atmost care at different heights and surface, with scaffolding of balli strong enough to carry the load, tighting scaffolding by Bann Rassi with tested every month & removing and making joint thight and intact by replacing. Loose or cc: Bann also using safety blt at height above 10 ft.	Sq.ft.		
	(a) Plain Surface Non-carve :			
	(i) Upto 10 ft. ht.	Sq.ft.	11.55	-do-
	(ii) 10-35 ft. ht.	Sq.ft.	12.25	-do-
	(iii) 35-65 ft. ht.	Sq.ft.	17.68	-do-
	(iv) Above 65 ft. ht.	Sq.ft.	18.00	-do-

S. No.	PARTICULARS	UNIT	RATE	REMARKS
	(b) Same as 3.8 For Marble carve and Decorative Surfaces :			
	(i) Upto 10 ft. ht.	Sq.ft.	35.51	-do-
	(ii) 10-35 ft. ht.	Sq.ft.	39.52	-do-
	(iii) 35-65 ft. ht.	Sq.ft.	41.29	-do-
	(iv) Above 65 ft. ht.	Sq.ft.	46.79	-do-
	(c) -do- Highly decorative and carve figure surface like mouth & other humen figure intacting the shape of fixure:			
	(i) Upto 10 ft. ht.	Sq.ft.	37.36	-do-
	(ii) 10-35 ft. ht.	Sq.ft.	42.20	-do-
	(iii) 35-65 ft. ht.	Sq.ft.	46.15	-do-
	(iv) Above 65 ft. ht.	Sq.ft.	51.25	-do-
4.1	Khamira colour washing as per old traditional practice to prepare the Khamira the lime should be slaked at least for 7 – 10 days and regularly it should be stirred by adding curved Gugal, for non-synthetic colour.	Sq.ft.	4.00	
4.2	Painting stucco work by Khamira as per traditional practice to highly decorative carved surfaces in different colour	Sq.ft.	25.00	
4.3	(a) P/F Belgium coloured glass in square pattern, opening not less than 4" by 4" fixing at one side only	Sq.ft.	425.00	This work has been got executed on Contract after inviting quotation and rates provided are as per actual tenders reveived for this work. It is a very small jab.

S. No.	PARTICULARS	UNIT	RATE	REMARKS
	(b) Add extra if fixing plain glass at Back side in 4.3 (a)	Sq.ft.	180.00	
	(c) P/F Belgium coloured glass in opening of irregular shape and small size fixing at one side of opening only.	Sq.ft.	650.00	
5.1	Refixing of stone jali, railing design pillars etc. complete with pointing in joints with neat cement and colouring pigment to match stone colour at Bikaner area at Ratan Bihari Complex pattern.		30.00	
5.2	Repair & refixing of dulmera stone chattree in the orginal shape complete pointings between joints of different stone parts of the Cattree with neat cement and colouring pigment to match same as stone colour at Bikaner practice, size 14' 7" x 3' 4" x 13' 6" as per Ratan Bihari Complex pattern at Bikaner.	Each Job	3552.78	
5.3	Fine dressed dulmera stone work :			
	(a) P/F of Dulmera stone with munni for stone railing complete – size 4" x 4" x 3' 6.50" at Bikaner.	Each	674.94	
	(b) Large stone Kalash (Size Z' X 1 – 1" length) made of Dulmera stone including dressing and fixing.	Each	1350.19	
5.4	Dulmera stone Dal size 1'-11" x 1' – 9" with carving of leaves, flowers, latoo as per existing design of ratan bihari Complex, Bikaner.	Each	850.00	These rates are for Ratan Bihari Complex as per existing patter for a particular & specific job.
5.5	Dulmera stone Jali as per existing design size 2'0" x 1'6" at Ratan Bihari Complex, Bikaner.	Sq.ft.	956.72	

S. No.	PARTICULARS	UNIT	RATE	REMARKS
5.6	Dulmera stone chajja, size 2' x 1' – 6" x (2" + 1 ¼ ") as per existing pattern of Ratan Bihari complex, Bikaner.	Sq.ft.	168.85	
5.7	Dulmera Stone Khura (Todi) size 4'x 3 ½ " x 4" as per existing pattern of Ratan Bihari Complex Bikaner.	Each	300.00	
5.8	Dulmera stone cut work pillar for Chhattree/Gumte (Ornamental work) size 4" x 4"/ 4" x 5" as per existing pattern at Ratan Bihari Complex, Bikaner.	Each	1329.69	
5.9	Dulmera stone thamble pillar for stone chattrees 8" x8" x 3" size as per existing pattern at Ratan Bihari complex, Bikaner	Each	1119.19	
5.10	Dulmera stone fine dressed cladding including removing of old existing stone with care and fixing new stone complete.	Sq.ft.	71.00	
5.11	Dulmera stone dasa with pan leaves finished 4" thick as per existing pattern of Ratan Bihari Complex, Bikaner.	Sq.ft.	157.85	These rates are for specific job for a particular area.
5.12	Chisel dressed at Top & sike dasa in Jodhpur stone including grooving for fixing Jali as per existing pattern at Sh. Raj Ranchod Das Ji Temple , Jodhpur	Sq.ft.	98.00	
5.13	P/F dressed stone kadam 2" thick as per Jodhpur practice –do-	Sq.ft.	115.00	
5.14	P/F dressed suridar Jali size 1' x 1 ½ ' x 3" finished of Jodhpur stone as per existing pattern of Raj Ranchod Das Ji Ka Temple, Jodhpur.	Each Job	383.84	Job work
5.15	P/F dressed Jodhpur stone Thambli as per existing pattern of Shri Raj Ranchod Das Ji Ka Temple, Jodhpur size 6" x6" x3' finished including making Latoo.	Each Job	1189.65	

S. No.	PARTICULARS	UNIT	RATE	REMARKS
5.16	P/F dressed Kangurah stone as per existing pattern of Raj Ranchod Ji Ka temple, Jodhpur practice Size 2' x 1' x 4".	Each	452.00	
5.17	Providing & Fixing dressed stone Chajja as per Jodhpur practice as per existing pattern of Raj Ranchod Das Ji Ka Temple , Jodhpur (5'3" x 6" x 3") curved shape.	Each Job	3149.36	
5.18	Providing & Fixing dressed stone Goomti Chajjah as per existing pattern of Raj Ranchod Das Ji Ka Temple, Jodhpur	Each Job	2093.32	
5.19	P &F dressed stone paga of size 12" x 12" x 3" as per existing pattern of Raj Ranchod Das Ji Ka Temple, Jodhpur	Each Job	310.69	
5.20	P/F railing of Bansi Paharpur stone with dressing on both sides as per design and fixing in white cement with Araldite and colouring pigment to match same as stone colour.	Sq.mt.	1396.39	
5.21	(a) P/F stone thambli of Bansi Paharpur stone after dressing as per design 4" x 4" x3' as per existing pattern of Laxman Mandir, Bharatpur.	Each	161.70	
	(b) P/F Thambli heads on existing Thamblies in Bansi Paharpur stones as per existing design of Laxman Mandir , Bharatpur.	Each	98.17	
5.22	P/F Bansi Paharpur stone on walls for cladding in approved design & joints matched in same colour as stone in white cement extra cost of stone used as dassa of 3" x 10" at top payable for only 3" along length (in 12 sqm. Loss is of 1.897 sq. mtr.)	Sq.mt.	807.91	
5.23	P/F Bansi Paharpur stone Margola on edges of walls of size 18" x 4" x 70' with gola on one edge as per design in white cement sand mortar.	Sq.mt.	10329.00	For complete job work.

S. No.	PARTICULARS	UNIT	RATE	REMARKS
5.24	P/F Bansi Paharpur stone dassa designed as leaf of pan in 18" x 10: x 26'	Rmt.	21087.00	For complete job work
5.25	P/F Bansi Paharpur stone dressed as per design of leaf of snake 12" x 30'.	Rmt.	26862.00	For complete job work

Published Material -
by the **Author**

1. Khanna Rajiv - The Revival of Kanak Vrindavan Valley - Architecture + Design, Sept - Oct 1992, Page 33-41.

2. Khanna Rajiv, Building Traditionally - Mirror work and panniwork, Architecture + Design, N.Delhi, March-April, 1993, Page No. 73-74.

3. Khanna Rajiv - Renewing the existing - Bagore Ki Haveli - Udaipur - Architecture + Design Jan-Feb. 1996, pages 56-65.

4. Khanna Rajiv - Landscape - Kanak Vrindavan Valley - Jaipur, Architecture + Design, May-June 1996, Page 55- 56.

5. Khanna Rajiv - Building Traditionally - Aaraish, Architecture + Design, Sept-Oct-1992 pages 95-96.

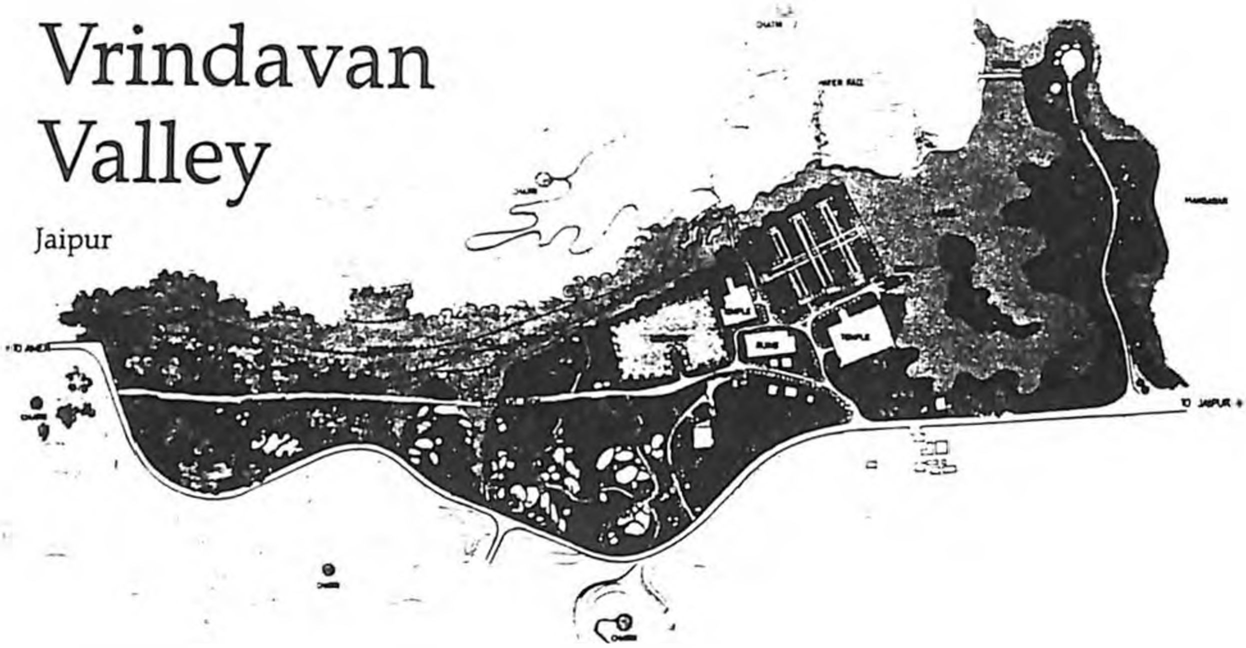
6. Khanna Rajiv - Restoration - Redevelopment of Ghat-Ki- Guni Complex, Jaipur, Scheme B, Architecture + Design, May-June 1997, Pages 75-80.

7. Khanna Rajiv, Lime & Yog hurt among natural finishes used to restore ancient Indian Temple, Pace, Vol. 46, Sept 92,Hongkong Press.

The Revival of

Kanak Vrindavan Valley

Jaipur



After eight years of research and effort to recall and re-use original building materials and techniques, this restoration project, covering an entire valley dotted with old buildings and in particular, two temples, bears witness to the beauty and viability of age-old techniques even today.

Architect **Rajiv Khanna**

In AD 1714, about fourteen years prior to the building of the now fabled city of Jaipur, Raja Sawai Jai Singh brought the idol of Vrindavan's ruling deity, Lord Govind Deoji to his kingdom. The idol was placed in a temple where the figure of Radha-Madhav had already been installed by the poet Jaidev of Bengal. The temple was situated in a valley that was green and lush and filled with *Kadamb* and *Dhak* trees of the kind that enriched the gardens of Lord Krishna in Vrindavan. Soon, the entire valley came to be known as Kanak Vrindavan Ghati, and the temple where the idol was installed, as the Govind Deoji Temple.

Towards the east of the temple was the sprawling Kanak Bagh, a garden laid out in a unique amalgam of the Rajputana and Mughal styles with waterways, fountains and flower beds. Adjacent to the temple was the smaller, but equally impressive Natwarji Temple built by Amar Kanwar, the devout sister of Raja Sawai Jai Singh.

During the course of almost three centuries, however, the harsh environment of the bordering desert took its toll on the temples. The lime mortar cracked and crumbled, walls weakened, roofs and ceilings developed cracks and the intricate *jali* work disintegrated. The deterioration of structures was caused as much by extreme variations in temperature, as by plant growth and moisture retention after rain. The adjacent Mansagar Lake with its fluctuating water levels during the monsoon and frequent flooding resulted in further dampness in these structures. Porosity of the material gave rise to capillary action allowing water to seep into the foundations and superstructure. As a result, the sedimentary stone disintegrated. Bats, stray animals and people encroaching onto the premises added to the damage. Left in this state, it was only a matter of time before the already ruined temples would be completely obliterated.

This deterioration was not restricted to buildings alone. The surroundings of these temples, too, degraded rapidly, influencing in a significant manner the condition of the entire complex. The disturbed aquatic ecosystem of the lake resulted in an unbalanced hydrological cycle which had led to frequent floods, high water pollution and elimination of aquatic life, as also depletion in the surface and sub-surface ground water.

Drastic changes had also occurred in the flora of the valley as a result of interference with the natural ecosystem. Climatic constraints apart, wood cutting and grazing had eliminated essential plants of the valley. The effects were severe, resulting in heavy erosion, heavy siltation in the lake, increased temperature and air pollution. Along with the natural fauna, the avifauna of the area had also become rare. In addition to all this, building development in the valley adjoining the city of Jaipur had taken place in a manner that completely disregarded its architectural

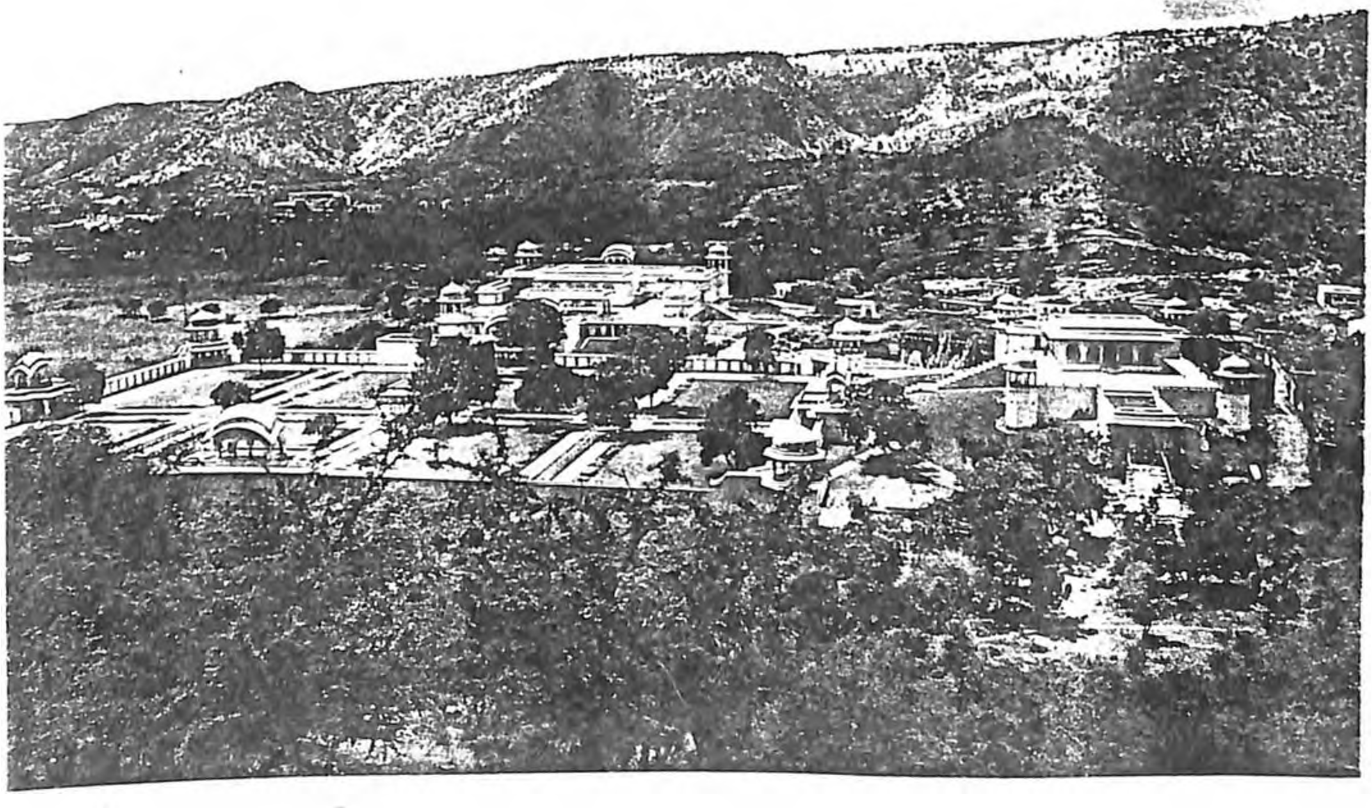
The temple [illegible] before and after restoration

and natural heritage as well as the cultural traditions that had prevailed.

With these concerns in mind a Conservation and Restoration Master Plan was prepared by me in 1984 for the valley, covering an area of [illegible] sq km between Jaipur and Amber towns. Stress was laid on comprehensive planning that took into account not only architectural restoration but also included re-establishing the ecosystem of the entire valley. The plan was accepted by the Government of Rajasthan in [illegible] with an anticipated cost of Rs [illegible] crores.

Public participation was necessary to make the project a success, and at this stage the noted industrialist, philanthropist, K.K. Birla, took the initiative, making this a pioneer project in the field of conservation and restoration. Sponsored by the Hindustan Charity Trust, work began in 1984, and a stretch of 2.5 sq km of the valley formed by the Aravalli hills, which had since been renamed 'Flower Valley', was selected and restored its original name, Kanak Vrindavan Ghati. Eight years later in 1991, the major part of the project was complete at a cost of Rs 2.5 crores.

I had noted that the character of buildings in this area had a distinct richness: traditional materials and unique techniques of construction. Forts, temples and gardens were part of it. The plan, therefore, suggested various methods of conservation to revive the original character, using authentic architectural material, techniques and stylistic details. An important consideration was to revive the historical and cultural activities of its past

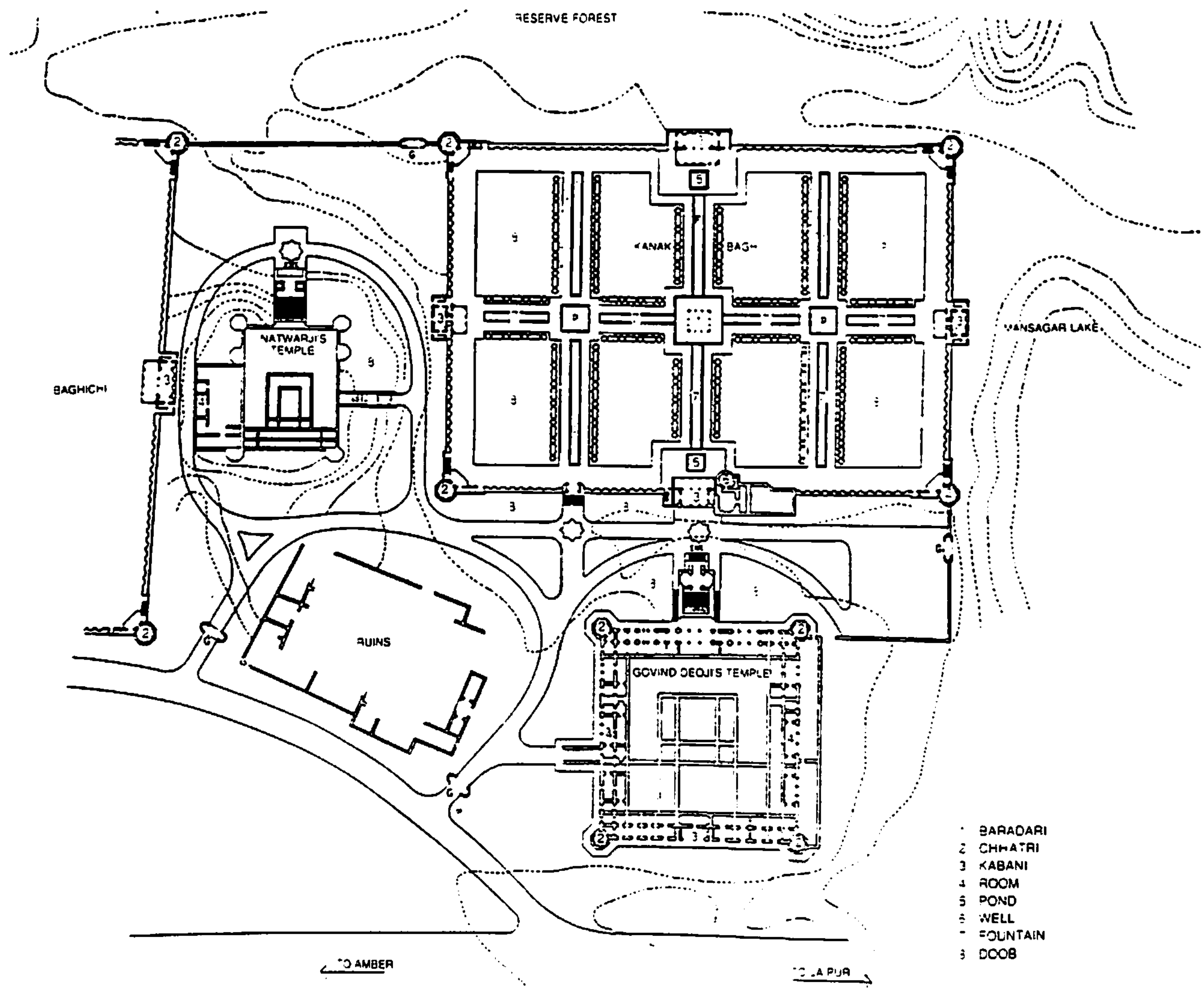


The Process

It was necessary that building restoration and environmental conservation work be taken up simultaneously. In order to counter the effects of over two centuries of decay I started research on the ancient materials and methods of construction used in these buildings. A conjectural plan of the original was made from the ruins. Buildings belonging to the same period in Rajasthan were documented. The intention was to recreate architectural features in terms of geometry, form, scale, colours and materials.

During the year 1984, various experiments with different traditional materials and methodology were carried out before the actual restoration work began in early 1985. It was difficult to locate the masons, artisans and craftsmen who could still use these old techniques, and apart from three, Angira, Suraj and Prabhudayal, most of them had only piecemeal knowledge, both about the composition of materials and the sequence of techniques. It was only after eight years of rigorous experiments that near perfection was achieved, and the results are now being implemented at Galta Temple complex near Jaipur where restoration work is in progress.

In addition to materials and techniques, the decorative arts of the period, now rarely in use, were also recreated. The time and effort involved in recreating original procedures and intricate designs, and the exhorbitant costs this entailed, had restricted their use for more than a century. However, our painstaking effort and patience finally produced original results. For instance, among the laborious techniques involved, the lime used in buildings for various finishes such as *aaraish* and *fresco* requires preparation for at least two years before its application. If any colour is to be added then natural stones are crushed, mixed with the processed lime and churned in pots for at least six months before use. Similarly, the *mirror* and *panni* work is so elaborate that it takes a day to create only two square inches of the surface in intricate geometrical patterns laid over relief work. The preparation of adhesives from extracts of plants is also a cumbersome process.

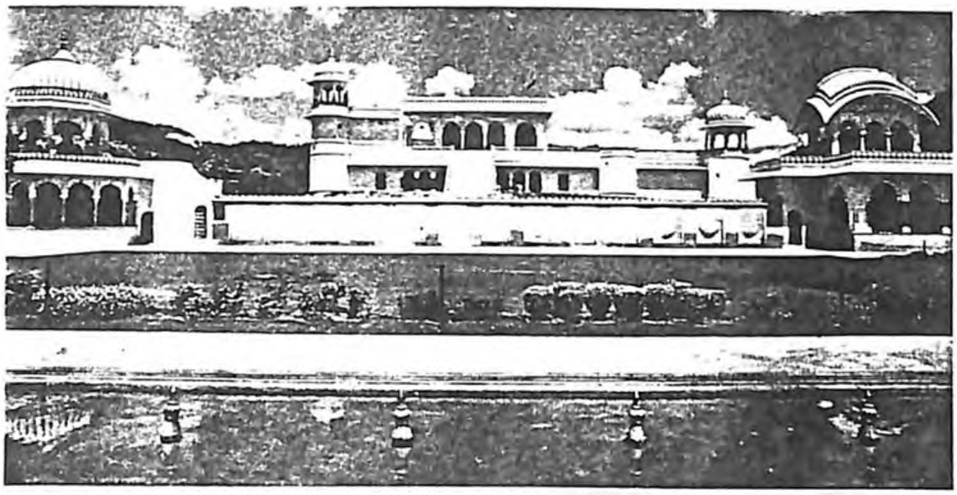


GROUND FLOOR

GOVIND DEOJI AND NATWARJI TEMPLES

The restoration work at Govind Deoji Temple (AD 1707) covered the ground floor which consists of sixty rooms built round its periphery, four towers at the corners, and the staircase leading up to the first floor. The upper floor required restoration of the pavilions [illegible] and twenty [illegible] partially enclosed verandas. The design of the temple is derived from the *vastu-purusha-mandala*.

The Natwarji Temple resembles Govind Deoji Temple. Although smaller in size, it has a variety of rich architectural elements.

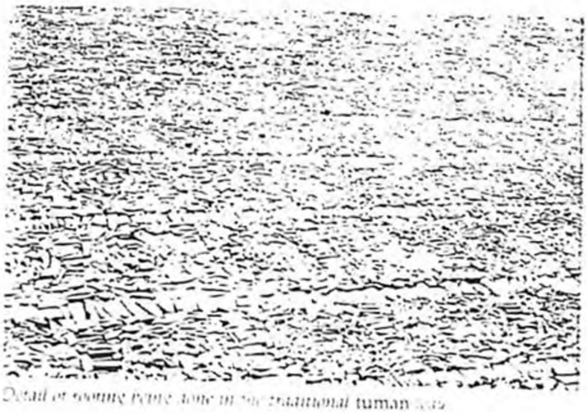


View of Natwarji's Temple from Kanak Bagh (AD 1707)

Govind Deoji's Temple after restoration.

Traditional Materials and Techniques

...e of thapi in preparation of 'dar' flooring



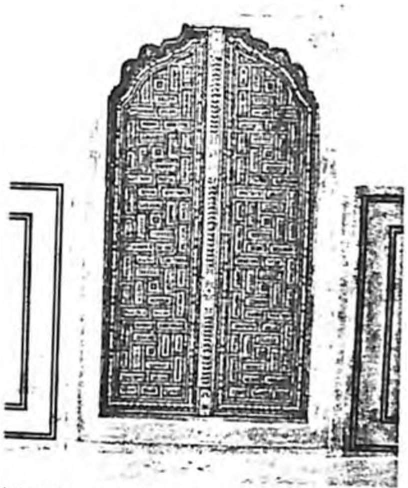
Detail of ... stone in the traditional tuman ...

Traditional Indian arts of construction made wide use of raw materials such as *gond* (gum), *gur* (jaggery), *narial* (coconut), *dal* (curds), *methi* (fenugreek), *sandh* (rope fibres), and others such as coloured stone dust and resins from leaf extracts.

DAR (Flooring)

In this project, every missing stone was relaid. Old lime mortar was reinforced with fresh lime mortar. Entire floors were dug up and replastered. All exposed terraces and roofs were treated for waterproofing with *methi*, *gur* and rope fibre, along with lime *surkhi* which ensures adequate waterproofing. To carry out the terracing work the first task was to dismantle the floor and re-lay it in lime and *surkhi* with stone pieces tightly joined in a circular formation. This process is known as *tuman*. To the lime and *surkhi* is added rope fibre (which prevents cracking), *methi* (a waterproofing agent), and *gur* (a binding material). The mix is then applied with wooden pieces on the *tuman* in a rhythmic beat accompanied by singing. Later, surplus water is extracted by beating the surface with bamboo strips for weeks; this is followed by ramming of wooden *thapis* (slats) which helps consolidate the lime mortar. This process spans two to three weeks. At the end of it, the surface is completely waterproof and is known in the local language as '*dar*'.

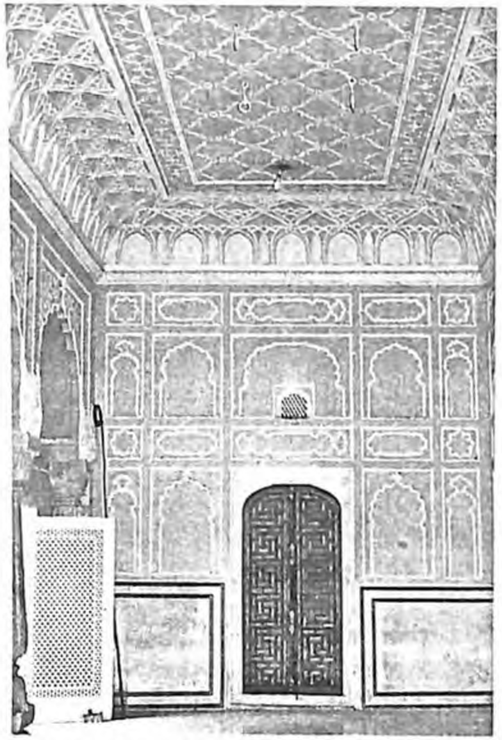
The '*dar*' surface becomes a base for yet another finish, known as *aarash*. Wall paintings or frescoes are also in *aarash* work. This finish can last at least a century without the loss of original colour, shine and without cracking in arid conditions. *Aarash* has been extensively used on floors, walls and pillars of the complex.

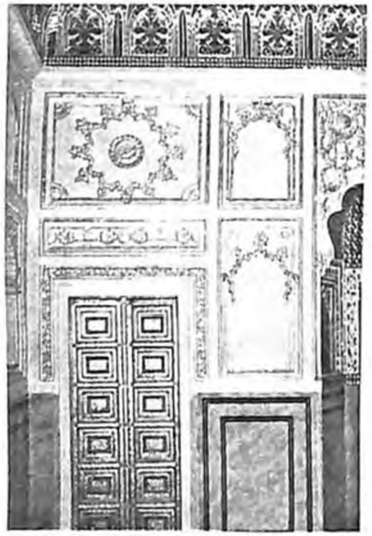


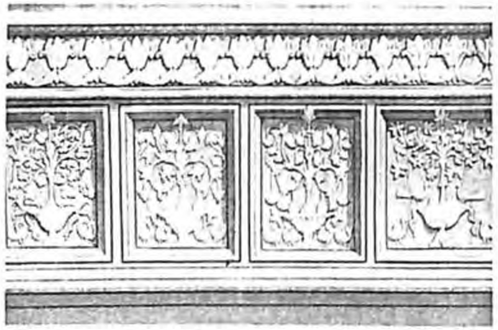
Inlay of 'mother of pearl' in the 'Swastik' pattern on a sandalwood door

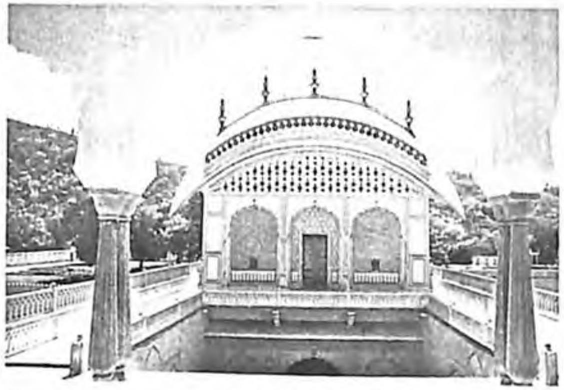
Other traditional decorative arts which have been revived in these temples include geometric and floral designs in relief work. There is an amalgam of mirror, *panni* and *meena* work in the *garbha griha* of both the temples. The inlay work on sandalwood doors is of 'mother of pearl'. Even the simple doors placed in the *garbha griha* have intricate floral designs. The brass and silver work is in decorative leaf and flower pattern.

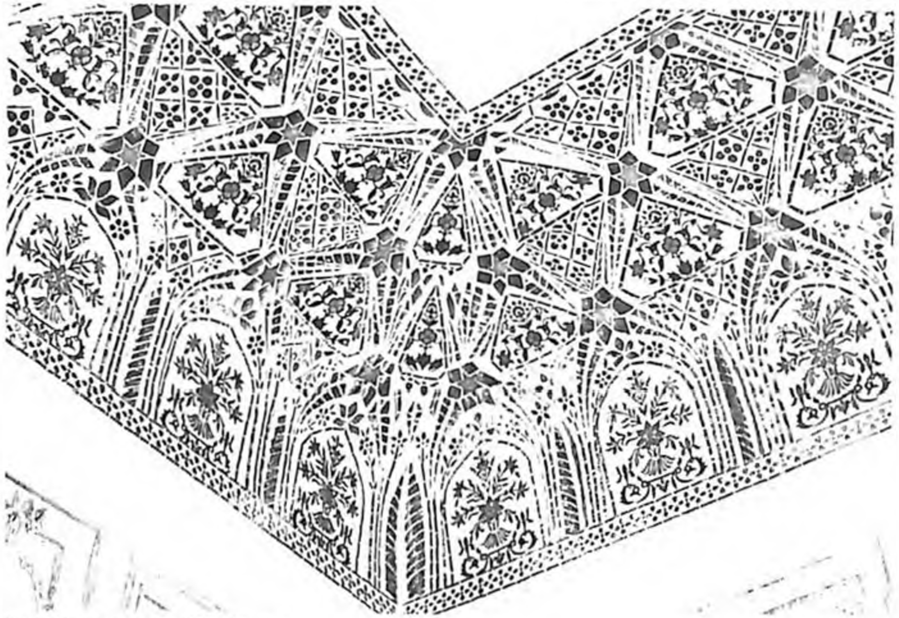
Traditional arts of decoration added to the interior of the garbha griha *of Satyanarayan Temple—in amalgam of mirror, silver, stucco,* panni *and* meena *work*











Sequence of Work

After the debris was removed, an extensive survey of the area led to the drawing up of a conjectural plan. A number of rooms which had been walled up or partially covered with debris were opened and bats removed by means of chemicals and smoke. About 150 labourers were engaged and a search conducted all over Rajasthan for masons who were conversant with the original techniques.

Some structures required only strengthening while others needed complete demolition and rebuilding. Drawings were made on the floor of the site.

Central Pavilion of Kanak Bagh

The roof had developed cracks and leakage. Temporary wooden rafters placed by the previous occupants of the room can be seen. The original marble columns on the right were missing. The damaged floor seemed like a compact stack of sand.

This central pavilion has a *[illegible]* resting over it. Thus, while restoring the pavilion, the entire load of the above existing *[illegible]* was transferred on temporary raised columns at the sides. Then the ceiling was opened up and fresh stone slabs were placed and the usual 'dar' terracing was followed. New engraved marble columns were reintroduced and *aaraish* flooring was relaid.

The Door

One of the lower rooms of Govind Deoji Temple has recently been converted into a museum. The loosened stone arch and weathered stone pillars were restructured. The broken wooden door was also recrafted following the traditional system of hinges, locking, and use of metal strips using nuts and bolts to strengthen the wooden door. The missing idol of Lord Ganesha in the niche above the door was replaced.

Closed Rooms of the Temple

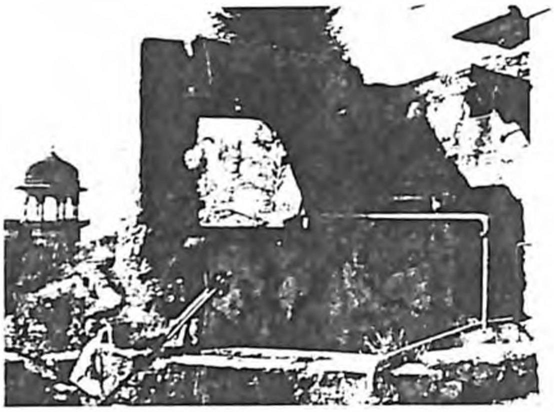
To our surprise, eighty rooms were discovered below the Govind Deoji Temple. The dampness and lack of fresh air in the closed rooms had disintegrated the building materials.

The rooms were reopened and the entire floor was dug open and aired. The damaged lime plaster of the walls was raked out and holes were carefully made in the walls so as to allow air to come in. Stone bracings were placed where there were vertical cracks.

The erstwhile main occupants of the rooms — thousands of bats — were removed by the use of Aldrin and smoke. The excreta of the bats (which is an ideal fertilizer) was used in the valley conservation scheme.

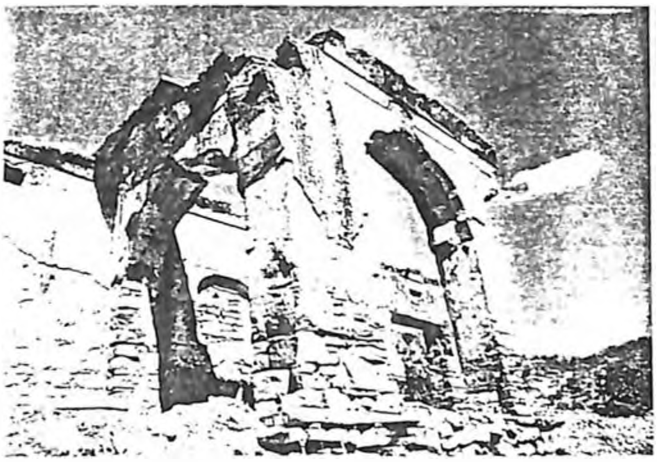
Irrigation system at Kanak Bagh

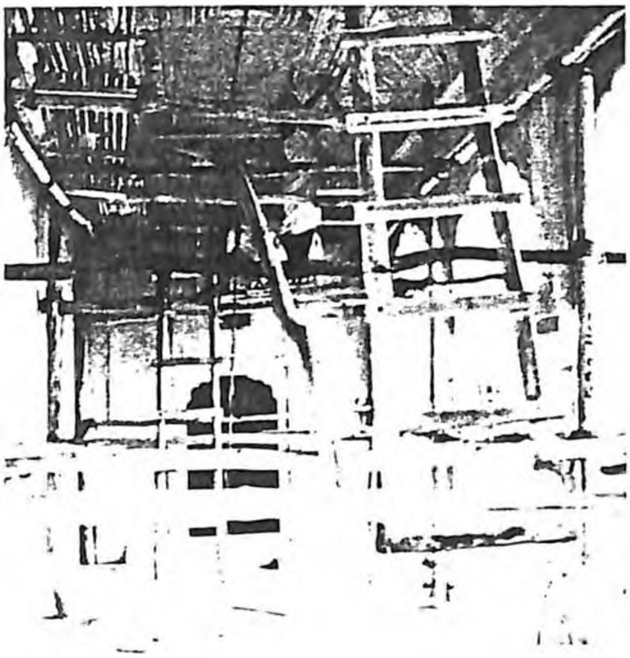
From a typical Shekhawati well, the water used to be lifted up by the use of pulleys with bullocks. Then it was stored in a tank lying above. From here water was drawn by gravity into the fountains. This ancient irrigation system has been restored.



Collapsed Chhatri

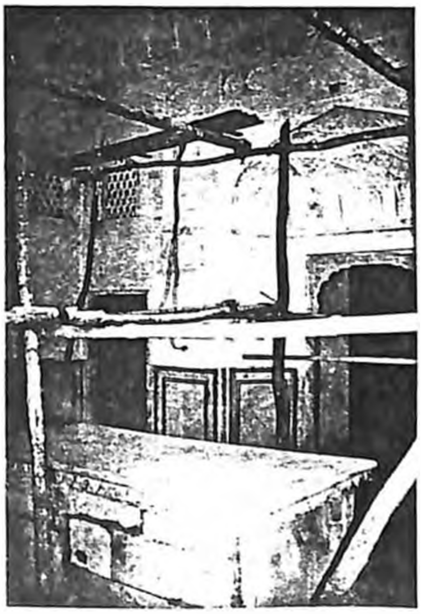
The deteriorated materials were fixed with fresh lime mortar. The dome above was rebuilt in stone and mortar giving it its original shape and style.





Garbha Griha

The *garbha griha* which had remained closed for three centuries was opened up and cleaned of bats and other debris. This view has been taken after eight months of work in progress. The surfaces are still being prepared for [illegible] and mirror work on the ceiling and walls. The marble pedestal seen was placed for the idols.

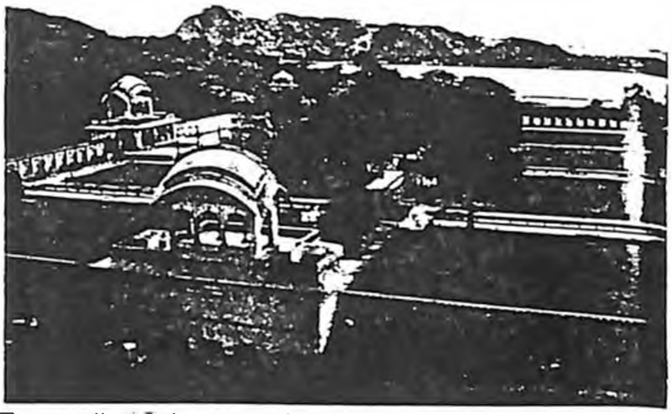


Parikrama

After a period of 8 - 9 months the *parikrama* was prepared to receive an intricate stucco design followed by [illegible] colours. Prevalent geometrical patterns were introduced on the wall panels and ceilings in relief work. The sub-divisions of panels were proportioned by drawing the actual size on the floor. The arched openings were refilled with freshly carved *jalis* to allow ventilation and prevent birds. Interior lighting was concealed in decorative niches or [illegible].

KANAK BAGH

The Kanak Bagh, located between the two temples, is laid out over four acres. It has a geometrical design with fountains, flower-beds, waterways and pathways. The outer, six feet high parkota wall (wall capped with arched forms) acts as a protection against the harsh climate and stray animals. In the course of time, a factory had come up and agriculture was being practised within the area. After these activities were stopped the land was restored to its original use as a garden. However, it was only after removing two feet of soil that one could trace the original design. The irrigation system was restored, channels were dug up and a pipeline relaid. The fountains were activated using gravitational force. Careful shuttering and centering resulted in replacing stone slabs to provide structural stability to pavilions under the *kabanis* (arch-shaped canopy covering a rectangular space). Eventually, after restoration of the *chhatris*, the *baradari* (pavilion) and *tibaras*, and with the accompanying sound of cascading water, the magnificence of the garden was restored.



The restored Kanak Bagh in the original geometric layout

CONSERVATION OF THE VALLEY

Treating the project as an entire heritage area, the conservation work involved re-establishing the lost ecosystem within the *ghati*. Soil and water conservation was achieved by restoring the old drainage pattern, accumulating the surface water in a series of ponds, recharging of existing aquifers, increasing soil depth using the check-*bandh* system, reintroducing the native flora of the Aravallis with ecological considerations, and improving micro-climatic conditions by creating a series of waterfalls and evaporation ponds, etc. Lasting over a period of eight years, this effort resulted in a rich *ghati* with an abundance of natural reserves. Migratory birds flocking over water-bodies and trees are now a common sight, and it is no longer unusual to see trees like the 'Flame of Forest', *Amaltas*, *Kadamb* and others adding to the colour and fragrance of the *ghati*.

The Valley before ...

... after conservation

In terms of active usage, the temples will accommodate a Vedic Centre with a comprehensive collection of Hindu scriptures. The lower rooms are being converted into a museum replete with miniatures depicting mythological scenes. And thus, for scholars and theologians, as much as for the pilgrim, this restoration project hopes to revive an architectural, environmental and cultural heritage.

Client *GP Birla*
Project architect *Ranu Khanna (Ranu Khanna and Landscape Associates)*
Finance and execution *Hindustan Charity Trust, Calcutta*
Period of restoration *1984-1991 (8 years)*
Cost *Rs 2.5 crores*

Ranu Khanna has a Master's degree in Landscape Architecture (1980), and is in the process of completing a doctoral thesis on 'Architectural Restoration and Landscape Conservation'. His work on the above project has earned him the Indira Gandhi Priyadarshini Award, 1991, and the Maharana Sajjan Singh Award, 1992. He is presently engaged in restoration work at Galta near Jaipur

2 BUILDING TRADITIONALLY

Traditionally, mirror work, *panni* work and stained glass in various geometrical designs was used extensively in the interiors of the forts, palaces and *havelis* of fifteenth century Rajasthan. Some of the finest examples of this work are to be seen in the ceilings, walls and columns of the palace at Samode, the *Diwan-e-Khas* at Amber and the City Palace, as well as the Lake Palace in Udaipur.

MIRROR WORK Rajasthan

Rajiv Khanna

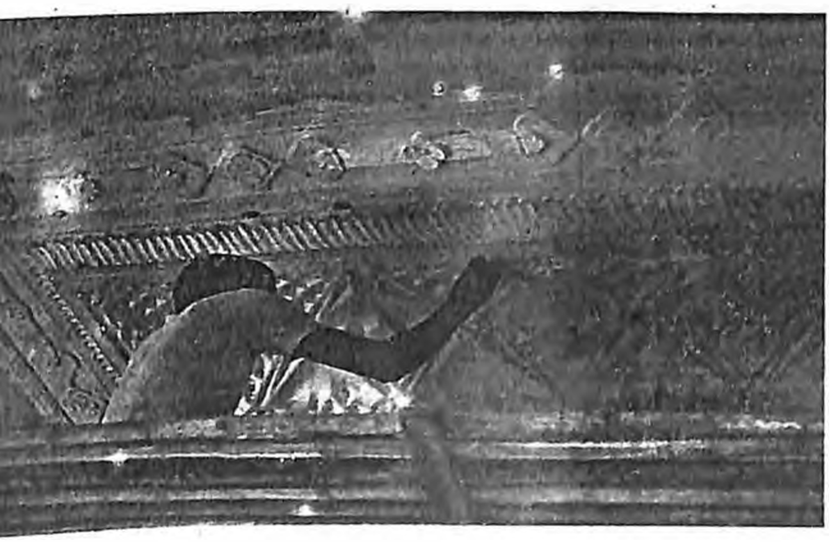
This highly intricate process requires specific micro tools — the *karni* for applying the paste, *naila* for finishing the surface, different types of *kalam* for scratching the lime paste and for cutting the mirrors and a *chimti* for gripping the mirror firmly — in addition to a special type of glue. The coloured mirrors are not available easily and come from Ahmedabad or Faizabad in circular shapes of 30 cm diameter and 2-4 mm thickness, costing approximately Rs 150 per kg.

The base on which the mirrors are placed is of lime plaster that has been watered for few days and made rough to prevent cracks. A special finish known as *loi* is then applied. This is a paste formed by mixing *kali* (baked lime) and *surkhi* (crushed burnt brick bats) in a 3:10 ratio with water. This imparts a fine reddish brown look to the surface now ready to receive the relief work. A 20-23 cm long *kalam* is used to carve out the design. (This tool has a pointed upper tip for carving, while the lower tip is left flat for scraping off the undesired paste. A circular central portion ensures a good grip.) The relief work is then followed in *gajmitti* after which the finer details are worked out in a paste formed by baking a mixture of gum and baked clay in a 1:5 ratio with water. Finally the mirrors are cut into the desired shape and their edges softened with a 15 cm long *kalam* (this one has teeth-like edges). With the help of a 10 cm long *chimti* they are then painstakingly placed piece by piece to form the floral pattern as per the design and geometry.

Cutting of mirrors is a very specialized task.

The mirror is firmly held with a chimti *while the edges are smoothened. Also seen are various other tools utilized.*

...f the design being carved out in gajmitti.



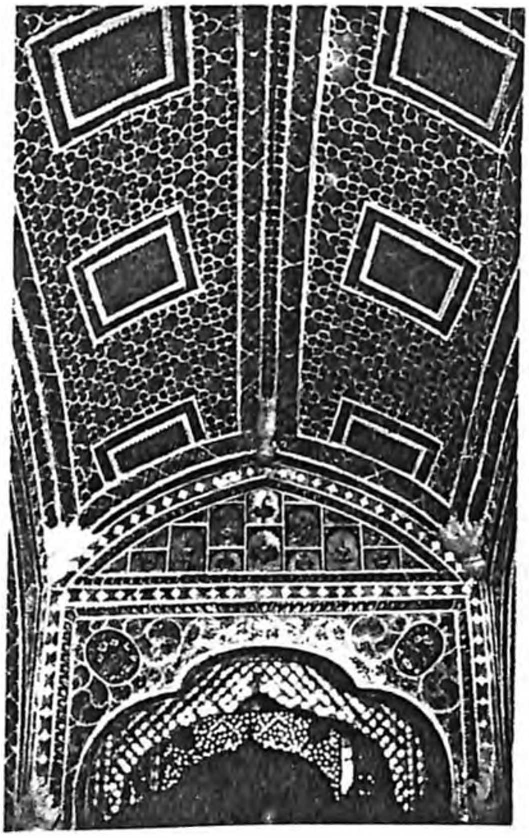
Studding of mirrors in progress.

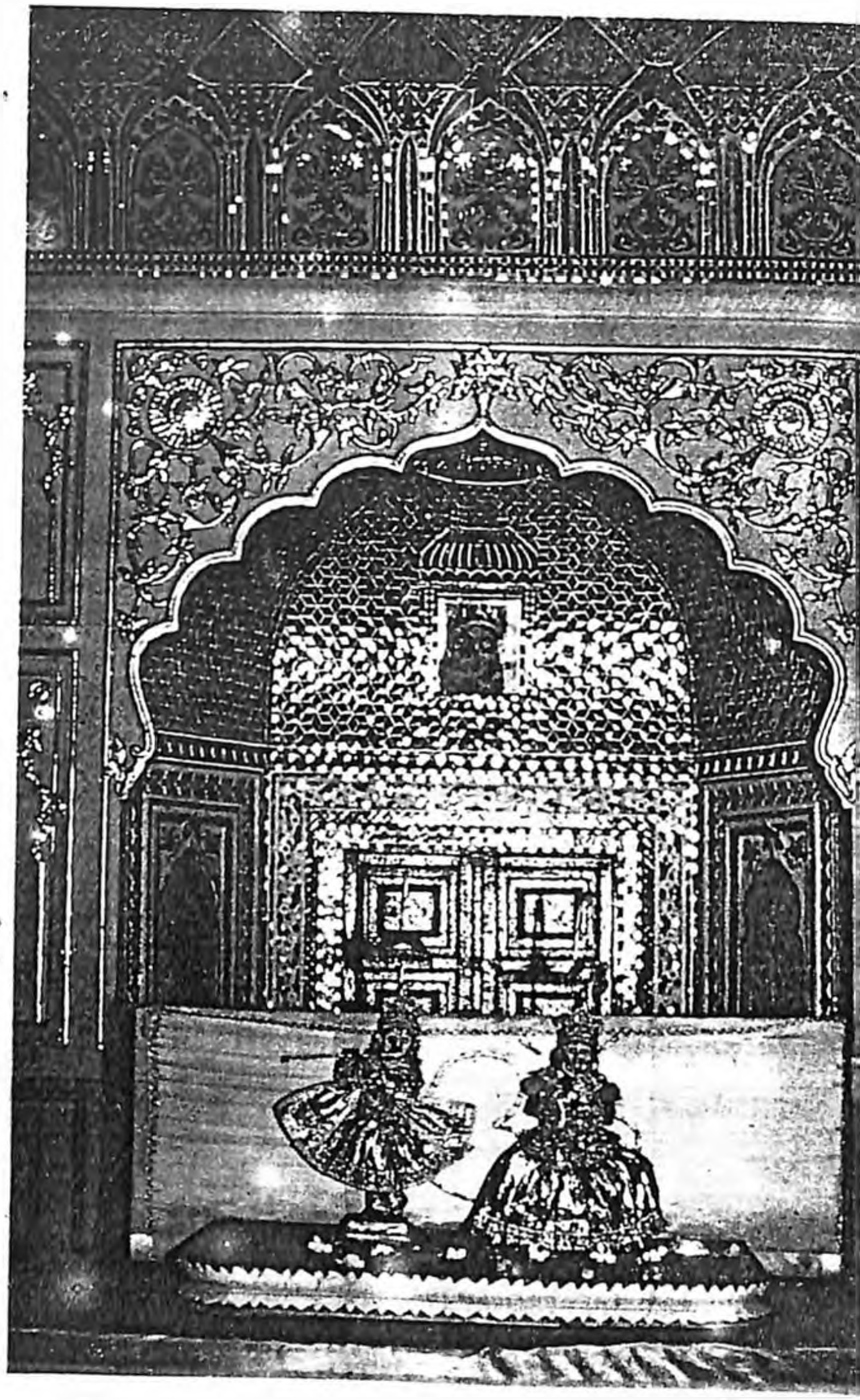
PANNI WORK Rajasthan

Rajiv Khanna

Often used in conjuction with it, *panni* is another ancient technique similar to mirror work though more colourful. *Panni* is a thin foil (10cm x 25cm) made out of the metal *ranga*, available in different colours (green, yellow, red, white and blue). The process involves outlining floral designs in paint on a glass surface 2 mm thick. The *panni* is cut by scissors and then rubbed with a special hard stone known as *hakkik ka pathar* to get a concave surface. The *panni* is placed on the outlined design with the help of a paste made from baked clay, gum and water. The glass is framed in lime plaster with a slight gap between it and the wall. The overall effect is not only three-dimensional, but also catches the sun's rays and reflects them with great clarity.

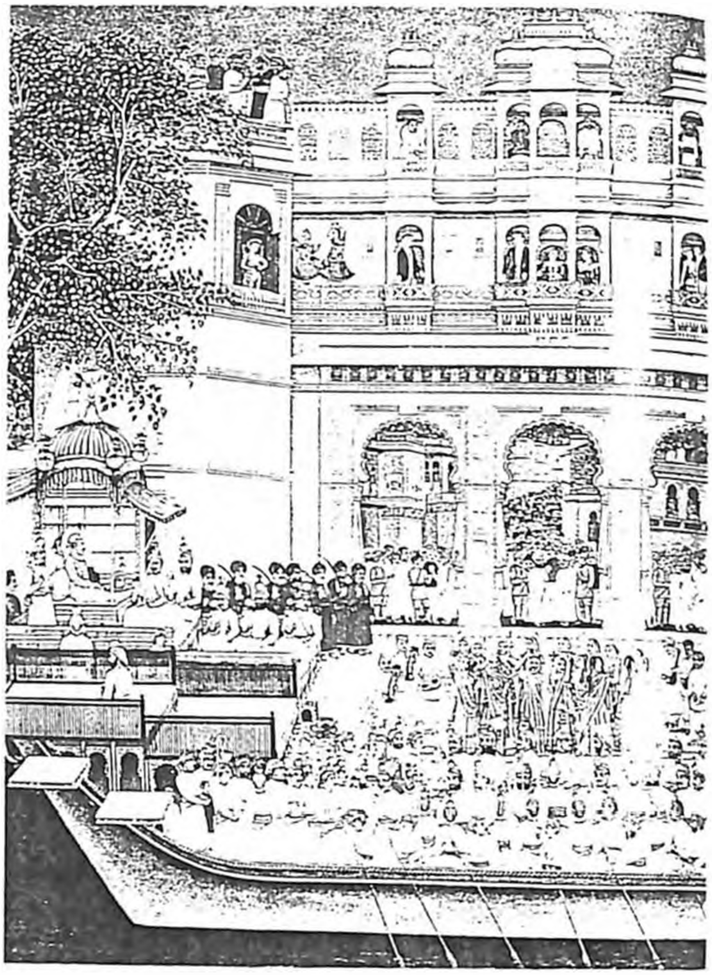
Interior of the Samode Palace, Samode, Rajasthan.





Recreated garbha griha *of Nat... Temple showing both mirror and p... work.*

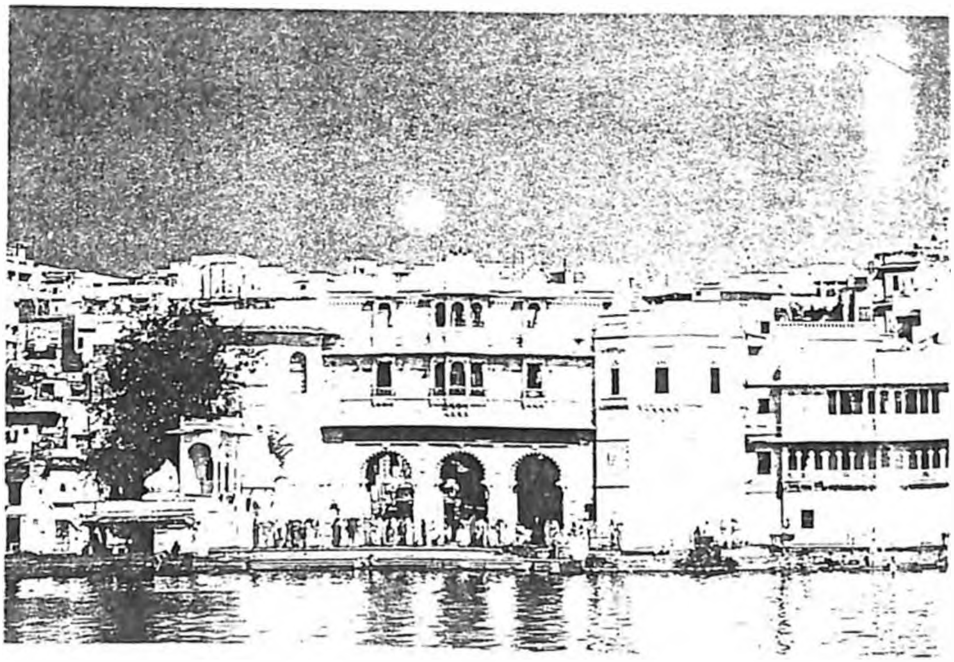
These processes are elaborate and require great skill and precision. This, combined with the expense involved has resulted in a loss of patronage. Today, there are only about a handful of craftsmen in Rajasthan conversant with this technique and they are mostly in the 70-80 year age group. One artist can complete only 20-30 cms a day. The cost varies from Rs 10,000 - Rs 20,000 per sq m based on the intricacy of the design. At the recently restored temple at Kanak Vrindavan, Jaipur (*see* A+D *Nov-Dec 1992*) mirror work is recreated on the ceiling of the *garbha griha* where the idols of Radha-Madhavji are installed, and *panni* work at the Govind Deoji's and Natwarji's temples. The master craftmen Suraj and Prabhudayal who have been associated with the work learnt this art at an early age, but for the past decade have used it only to make decorative pieces and artefacts. ♣

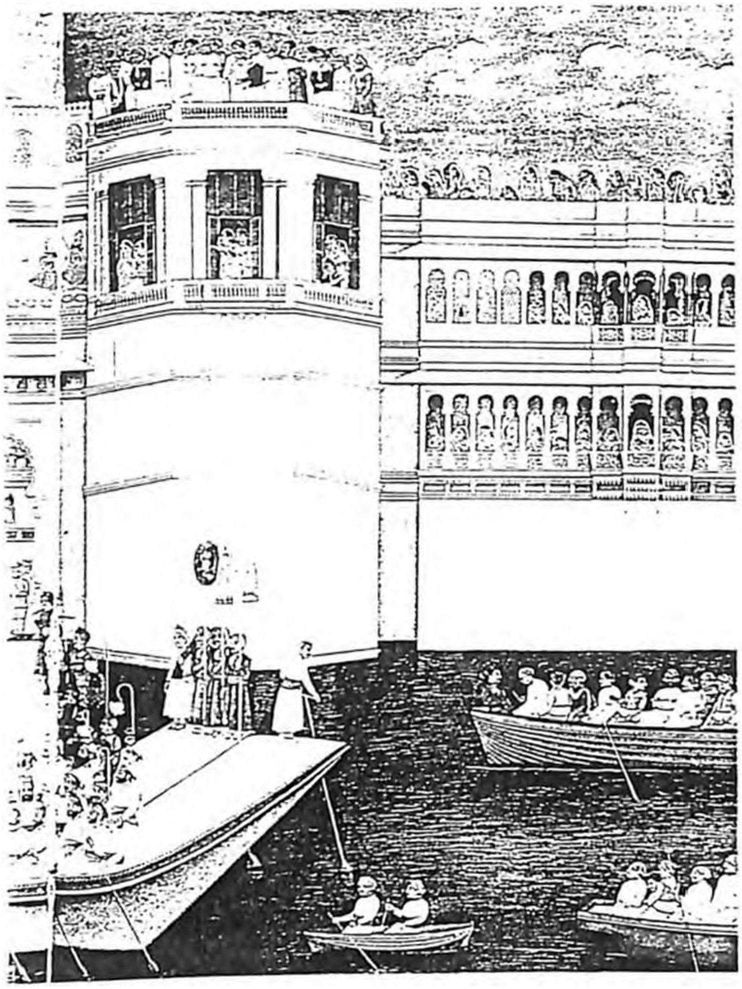


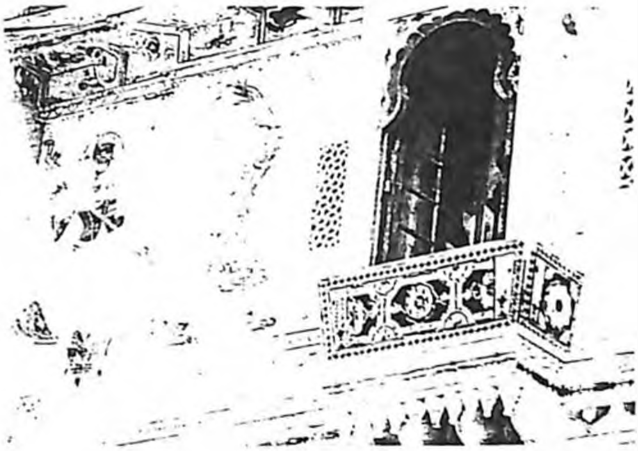
Bagore ki Haveli Udaipur

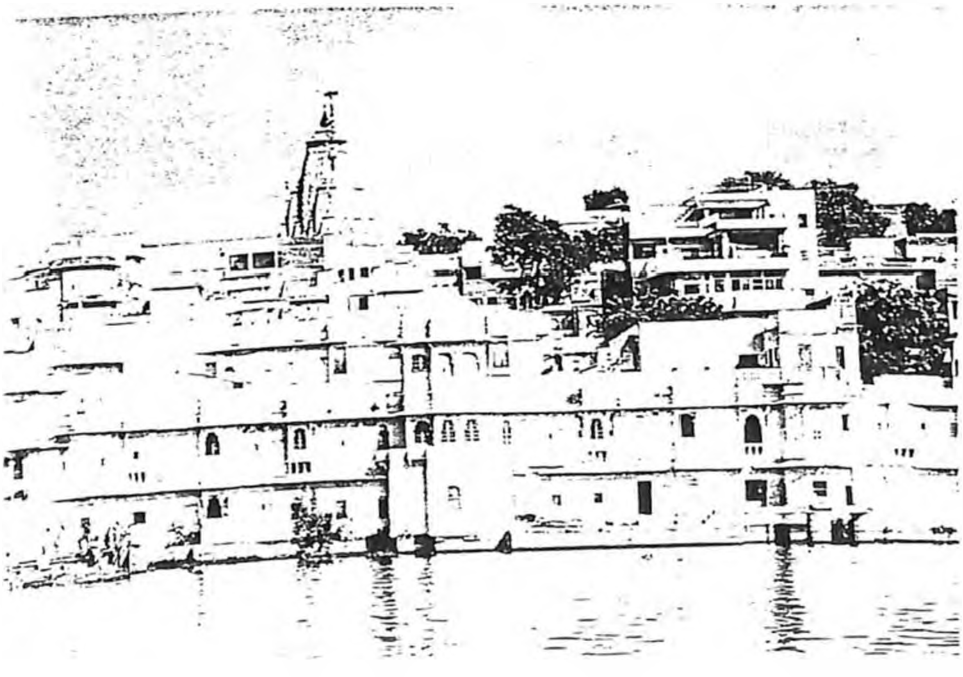
Architect Rajeev Khanna

Bagore ki Haveli is a three hundred year old palatial building situated on the banks of Lake Pichola in Udaipur. Built by Maharana Sajjan Singh in 1671, it is a fine example of the rich cultural and architectural tradition of the golden era of Mewar. The haveli, uninhabited and neglected over a long period, had degenerated tremendously, with encroachments and additions distorting the original grandeur. It came into the limelight again when it was handed over to the West Zone Cultural Centre for office. The Centre now proposes to convert the *haveli* into a living museum of the cultural and living traditions of the region by recreating various environments of the eighteenth and nineteenth century. Extensive conservation measures, carried out to stop further deterioration and to restore the *haveli*, played a crucial role in encouraging architectural revival.









Designed to accommodate the large extended family of the Bagore Maharaja, the *haveli* was divided into distinct sections. Each of these areas had their own significance and ambience which also determined the detailing and architectural character. Clarity in public and private spaces was evident in the distinct planning, where all public and semi-public *chowks* were near the entrance on the ground floor, and all private areas on the upper floor. A series of *chowks* at various levels clearly demarcated the various activity zones.

Above left *Maharana Bhupal Singh celebrating the Gangaur festival (painting c 1935). From* The City Palace Museum, Udaipur, Paintings of Mewar Court Life, *Mapin Publishing, Ahmedabad, 1990*
Above *Detail, exterior wall of the* darikhana *at Tripolia Gate.* **Left** *Lakeside view of the* haveli *today.* **Far left** *Parvati Ghat and Gangaur Ghat on Lake Pichola*

The Chowks

The *chowks* on the ground floor functioned as the main areas for daily chores as they housed the stores (*bhandar*), the stables (*paiga*) and the weaponry (*silaikhana*). These were primarily the *mardana* areas. The forecourt to the entrance (Tripolia Gate) and the Gangaur *ghat* was known as the Mor Chowk.

Mor Chowk The *chowk* owes its name to the geometrical panels of peacocks in multi-coloured glass panels set in the gate. This dominating feature on Tripolia gate reveals the rich architectural vocabulary of the *haveli*. Above it is the *darikhana*, popularly known as Kanch Mahal, rich in detail and ornamentation work and exquisite mirror and glass inlay work (*pacchikari* work) seen on the walls, windows, *jharokhas* and *izaras*. The Tripolia Gate is flanked on either side by two octagonal towers called the *badi burj* and the *choti burj*. The interior of these *burjs* along with the *darikhana* combined to make a huge grand space for the Maharaja's court.

Manak Chowk Mor Chowk led into Manak Chowk, the first in the series of public spaces in the *haveli*. It formed the entrance and had hardened earth to facilitate the movement of horses. It led to the Ganesh Pol that marked the entrance to the activity court. The *naubatkhana* and *nagarkhana* located within the gate housed the musician. The west side of the *chowk* had the *paigas* for guest and visitors. A staircase next to the *paigas* led to the *darikhana* which was the administrative area. Work such as collecting revenue taxes, etc. was carried out here.

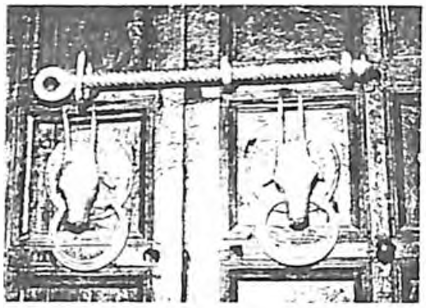
Chandi Chowk Manak Chowk then led into Chandi Chowk that was the nucleus of the entire *haveli* as it formed the hub of most of the day-to-day activities of the staff. Chandi Chowk is the last public *chowk*, with a huge three-storeyed fountain as the focus. In the centre of the *chowk* there was an open well under a *neem* tree that provided the immediate water requirement for the area. The *chowk*, like the Manak Chowk, was not paved because of the constant movement of horses, cows and elephants in this area. On the west side of the Chandi Chowk were *paigas* for the personal animals of the maharaja and other noblemen. Above these was located the private *darikhana* or men's wing. The second floor of the *darikhana* is an open terrace used for musical concerts and competitive chess matches.

Tulsi Chowk Around this *chowk* resided the royal women. Around the *chowk* were separate rooms for every *rani*. This *zenana* was out of bounds to the men. Besides the daily chores, religious activities were also performed here.

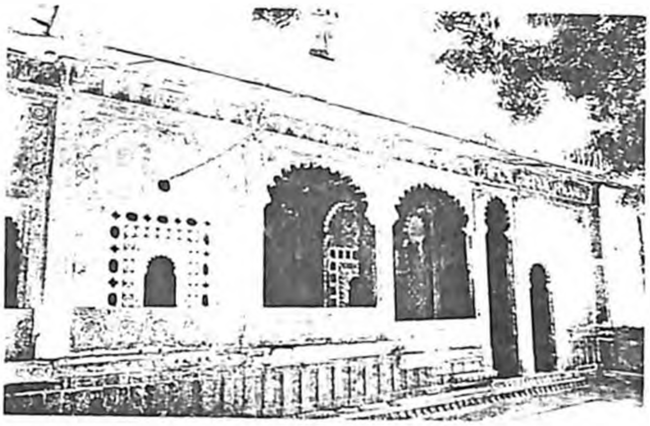
Moti Chowk was the centre of cultural activities and for display of arts and crafts. Here both men and women of the *haveli* could participate in musical concerts and dances and it became a focal area during festivals.

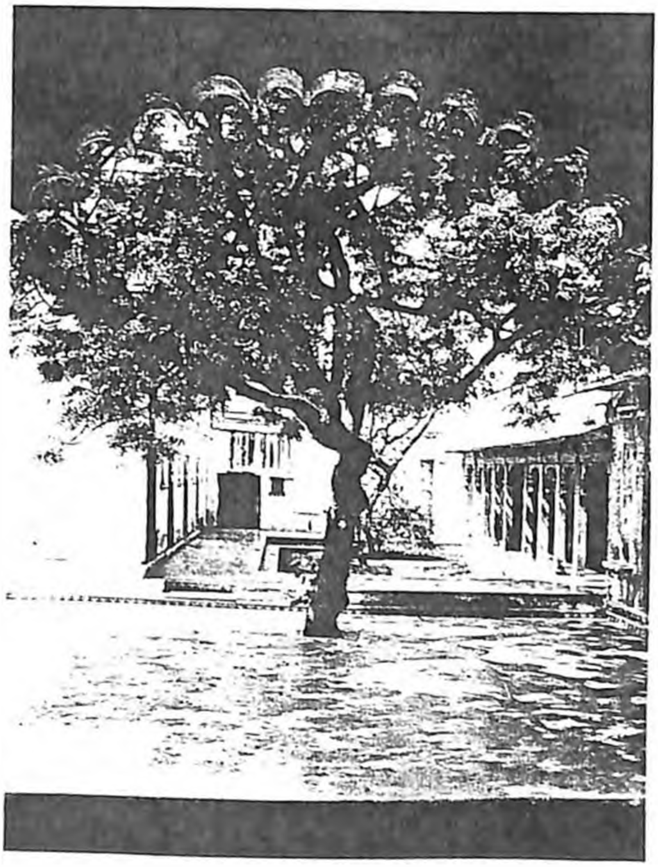
Kamal Chowk had a special significance in the *haveli*. It was enlivened by cultural and religious events such as performance of puja, music, *holi*, etc. Kamal Chowk owes its name to the fountain in the centre which has a lotus shaped pedestal. The central fountain, is in the form of a deep rectangular tank. From the base of the fountain, numerous lotus petals in stone arise and cover the sides of the pond, when the fountain was in operation it looked like a floating lotus.

Left A dancing peacock in pacchikari, one of the many that give More Chowk its name. **Below** Tripolia Gate leading to More Chowk. **Below left** Manak Chowk, showing Bagore ki Haveli on the left and Netawak Haveli to the right.

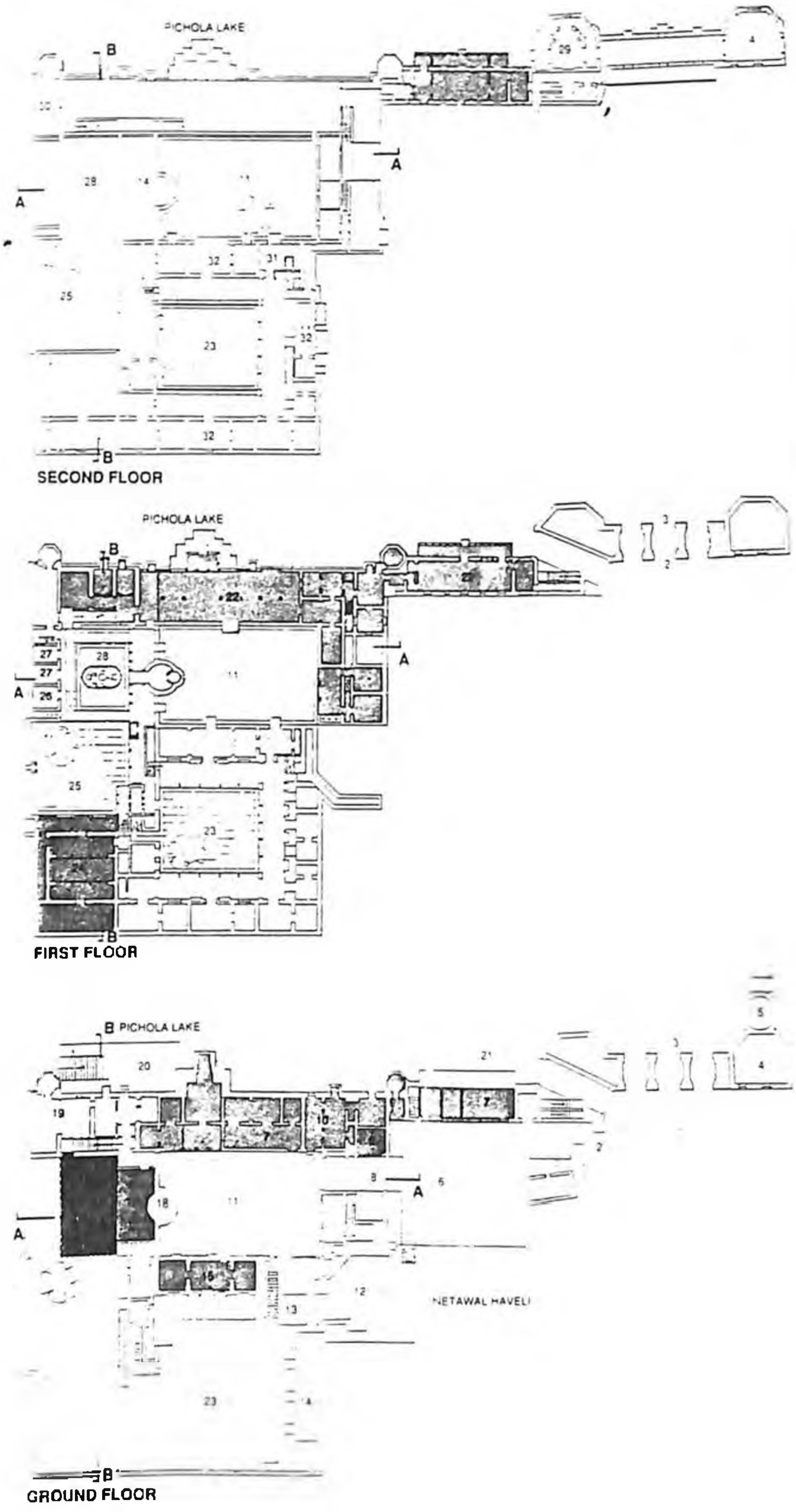


Far left *Brass lock at Bari Burj.* ***Left*** *Pacchikari detail on the izzaras.*





Clockwise from above right *Moti Chowk; Kamal Chowk from Moti Chowk; Corridor at Tulsi Chowk; Chandi Chowk*

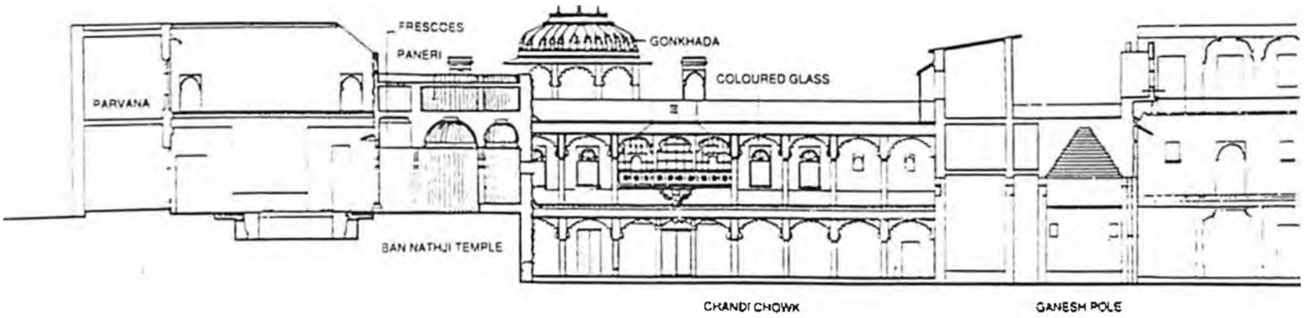


USES OF CHOWKS AND PERIPHERIAL AREAS

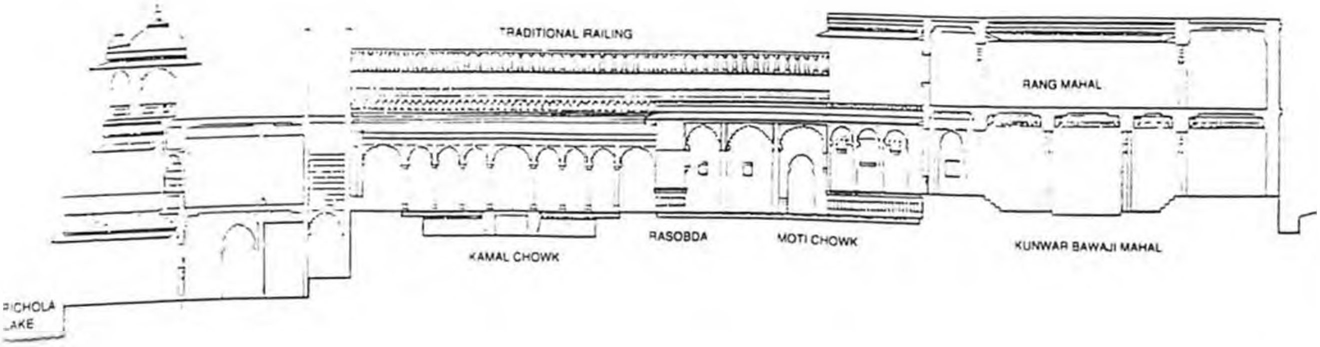
- MARDANA
- FARASHKHANA
- SILAHKHANA
- BHANDAR
- RELIGIOUS
- NAGARKHANA
- ZENANA

1 MOR CHOWK
2 TRIPOLIA GATE
3 GANGAUR GHAT
4 BADI BURJ
5 TEMPLE
6 MANAK CHOWK
7 PAIGA
8 GANESH POLE
9 NAGARKHANA
10 DAROGA
11 CHANDI CHOWK
12 GHANI
13 HATHI THAN
14 PANERI
15 FARASHKHANA
16 SILAHKHANA
17 BHANDAR
18 FOUNTAIN
19 PARVATI VILAS
20 PARVATI GHAT
21 PARVAL GHAT
22 DARIKHANA
23 TULSI CHOWK
24 KUNWAR BAWAJI MAHAL
25 MOTI CHOWK
26 KOTHARI
27 THAKURJI
28 KAMAL CHOWK
29 [illegible]TI BURJ
30 [illegible]ASCBDA
31 GANGAUR MATA
32 ZENANA

Right and far right Typical rooms showing the extent of deterioration that had occured in some areas.



SECTION AA



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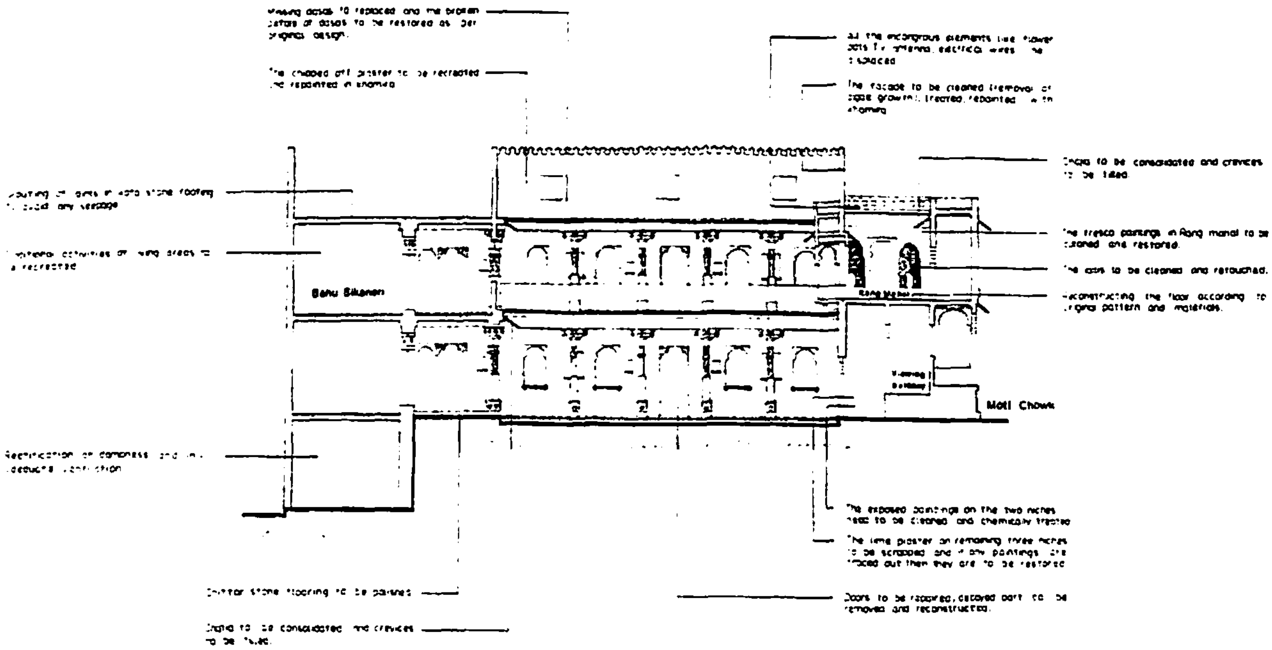
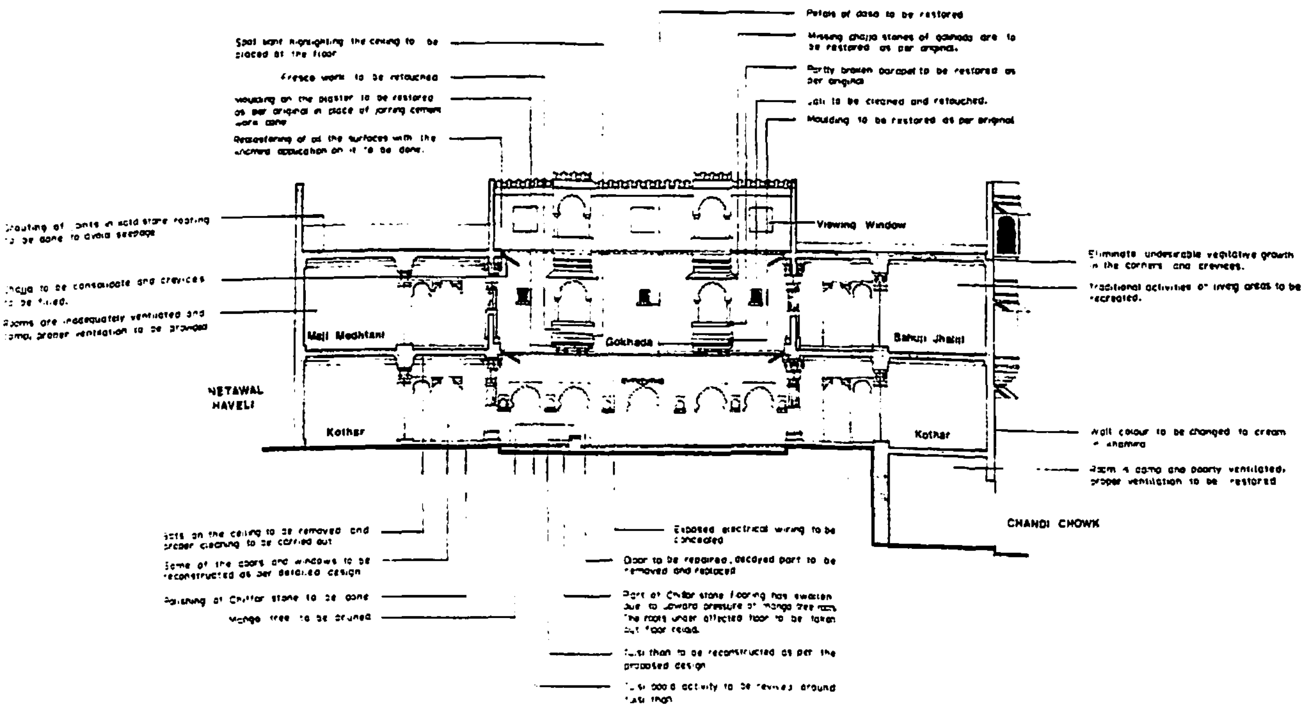
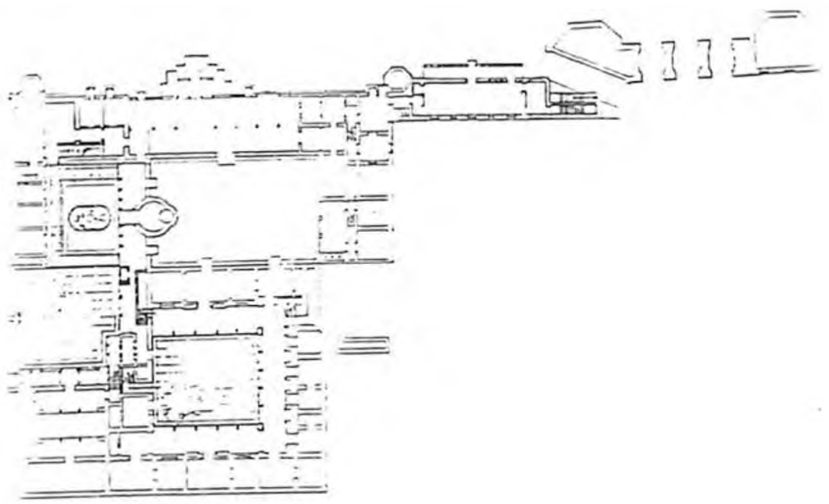


TULSI CHOWK EAST ELEVATION



TULSI CHOWK SOUTH ELEVATION

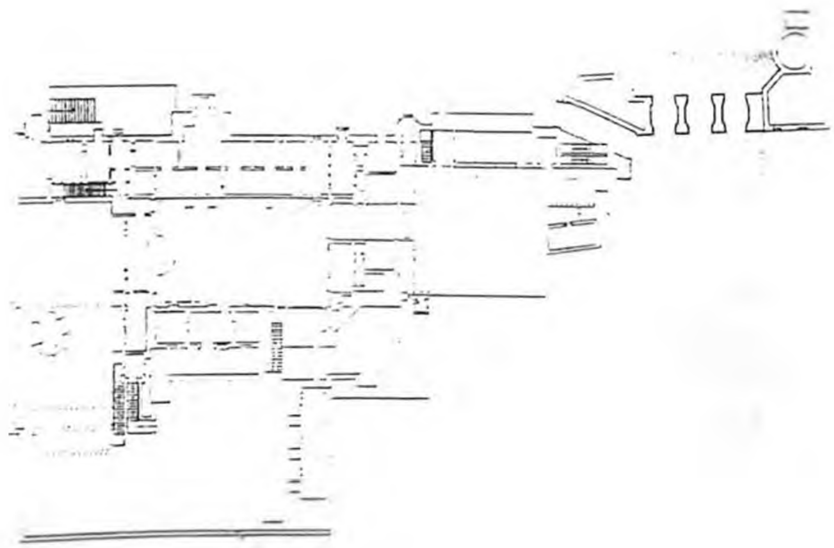


FIRST FLOOR

Museum proposal

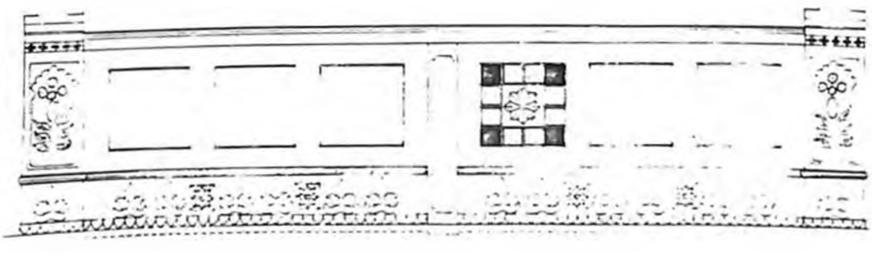
The post-renovation phase of the *haveli* was the revival of both the private and public spaces. The private areas were to become a museum and the *chowks* individually treated accommodate traditional cultural activities. Clarity in circulation pattern was established by demarcating the public and administrative movement areas. The public was to enter the *haveli* through the Parvati Ghat leading to the Chandi Chowk.

Many physical elements, as symbols of the past, were used to recreate the ambience of historical times in various parts of the haveli that was at the crux of this re-use and renovation effort.

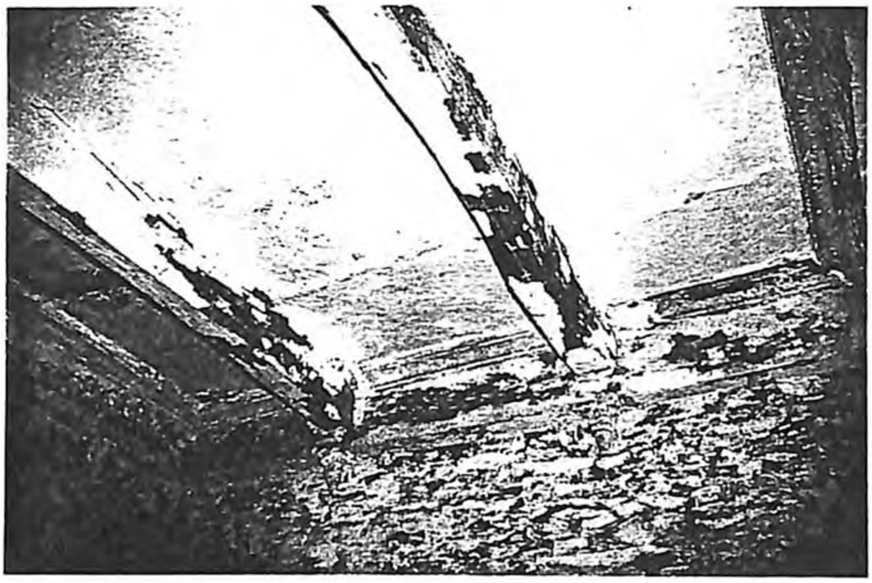


GROUND FLOOR
PROPOSED CIRCULATION PATTERN

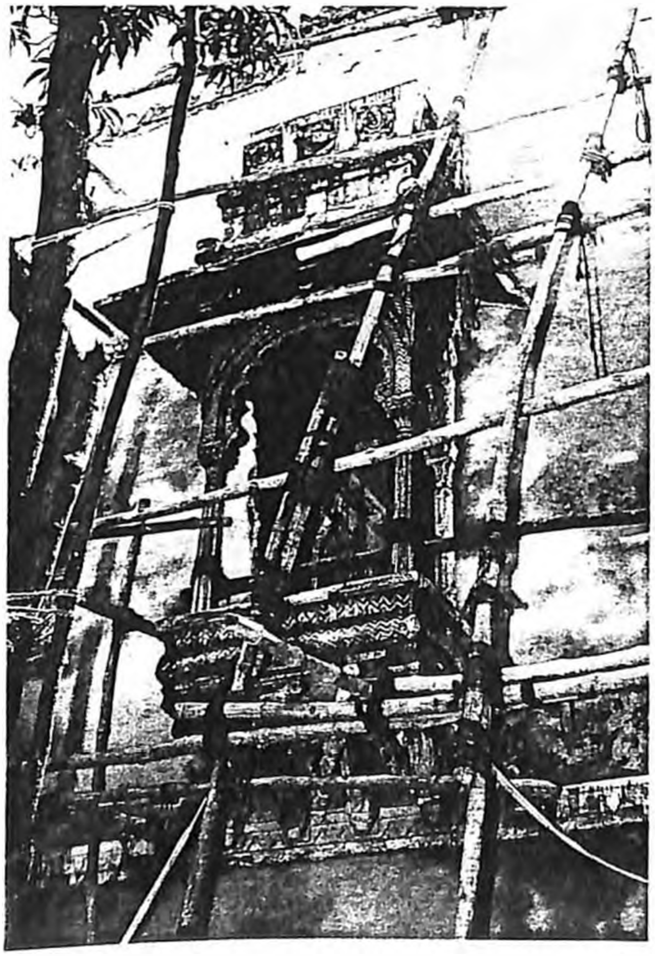
Display in a jharokha *of the renovated* darikhana *at Chandi Chowk*

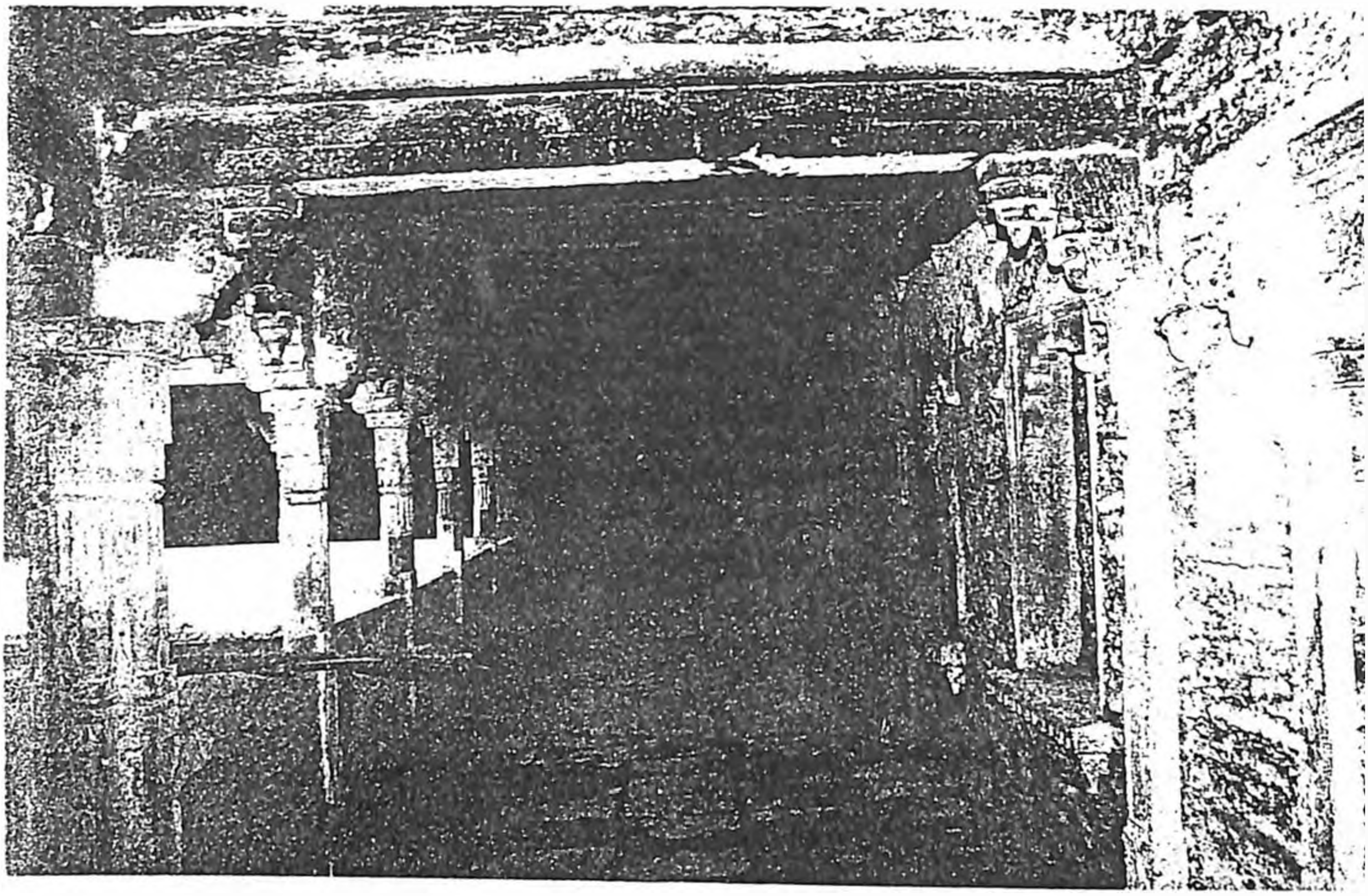


BALCONY DETAIL



Left Temporary wooden supports were inserted where required. Below Cleaning the plaster off the stone walls. Below left Scaffolding over a jharokha prior to the application of lime plaster.

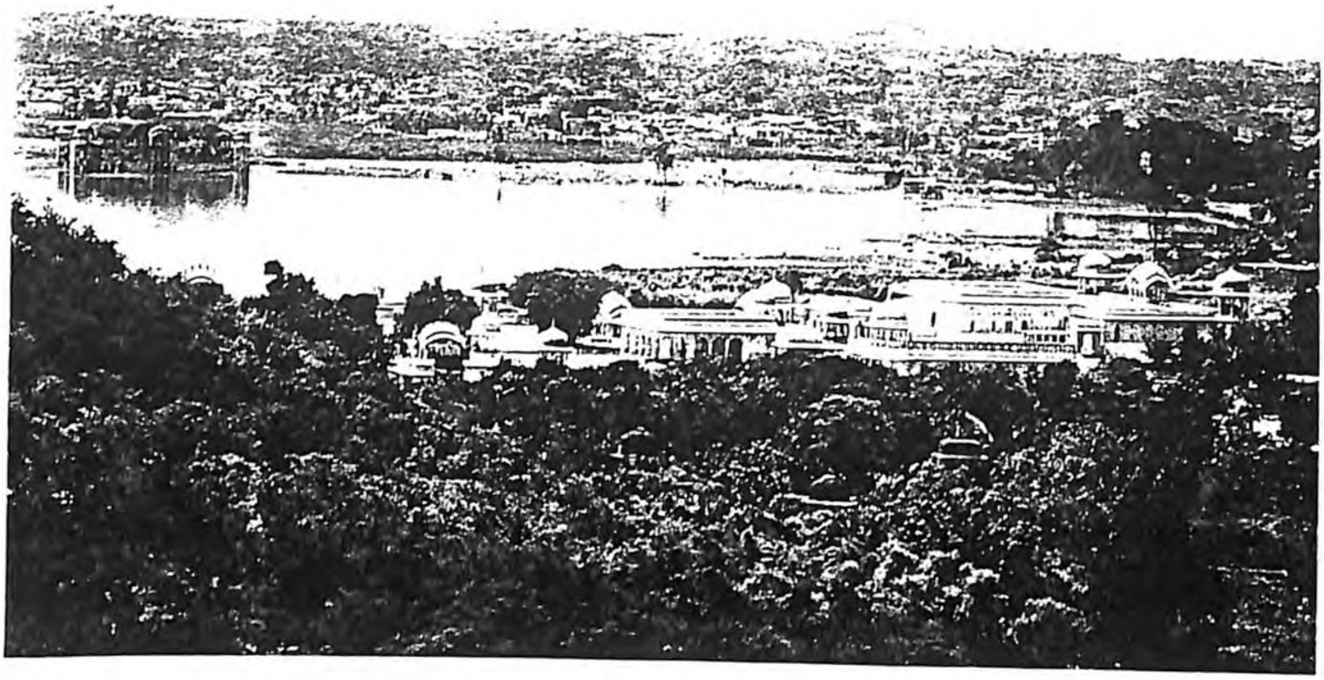




Above Work in progress on exposed stone pillars and patties in the corridors of Tulsi Chowk. Below Carving ornamental features in kara finish. Below right Finishing a arch in araish

Kanak Vrindavan Valley Jaipur

Landscape and Restoration Architect Rajiv Khanna



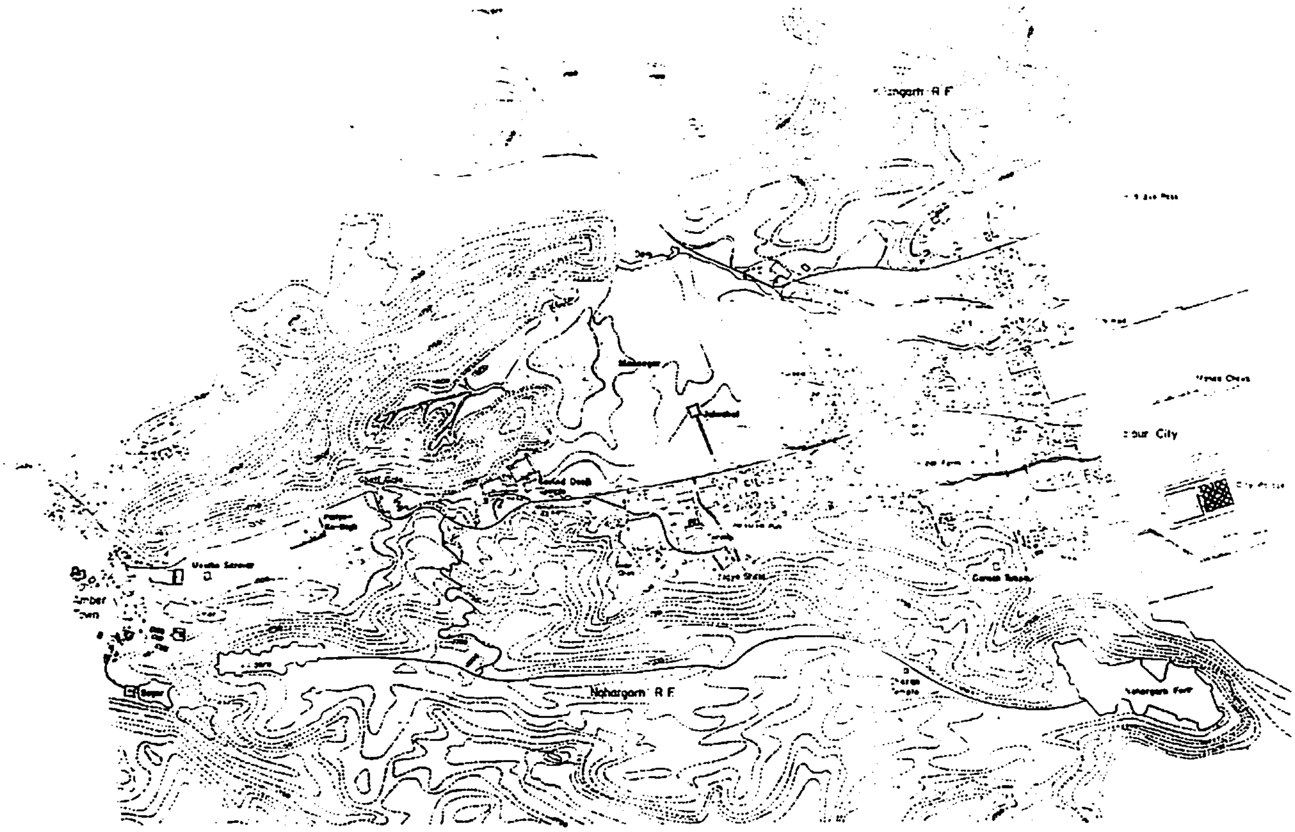
The valley, named the Kanak Vrindavan Ghati by Sawai Jai Singhji in the early eighteenth century, lies to the north of Jaipur walled city and is flanked by the Aravalli hills. Beginning with the Zorawar Singh Gate on the northern periphery of the walled city, this region forms a corridor of tremendous historic and tourist interest.

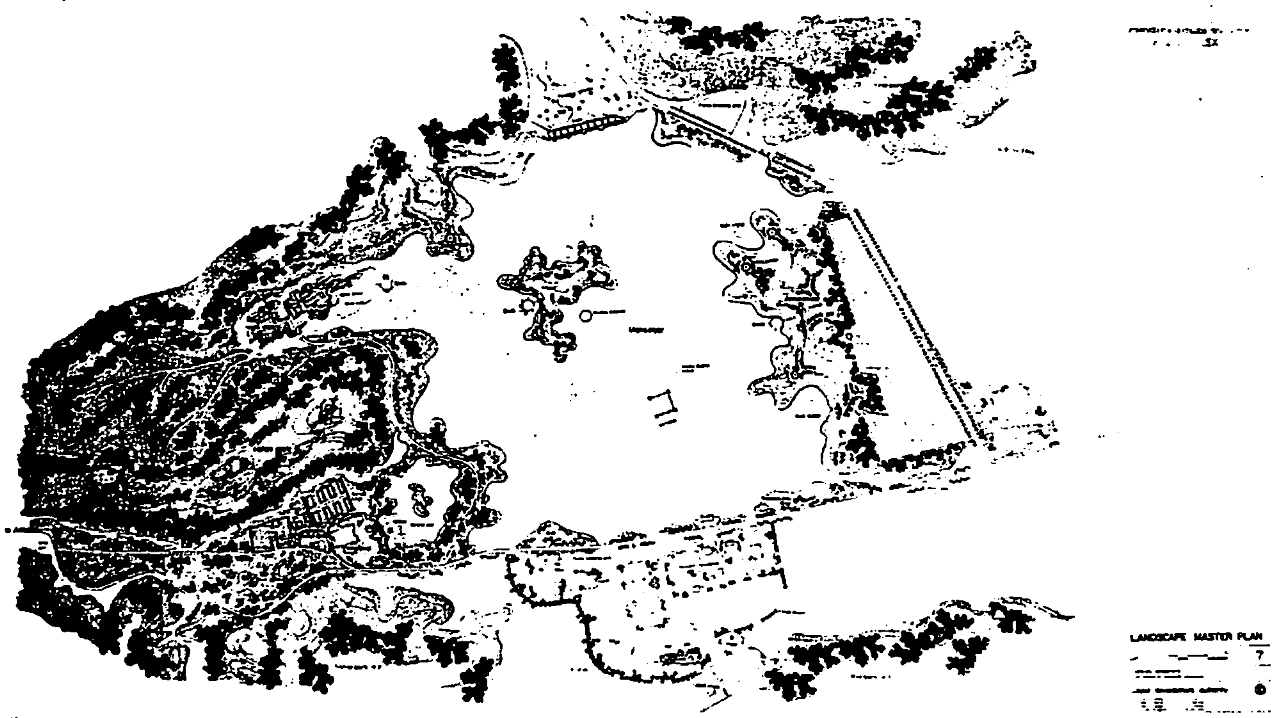
In the heart of the Kanak Vrindavan valley is the lake Mansagar created by Sawai Man Singh a few centuries ago by damming the Darbhavati, a small river that used to flow through the valley. According to historical plans—circa AD 1725—the Jai Mahal situated in this lake had been the Maharajah's pleasure palace

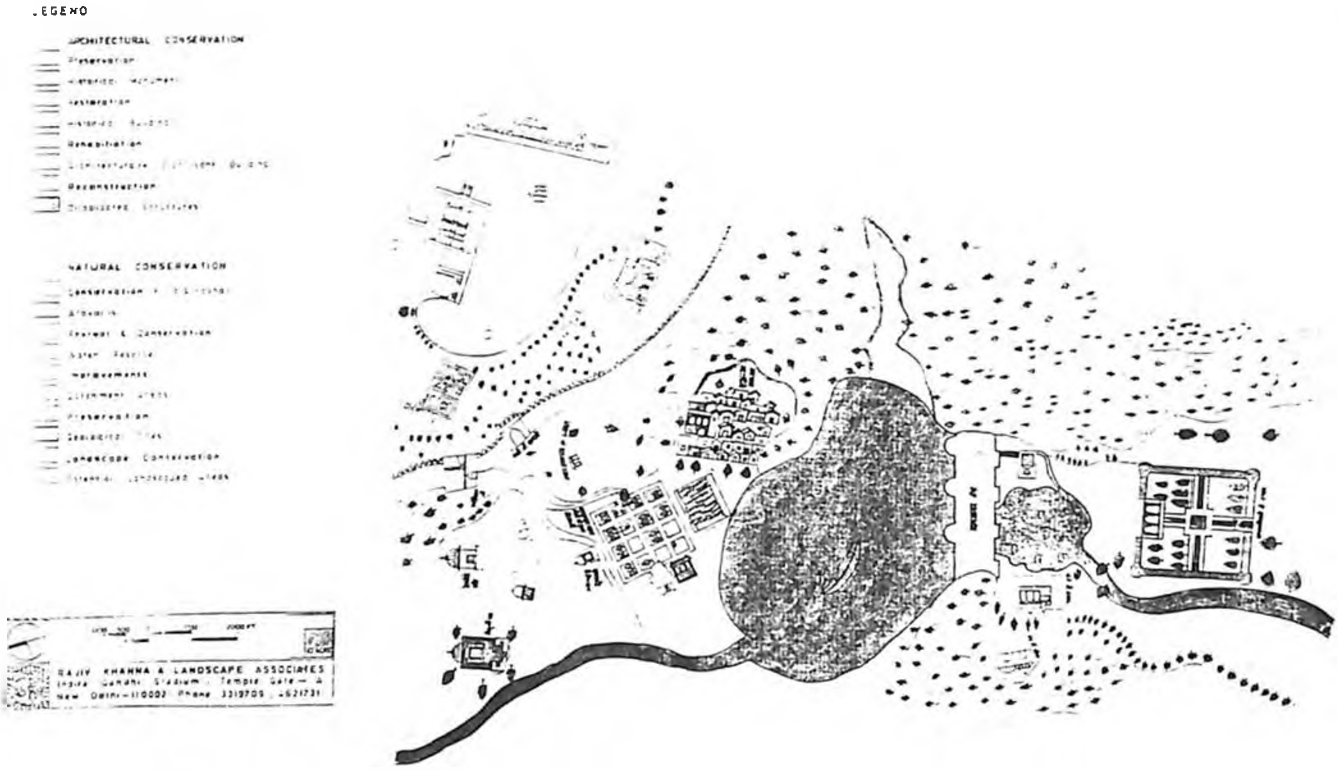
The Mansagar is surrounded by hills of the Aravalli ranges. Kilangarh in the east and Nahargarh in the west. A wealth of flora and fauna once covered these hills. Interference with nature was minimal and the effects were within its natural regenerative power.

However, after Sawai Jai Singhji shifted his capital to Jaipur in the early eighteenth century, the temples and palaces in the valley lost their importance and over the years disintegrated into ruins. After independence, the increasing population of the walled city spilled over into the valley in a haphazard growth that vitiated both the historical and environmental contexts. In addition, short-term

Kanak Ghati as it looks now, top and in 1975, above


Nahargarh R.F


LANDSCAPE MASTER PLAN



Historical map of the valley, with the Mansagar Lake. (Courtesy National Museum, Delhi)

development concerns, loss of aesthetic and cultural values, incompatible landuse, inadequate resource management and air and water pollution led to the degradation of the valley. In 1975, the situation worsened drastically when the sewage of the city and the toxic waste from nearby factories was diverted into the lake.

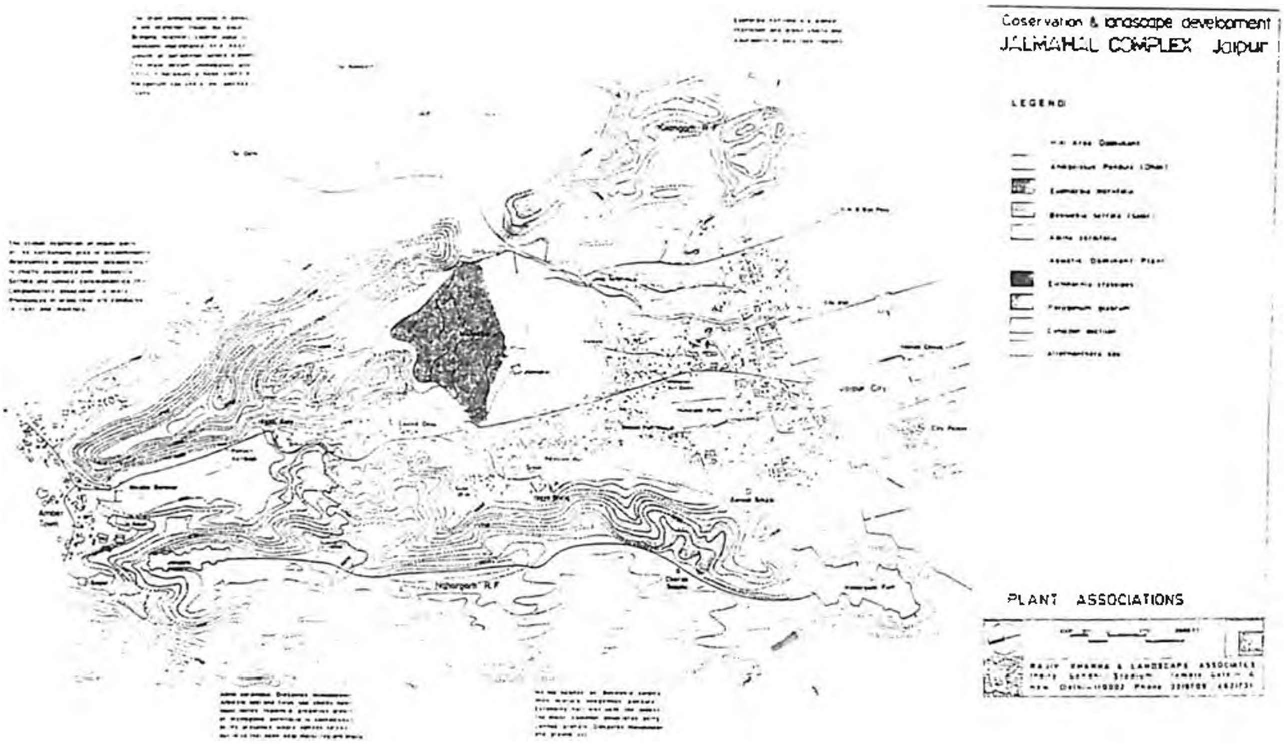
The disturbed hydrological cycle led to floods, depletion of ground and surface water, elimination of aquatic life and high water pollution. Heavy interference in the ecosystem, in the form of the introduction of exotic plants, cutting of wood and grazing, depleted the surrounding forests. Natural constraints such as soil with scanty humus and a low water holding capacity, scarce microbial flora, the absence of carpet vegetation and an inhospitable climate reduced the green cover. This led to soil erosion, air pollution, siltation in the lake and increased temperatures. The dwindling forest cover resulted in the gradual elimination of wildlife from the area.

The valley had deteriorated considerably when we started work on the development proposal in 1975. The situation presented a unique challenge where one had to prepare a plan for the rejuvenation of an entire valley, honouring the accultured symbolism it evoked by virtue of its natural and man-made history. The entire landscape had to be recreated, addressing environmental issues and preserving the integrity of the historic structures scattered through it. For this development, an area of 28 sq km, that used to be original catchment area, surrounding the lake was identified and marked as a conservation zone.

Following this a large-scale environmental study of the region was carried out. This included an analysis of the natural and man-made factors affecting the ecosystem of the valley. Technical issues such as the effect of the microclimate, the lake's hydrological cycle, soil characteristics, the patterns of flora and the habits of fauna were considered. Factors leading to the degradation of the environment were identified.

The basic philosophy was to revive the valley by restoring its past character. This included the restoration of the original landscape, conservation of architectural monuments and the revival of traditional skills and techniques, bringing about a cultural resurgence in the region. A comprehensive

The Brahmpuri Nallah used for grazing, now a part of the Mansagar lake.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Nahargarh R.F
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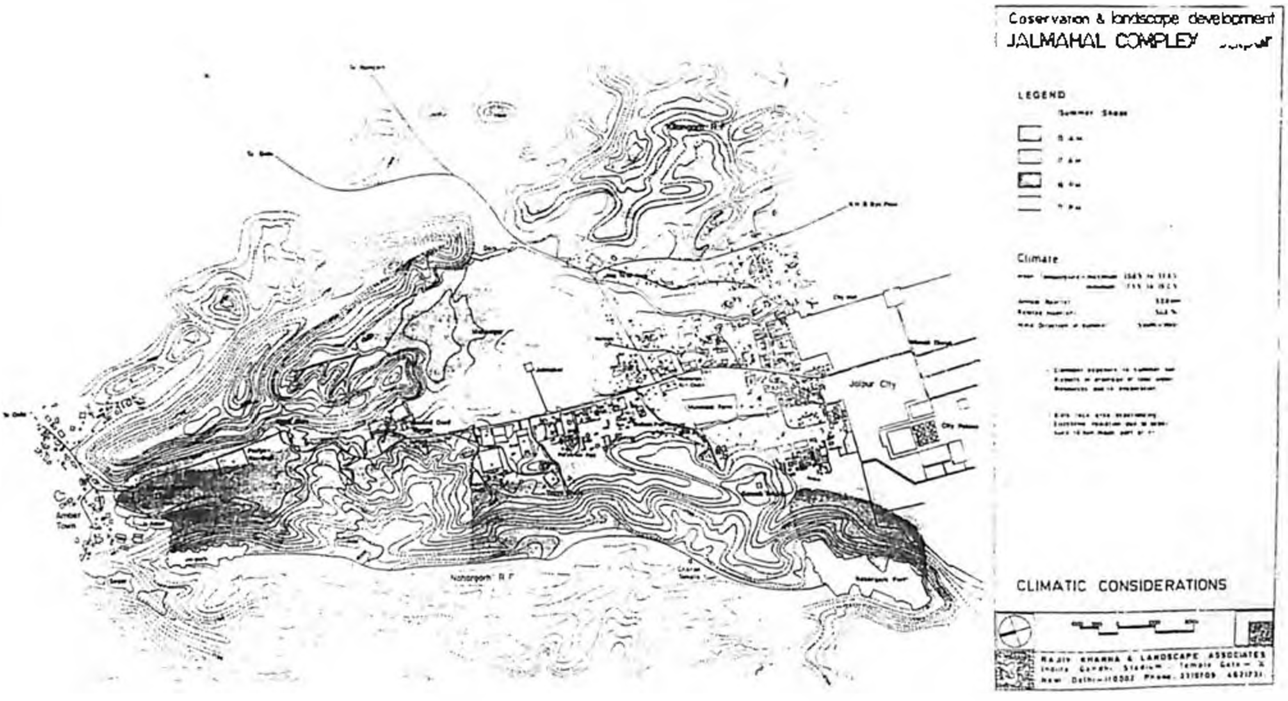
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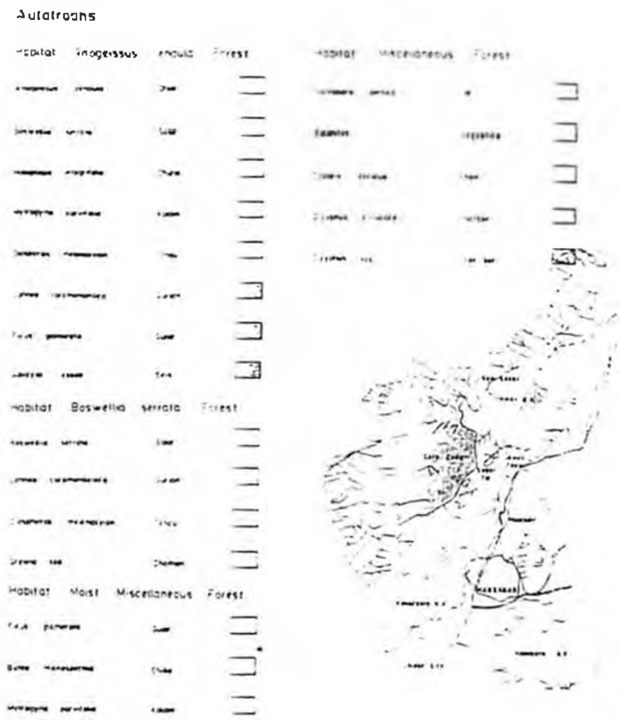
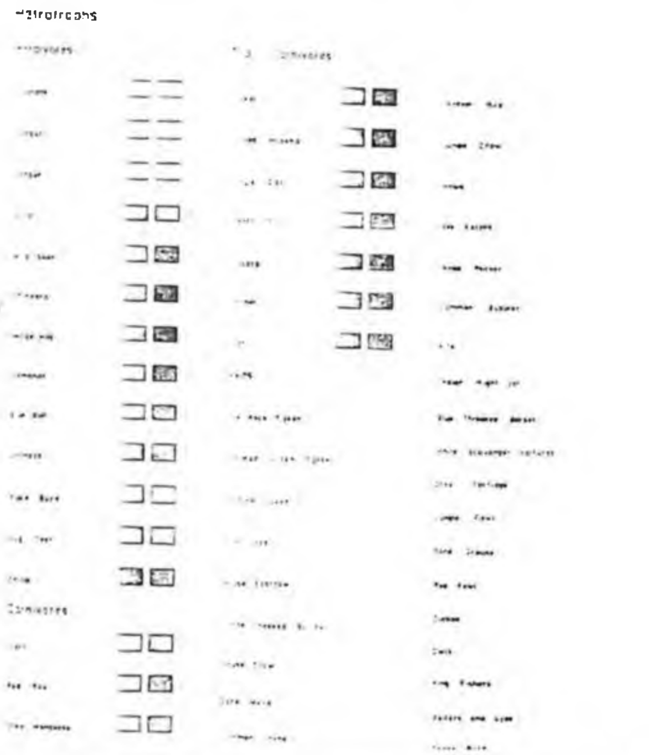
Jaipur City
Amber Town





Fauna 1880–1980

master plan was prepared after studying historical maps that describe the area as it existed a few centuries ago with its natural resources and built structures. The Rajasthan government approved this landscape and architectural conservation master plan in 1984.

The plan proposed to recreate the old natural environment by introducing flora typical of the Aravallis, in the valley and the surrounding hills. The flora varied in distinct tiers on the hills depending on the altitude, soil quality, atmospheric conditions and inter-relationships among the plants. Plants and trees have been proposed on the basis of the past configuration and the present environmental conditions.

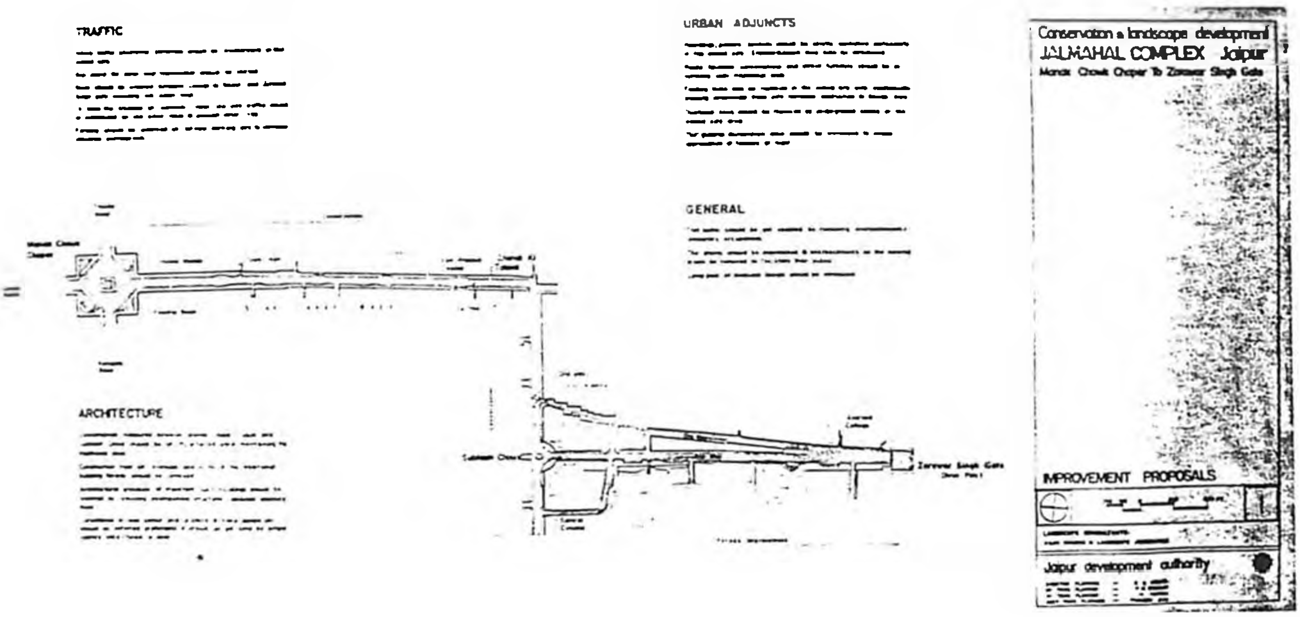
The plan also calls for the reintroduction of animals and birds, that have disappeared from this region. Thus, rather than restricting itself to the proposal of geometries, water bodies and plants, the landscape development attempts to regenerate a whole ecosystem in the image of the one that existed previously.

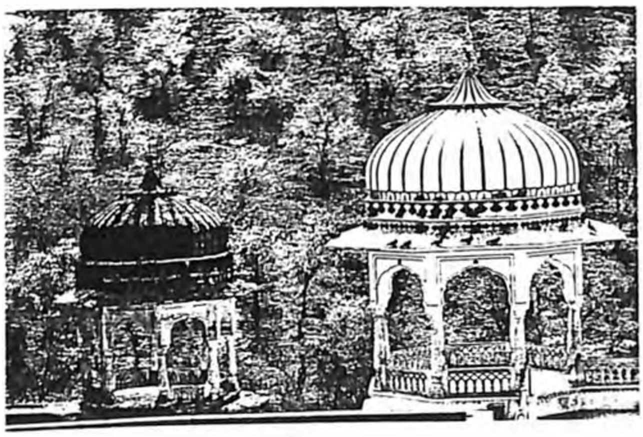
As the development is taking place in a context with a rich historical content, special care has been taken to reflect the style of the built environment in the design of the landscape especially near the historical monuments. The designed landscape integrates harmoniously the hardness of the built environment with the softness of the planted one. Gardens enhance the beauty of the monuments without detracting from their importance.

The monuments themselves have been rebuilt or restored and guidelines have been set for their preservation. Only traditional materials such as lime, *sanah* (rope fibres), *dahi* (curd), *nariyal* (coconut) and *gona* (gum) have been used in the entire work. *Methi* (fenugreek) has been used for

REGION	TREE	
	Scientific Name	Common Name
Hill tops (especially on south-west facing hills)	Anogeissus pendula	dhok
	Boswellia serrata	salar
	Lannea coromandelica	gurjan
	Diospyros melanoxylon	tendu
	Grewia species	dhaman
	Boswellia serrata	
Lower hills	Prosopis juliflora	vilayati babool
Moist areas	Cordia gharaf	goondea
	Mitragyna parvifolia	kadamb
	Albizzia lebbek	siris
	Ficus glomerata	gular
Near rivulets and streams	Butea monosperma	chhila
Scrubs	Ficus glomerata	gular
	Aegle marmelos	bel
	Zizyphus mauritiana	ber
	Balanites aegyptica	hingot
Field vegetation	Adhatoda vasica	adusa
	Grewia species	
Grasses	Apluda mutica	dhanyara
	Capparis zeylanica	morodia
	Aristida depressa	lampa

The project aims at a regeneration of the entire eco-system





Chattris in Kanak Bagh in process of being restored

waterproofing and *gur* (jaggery) has been utilized for binding. Stone colours which are permanent have been used, in conformity with the style of the region. Even the techniques used are traditional such as *aaraish, khamira* and *dar* flooring.

The whole area was proposed to be developed as a tourist spine with a 200 feet right of way. Heavy traffic has been diverted to the national highway through a bypass. Many people who had encroached on the valley have also been relocated. An acquisition plan prepared by the Jaipur Development Authority has been enforced.

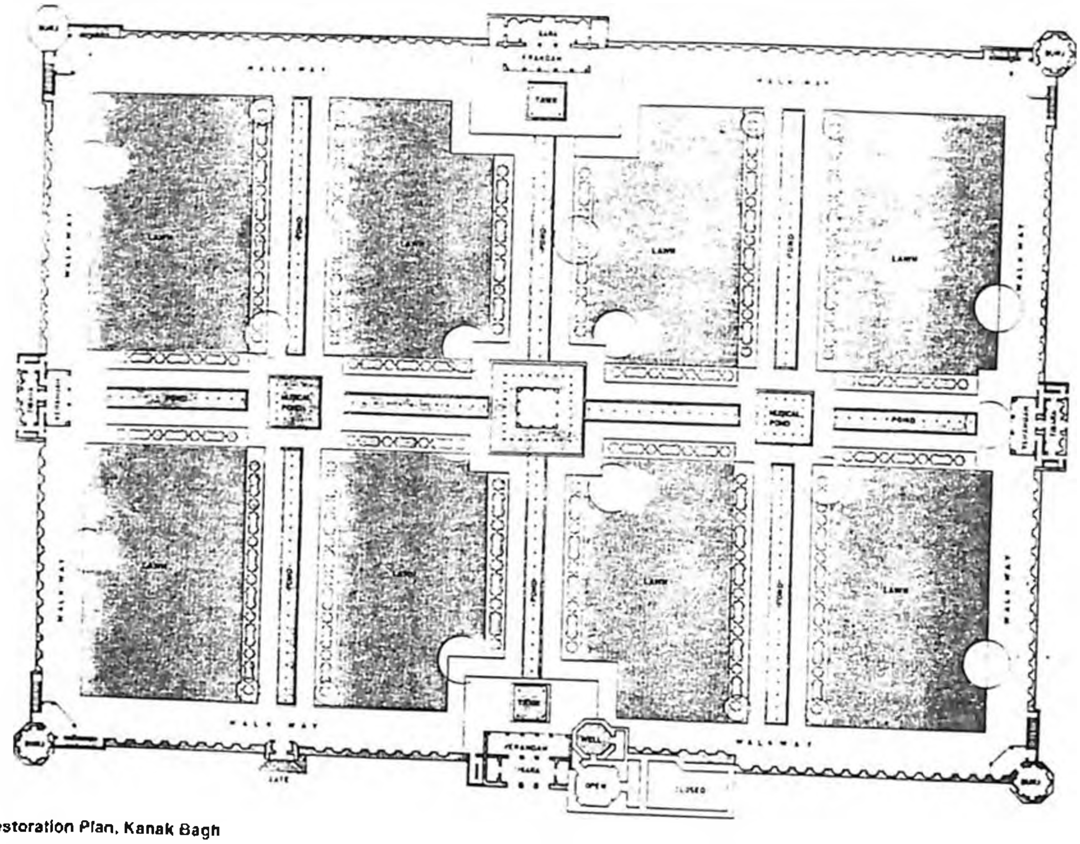
The entire valley has been divided into subzones that are being developed separately within the overall context.

The Walled City Area

The conservation plan prepared for the walled city area from Manak Chowk to Zorawar Singh gate, encompassing the Hawa Mahal and Jalebi Chowk called for the conservation of old buildings and suggested improvements in traffic flow and existing infrastructure. The plan has been partially implemented. Outside the walled city, this development proposal further extended up to the Mansagar Dam. Parasuram Dwara temple, situated opposite the Mansagar lake has been restored and a traditional building arts centre created in the temple complex to impart training in the traditional skills and crafts of the region such as *aaraish, khamira,* fresco work, mirror work, *panni* work, inlay works and *dar* flooring.

Kanak Vrindavan

The Hindustan Charity Trust took the initiative for the development of this area



Restoration Plan, Kanak Bagh

comprising the Govind Deoji Temple, Natwani Temple, the Kanak Bagh and the Kanak Ghati, all of which are as old as AD 1714. The temples, which were in ruins, have been rebuilt, keeping intact their original architecture (*refer* A+D, *Sept-Oct 1992*). Kanak Bagh and Kanak Ghati have also been restored to a large extent.

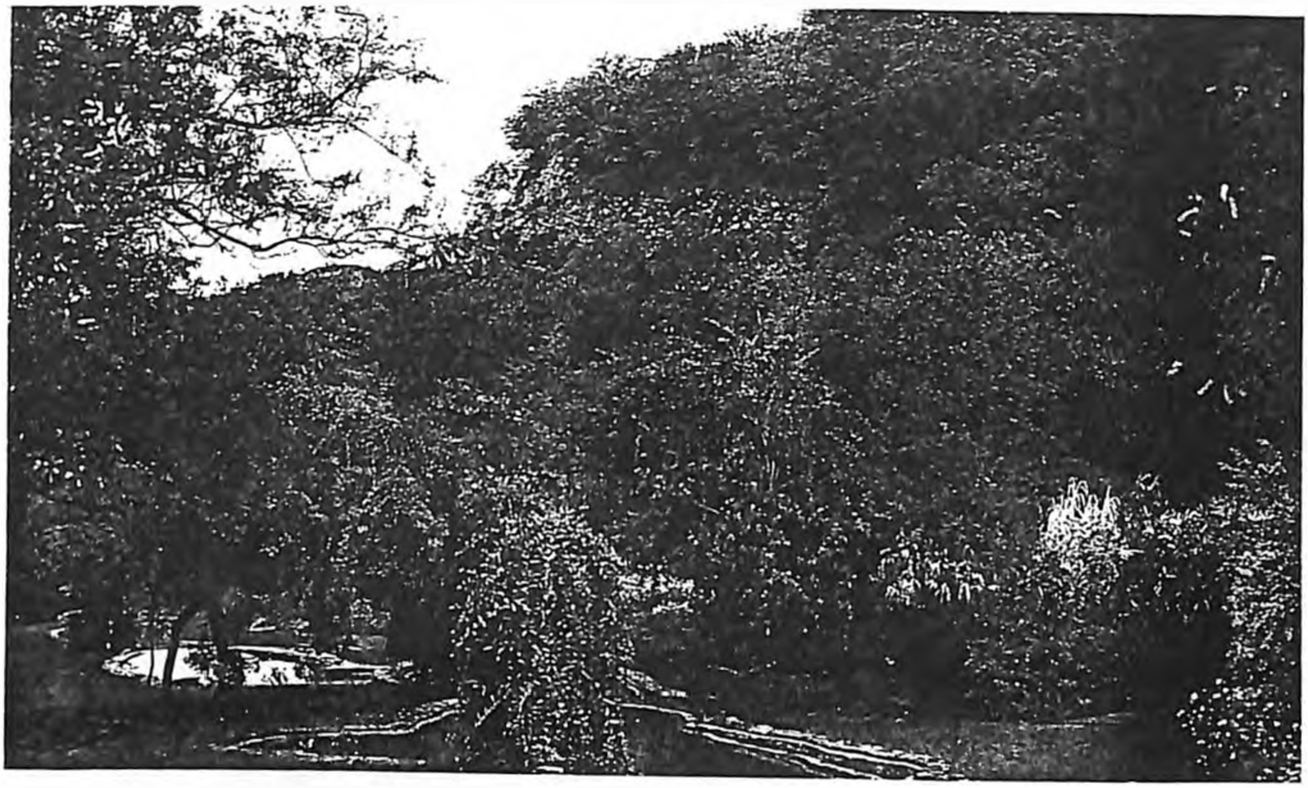
Kanak Bagh

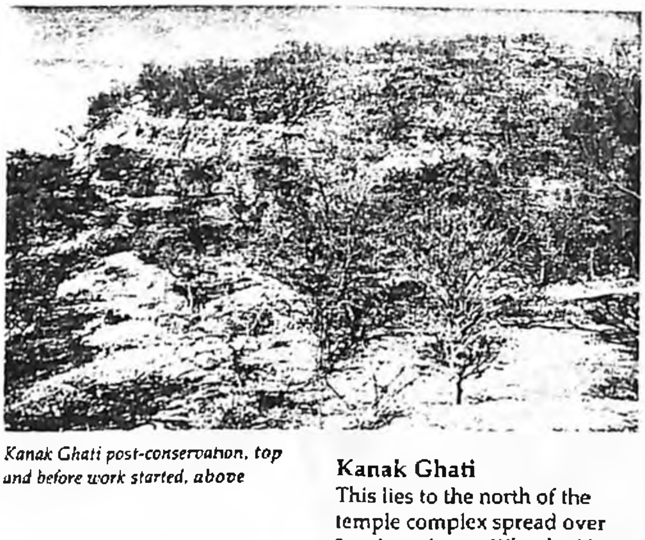
Spread over four acres, Kanak Bagh used to be the garden attached to the Govind Deoji temple. However, over the years, the land was diverted for agricultural use and on a part of it a carpet factory was set up. The original garden, buried beneath two feet of soil, was all but forgotten. Restoration work, when it began, required the conjecturing of the original layout geometry from excavated remains.

Today, the old channels, fountains as well as the traditional watering system have been recreated. The *baradari* in the centre, the pavilions, *kabanis, chattris* and the *parkota* wall have been rebuilt. In keeping with the philosophy of the master plan, traditional materials and techniques have been used to restor this garden to some semblance of its original glory.

An important consideration in the design of Kanak Bagh was its harmonious integration with the temples in the complex. As the Bagh is an extension of the temple, the built elements such as the *kabanis* and *chattris* have been built in the same style. The main axes of the garden are parallel to those of the temple and the rectangular geometry of the garden emphasizes its unity with the rectilinear structure of the temple.

Kanak Bagh post-restoration, above and pre-renovation left





Kanak Ghati post-conservation, top and before work started, above

Kanak Ghati

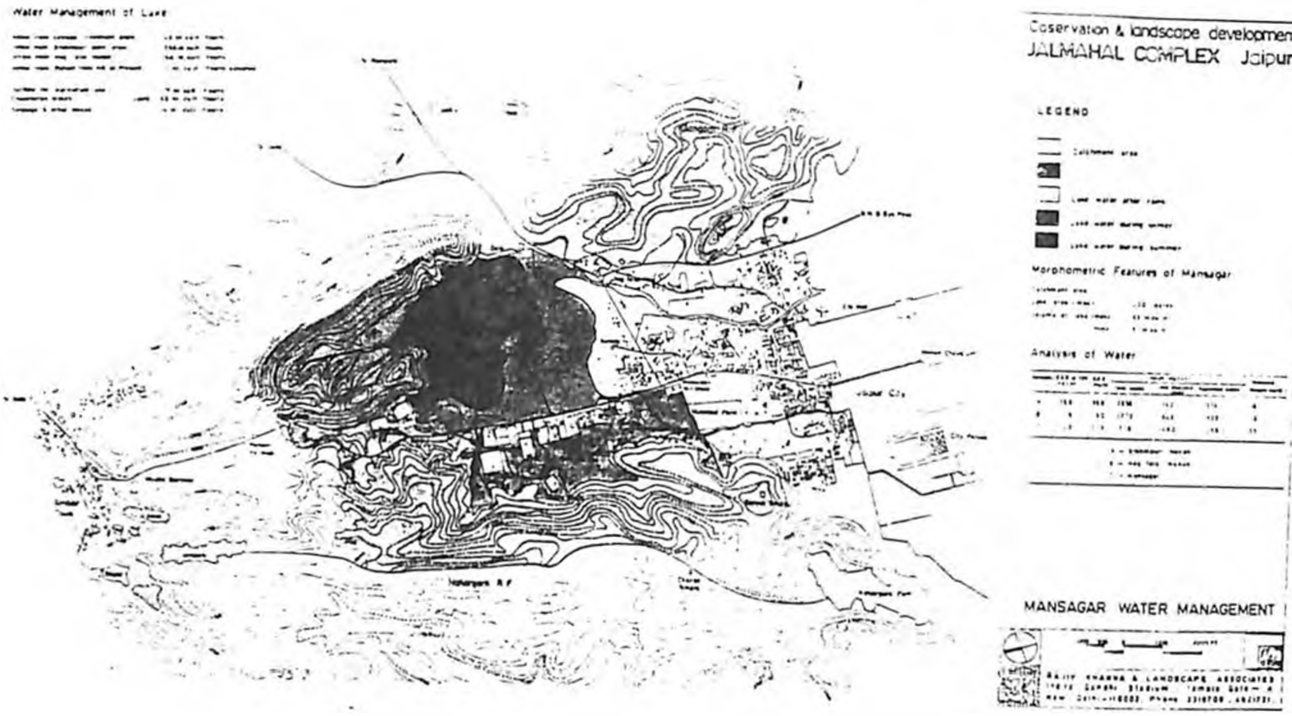
This lies to the north of the temple complex spread over 2 sq km of area. What had been once a lively forest had become barren, owing to the ravages of man aggravated by an inhospitable climate. The steep slopes had resulted in a swift rain water run-off leading to extensive soil erosion, making it difficult for the vegetation to survive.

The basic issues in the restoration of this *ghati* have been the conservation of the existing flora, mostly *dhok* (*Anogeissus pendula*), that has always been predominant in the area forming climax vegetation that has adapted and survived through thousands of years. New trees that have been planted are complementary in terms of characteristics to this species. While selecting plants, the food habits of birds were also considered, resulting in an increased influx of birds such as the Blue Throated Barbet, Eagret and the Spotted Dove. Exotic plants have been used with restraint to enhance the beauty of the *ghati*, without detracting from its original character.

The flow of rain water has been intercepted, and collected and recycled through various connected cooling pools. The reduced run-off and increased percolation rate has greatly improved the water table in the *ghati*. The interception of the water has also reduced soil erosion.

The valley has been planned as an orchestration of views and experiences creating various moods as the visitor moves around the landscape. By treating the whole landscape as a multi-dimensional canvas seducing the human senses—through an interplay of sound, colour, texture and fragrance, visitors are brought into a series of planned associations with nature, evoking a myriad of emotional responses.

Apart from improving the ecosystem of the area and creating a multivalent ambience signifying the multiple values and meanings attached to this valley, the landscape development also reflects the influence of the adjacent Govind Deoji Temple through the sculpural depiction of episodes in the life of Lord Krishna at various points in the *ghati*.



Mansagar Lake

This complex includes the Mansagar lake, Jal Mahal and the Mansagar Dam. Over the years disturbances in the catchment area greatly reduced the storage capacity of the lake, thus decreasing its potential for use in agriculture, forestry and daily consumption. The Nagtalai Nullah carries silt from the Kilangarh foothills at 14 lakh gallons a day. This is further compounded by quarrying and construction activities in the foothills that have reactivated sand deposits, accumulated as dunes by air movement. Heavy storms transport the loose sand to the lake. Rain water run-off also carries this unstable sand to the lake. With the depletion of forest cover, there is little to prevent erosion and consequent siltation in the lake.

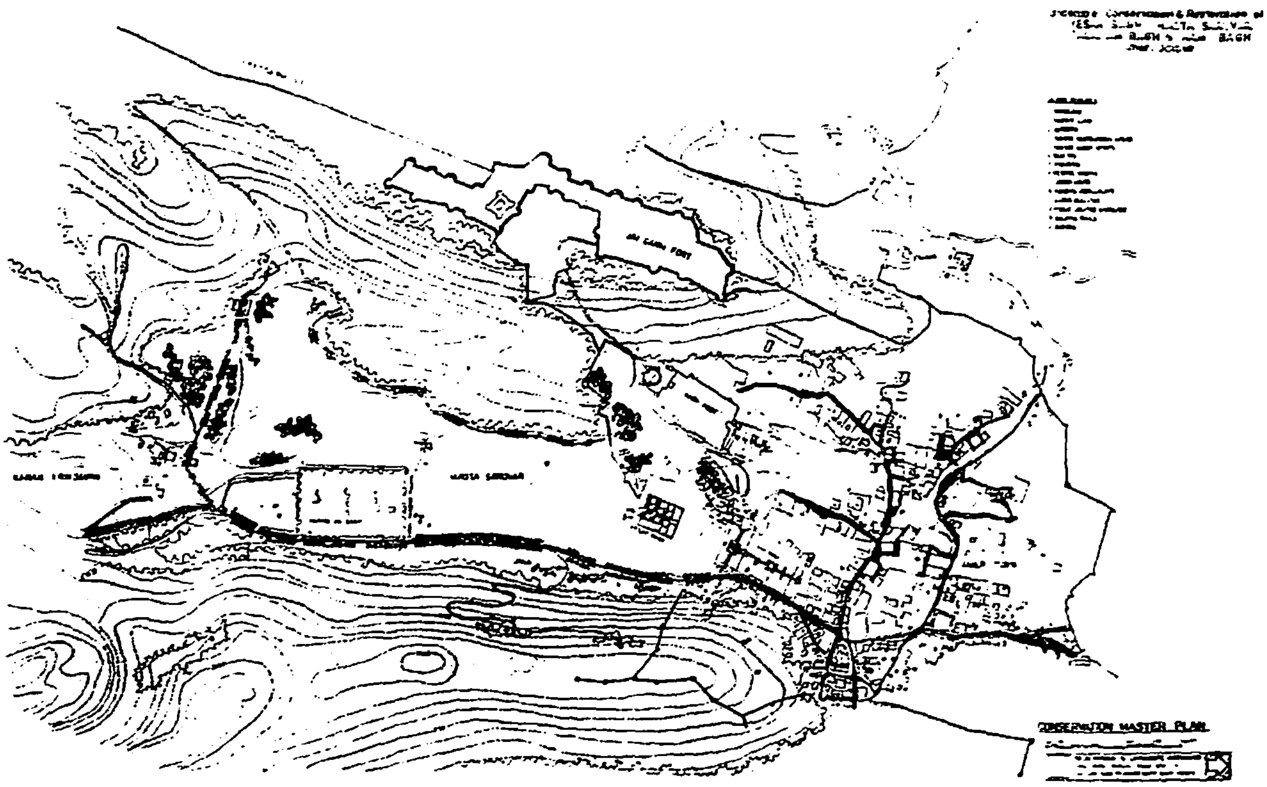
Further compounding the problem is the Brahmpuri Nullah that carries 12 lakh gallons of the city's waste—BOD 380 mg/l; COS 980 mg/l and solids 2856 mg/l at the rate of 5 cusecs—right into the lake.

To stop the lake's pollution, remove its impurities and restore its former capacity, various measures have been proposed. The water of the Brahmpuri Nullah is to be treated before it flows into the lake; the hills are to be afforested; the Nagtalai Nullah will be deepened at the inflow point to allow for siltation; the lake is also to be dredged in stages to remove the silt. Twenty acres of area has already been desilted, increasing the depth of the lake and thereby its capacity; water hyacinth that had become a scourge has been removed from this area; steps are also being taken to revitalize the lake by introducing aquatic life.

The Jal Mahal is being restored and rehabilitated as a museum. Floors that had been buried under sludge have been reopened and aerated to reduce decay because of moisture. The structure has also been strengthened. The garden on the roof will be revived as a lawn, with a symbolic imprint in the centre that will represent the existing pavilion buried below.

The Mansagar Dam is also being restored. The terraces on the dam will be used for providing a panoramic view of

Aerial view of the model showing Mansagar lake and its surroundings



the valley with its historical monuments by developing them into lawns with low ground cover. Silt from the lake will be deposited on the adjoining areas to create a recreational park and a heritage resort.

The valley to the north-east of the lake, the Kadamb Ghati, will be afforested with *dhok* (*Anogeissus pendula*), *Kadamb* (*Matrigyna perviflora*), *Salar* (*Bosawellia serrata*) and *Amaltas* trees. The rain water will be intercepted to reduce water run-off and, thus, reduce soil erosion. This water will be collected in natural water reservoirs.

Amber Ghati

This complex comprises historical gardens such as the Kesar Kyari, Ram Bagh, Dalaram Bagh and Sagar Tal.

Kesar Kyari, jutting into the Mautha Sarovar at the foothills of the Amber fort, use to be a viewing garden for the rulers of Amber. It was laid out in a style that is an amalgam of Rajputana and Mughal influences. The process of restoration traced out the old channels, flower beds, pipelines and other features in an attempt to recreate the Bagh to as close to its original state as possible. The other three projects are being taken up for execution in the near future.

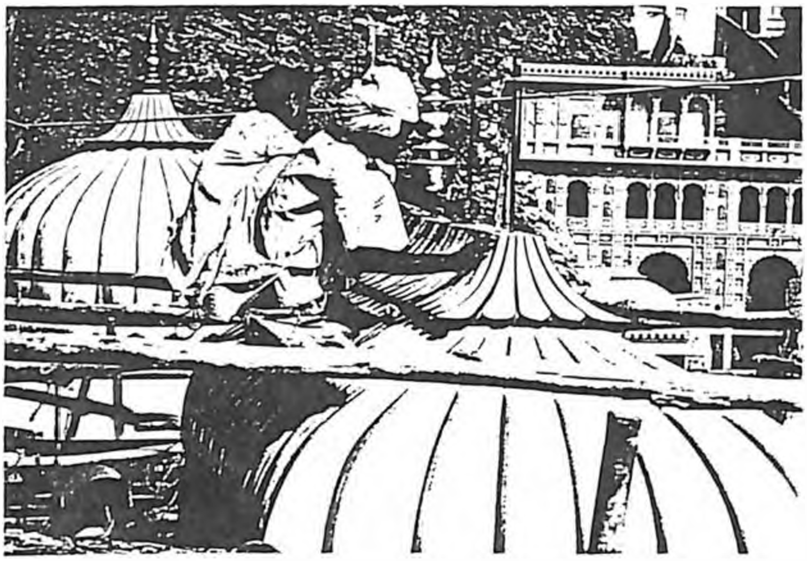
The revival of the Kanak Vrindavan valley has been a pioneering achievement. It started with an undergraduate dissertation twenty-one years ago and is continuing as a doctoral work. Today one can see perceptible improvements in the valley. One of the salient features of this project is that it is the first time traditional materials and techniques have been used in the hard landscape. Many artisans who mastered their skills in the restoration of this landscape have found gainful employment outside, reviving skills and traditions that had lain dormant for centuries. Even more important, this work has laid the foundation for other projects starting a landscape and architectural conservation movement throughout Rajasthan.

Photographs courtesy the architect

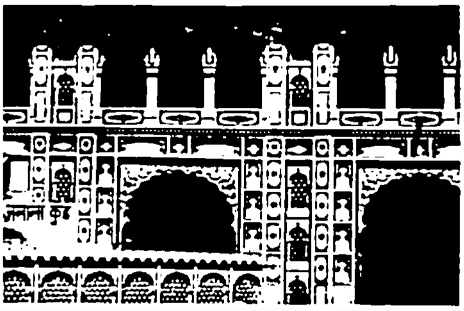
Rajiv Khanna would also like to acknowledge the various government agencies that were involved in the implementation of this project, without whose co-operation, this work would not have been possible.

Finance and Execution:
Kanak Bagh, Govind Deoji and Natwarji temples *Hindustan Charity Trust (1984–1991)*
Kanak Ghati *Birla Archaeological and Cultural Research Institute (1984–1991)*
Mansagar Lake *Jaipur Nagar Nigam, PHED, and other government agencies(continuing from 1993)*
Jal Mahal *Jaipur Nagar Nigam (1993–1996)*
Mansagar Dam *Jan Mangal Charitable Trust (1993–1996)*
Kesar Kyari *Jaipur Nagar Nigam and others (1992–1994)*
Parasuram Dwara *Avas Vikas Sansthan (1993–1995)*
Nhargarh National Park *Forest Department*
Afforestation *Forest Department*
Walled City Area *Jaipur Development Authority (1983–1985)*
Infrastructure Development PWD

AARAISH Jaipur — *Rajiv Khanna*

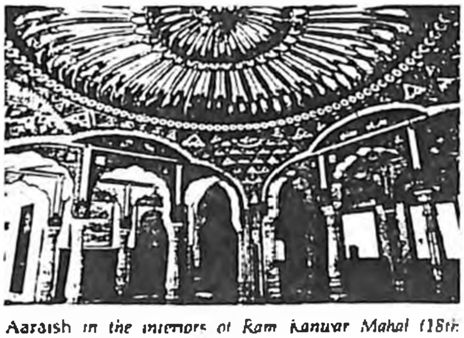


Aaraish *on* chhatris *and* kabanis *at the Galta temple complex*



Photos Rajiv Khanna

A recently constructed screen wall over the Zenana Kund at the Galta temple complex is laid with aaraish *in relief work using different colours for motifs*



Aaraish *in the interiors of Ram Kanwar Mahal (18th century) at Galta*

Aaraish is an age-old technique producing an impeccable lime finish which has enriched the interiors of palaces, forts and *havelis*, withstanding the harsh climatic conditions of arid regions, and adding colour and theme to the remarkable architectural scene in Rajasthan. This lime finish is smooth, cool to feel and has a gloss to it. It remains intact for centuries without developing cracks in spite of the diurnal variations in temperature. The glossy surface prevents accumulation of dust and sand prevalent all over Rajasthan.

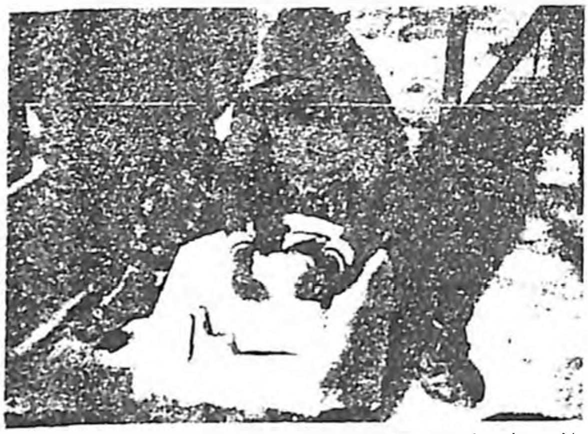
An existing example of *aaraish* at Ganesh Pole, Amber Fort, dates it to the period when such traditional techniques were commonly used. The wall paintings, in *aaraish* (frescos) at Galta outside Jaipur have also remained intact without loss of colour, shine or the development of cracks since the sixteenth century. This technique reached a peak during the reign of Maharaja Pratap Singh (1779-1803), the ruler of Amber/Jaipur. For a century this art flourished and was successfully implemented on various architectural elements, wall paintings, interiors of palaces and even on artefacts. The wall frescos depicted various themes from Mughal court life, legends from the Krishna and Radha theme and episodes from the *Ramayana*. Intricate geometrical designs and ornamentation also adorned the walls, floors and ceilings where *aaraish* was used. In Shekhawati and Bundi, even the common man's *haveli* depicts signs of this art. Unfortunately, the practice of this technique has died down and lost its importance in today's age of advanced technologies with constraints of time and skilled artisans.

At the Galta temple complex near Jaipur, this technique has been revived and is comparable to the *aaraish* that was done here in the sixteenth century. The entire exterior surfaces of *chhatris*, *kabanis*, temple facades and the newly erected screen wall at the Zenana Kund and Mardana Kund have used this finish with natural stone colours like green, yellow ochre, brown, orange and maroon. The ornamentation in relief work is also done is *aaraish*.

The Process

In the case of flooring, a surface is made waterproof — known as a *dar* surface. In this method, rope fibre is added to lime and *surkhi* (to prevent cracking); to this is added *methi* (for water proofing) and *gur* (for binding). Surplus water is extracted by beating the surface with bamboo strips for weeks to the accompaniment of rhythmic songs. Wooden *thapis* (slats) are then rammed down on it for 2-3 weeks to consolidate the lime water. The surface is now completely waterproof and known as *dar* and is the a base to carry out the *aaraish* finish.

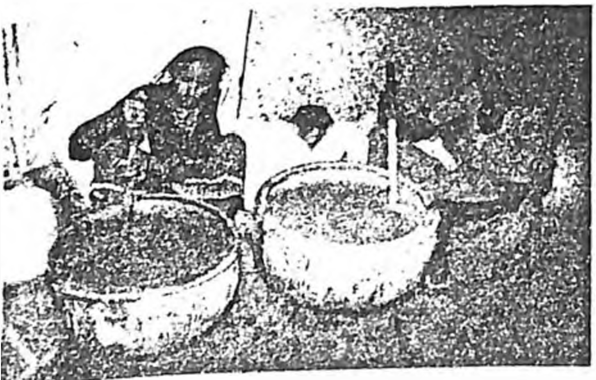
The preparation of *aaraish* work begins by purifying lime in water for at least two years



Lime paste prepared over two years is ground with marble powder and applied as a primary coarse layer known as kada *over the* dar *surface.*

The ground lime paste, kada, *is being applied on the* dar *surface with a wooden spreader. The final layer of fine lime will then be laid over it.*

Green colour being extracted by rubbing natural stones.



Natural stone colour being mixed with the two-year old processed lime in earthen pots. The churning continues for at least six months before application in the aaraish work.

before its application. The water is replaced every day and churned in large earthen pots with the help of a wooden stick. *Gur* (jaggery) and curd is also added to it. Control of temperature is essential, therefore dark rooms are preferred. The lime paste is then taken out and ground with marble powder and made into a coarse paste which is further applied to the already prepared lime mortar *dar* surfaces with the help of flat wooden spreaders. This process is known as *kada*. The *kada* surface is kept moist to allow settlement of lime for two to three weeks.

While the preparation is on, curd is added to the lime (which has been purified for two years in the earthen pots) for final cleaning purposes. Curd removes dirt particles existing in the mixture and turns it into a smooth, fine paste which is finally applied on the earlier, coarsely plastered surface. The thickness of the finish is usually 3-5mm. This is the finest paste. The surface is then evenly spread and smoothened by a fine knife. If any colour is to be added, then natural colours are extracted by a process of rubbing stones and mixed in the lime paste along with gum extracted from the *Prosopis juliflora* tree, and churned for at least six months before application. (It must be mentioned that these stones are not easily available.)

Now the surface is allowed to harden under normal temperature, but protected from the direct sun and dusty winds. A special hard stone is rubbed over the surface along with coconut water to give it a shine fine enough to see one's reflection in it. The process is now complete ✣

The author is an architect who experimented for over eight years on the traditional technique of aaraish at Kanak Vrindavan Ghati and the Galta Temple complex, Jaipur, and has been able to implement the art successfully in these places.

Redevelopment of Ghat-ki-Guni Complex Jaipur

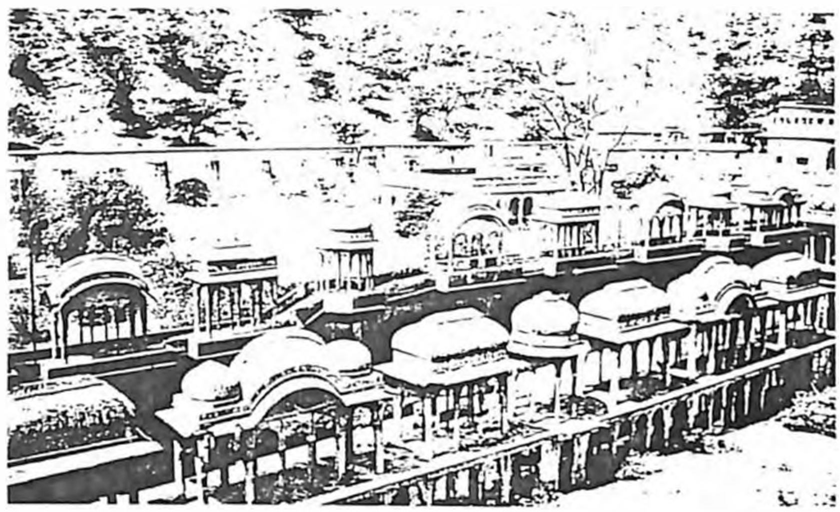
Ghat-ki-Guni has been identified by the Department of Tourism, Rajasthan as an area to be developed as a heritage village. Lying on the outskirts of Jaipur city on the Agra road, it is a two kilometre long stretch of old havelis, temples and gardens, built at the base of a long and narrow valley. It has an impressive conglomeration of 52 unique historical structures amongst which are the Raj Niwas Bagh, Vidhyadhar Gardens, Rameshwari Temple and the Vishwakarma Temple.

A competition for the redevelopment of the Ghat-ki-Guni complex was organized by the Awas Vikas Sansthan on behalf of the Department of Tourism, Rajasthan towards the end of 1995. The jury consisted of, amongst others, M.N. Joglekar and Prof. D.P. Kambo.

The design brief given to the architects specified that the traditional pale cream colour scheme as well as the architectural elements be retained. Also, the existing heights of the buildings had to be retained and any new structures proposed would have a maximum height of ground plus three floors. The open areas and gardens had to be preserved and not reduced in any way.

Eleven professionals were short-listed out of which two firms, Anupama and Rajeev Architects and Rajiv Krishna Restoration Architect, were jointly awarded the Second Prize. The First Prize was not awarded.

Featured here are the second prize winning entries: Schemes A and B



Scheme A

Architects **Anupama and Rajeev**

The proposal for the Ghat-ki-Guni to function as a complete heritage and cultural zone comprised a programme which considered the following planning and design issues.

Traffic and Transport

A transport node shall be provided at the Jaipur end, along with adequate parking, which will be a junction for public transport bringing people to this complex.

Ideally, the area should be pedestrianised; however, since some provision has to be made for access and servicing within the control area, a walkable stretch of one kilometre pedestrian walkway shall be provided on one side of the street, leaving a road width of six metres.

Public Facilities

A small information office shall be provided at the Agra end of the street which will also house public conveniences, drinking water facilities, a refreshment booth, post office, bank, police post, medical centre and telecom facilities.

An interpretation centre is proposed at the Jaipur end of the street just before the Gateway, which marks the beginning of the control area.

Streetscape

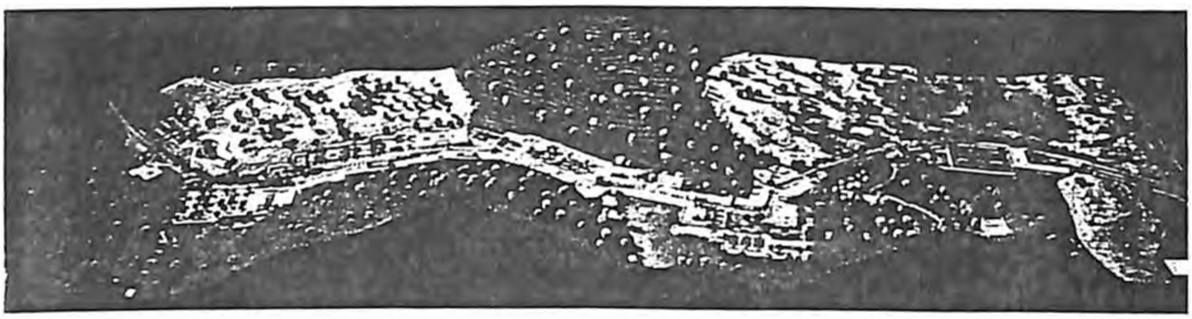
Kiosks and booths shall be provided on the street and in some of the open piazzas. Seating platforms, streetlighting, planters, trees and signage will also be provided. The signage shall be of two types: one graphic, and the other stone tablets that provide information on the history of each building, space or furnish details about the natural flora and fauna.

Tourist Accommodation

This will be provided on camp sites, the Raj Niwas Garden Hotel within the vast

Scheme B

Architect Rajiv Khanna



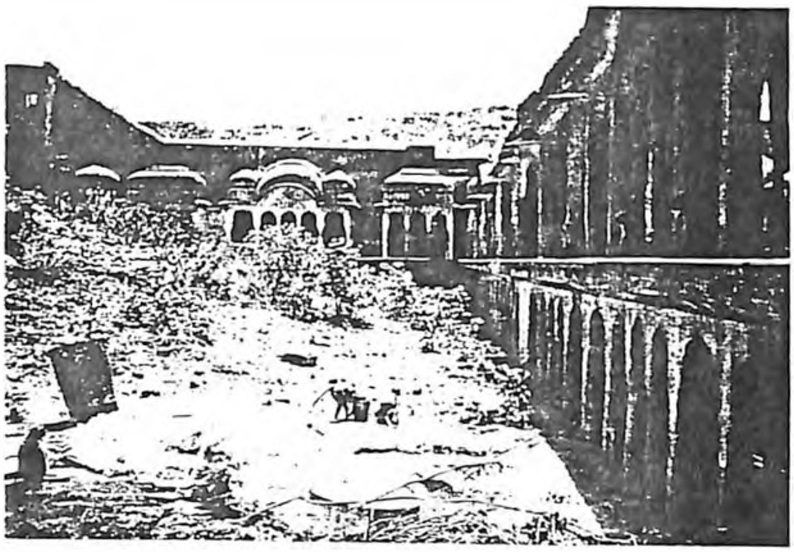
The whole scheme has been envisaged as developing an art and cultural centre that involves expansion of activities to include traditional handicraft and village craft.

Along the Jaipur-Agra highway this site should not be overloaded with constant traffic from Agra to Jaipur. Instead, it needs to be diverted through the bypass.

The entire stretch of two kilometres is proposed to be demarcated into four zones:

- recreational zone
- residential zone
- religious zone
- cultural zone

Each zone is representative of bygone era with major emphasis on recreating the heritage of this ghati.



Recreational Zone

At the beginning of the stretch towards the west (near Galta ka Darwaza) are aeolian sand deposits in a state of fragile equilibrium. These sand dunes need soil stabilization that is conservation of natural heritage with vegetational cover on them. Afforestation can help to put this stretch to recreational use and development of an ecological park. This green belt shall further act as a buffer between the city and its ghati complex.

Residential Zone

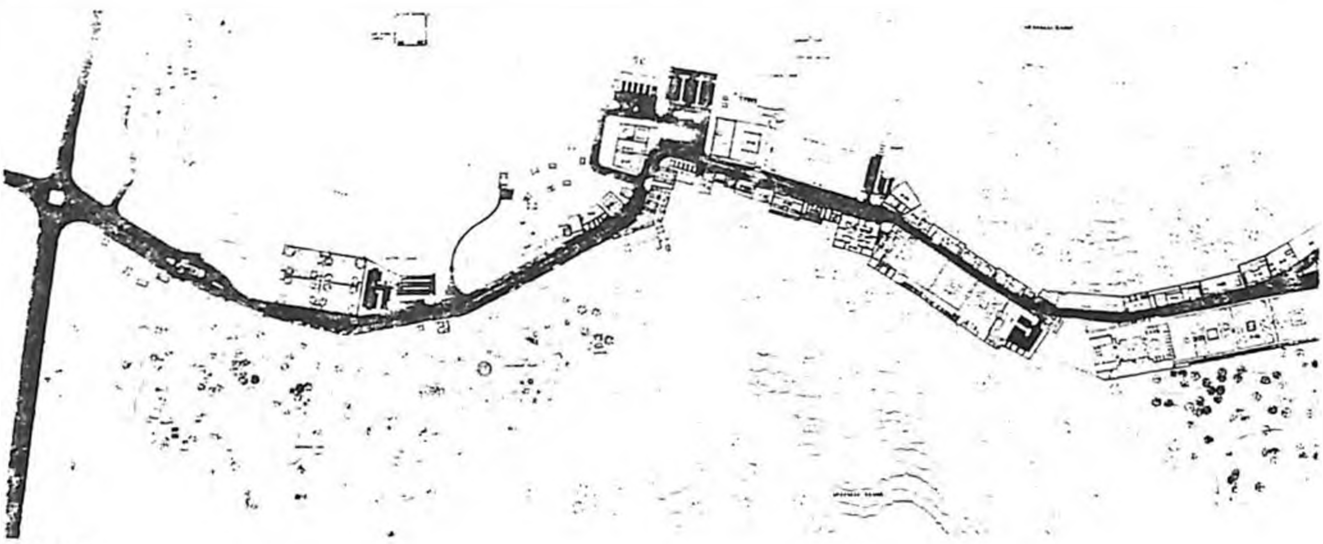
Beyond this stretch is a low-lying residential zone with the floor level of the structures below the street level. These structures face acute problems of drainage and structural safety. Intervention is necessary for the uplitment of the area on the whole with a certain set of controls/models prepared for the new construction.

Religious Zone

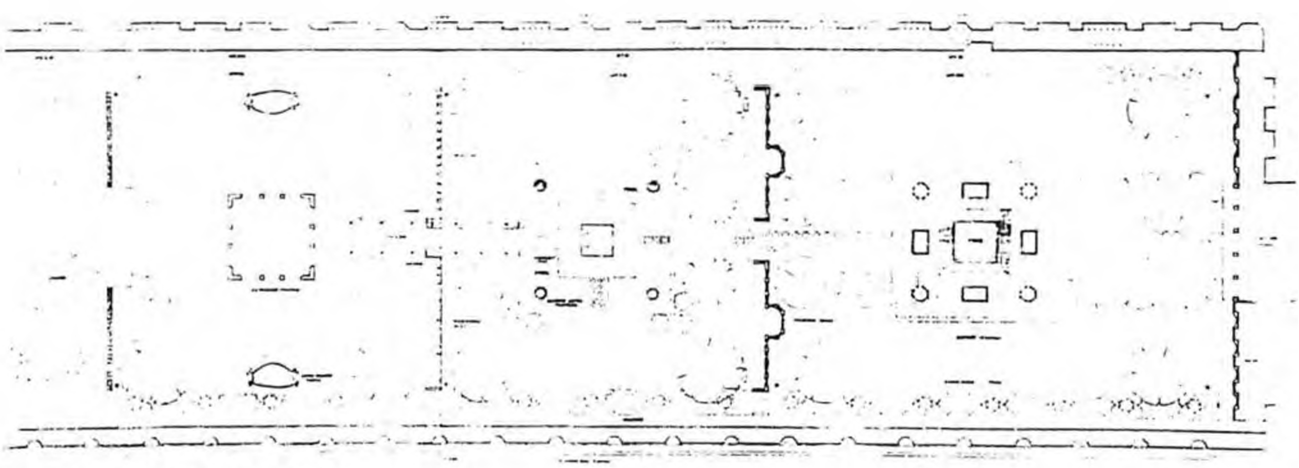
The next stretch of land is dotted with temples. This zone needs intervention with all the religious activities to be recreated. A large space with a *baradari* in the centre which was once Narsingh ka Bagh can be adapted for cultural activities. This is the only open space available. No new construction should be permitted but left free for processions festive occasions.

Within the entire area, the various vantage points are identified which give interesting and picturesque views of the cultural processions; for example, Bhagwan Sunar's haveli with terraced corridors, which has been proposed to be adapted for the performance of light and sound shows and overlooks the cultural activity ground.

A series of similar historical sites are lying in a row which may become a tourist spine with a little effort to rehabilitate these dilapidated structures.

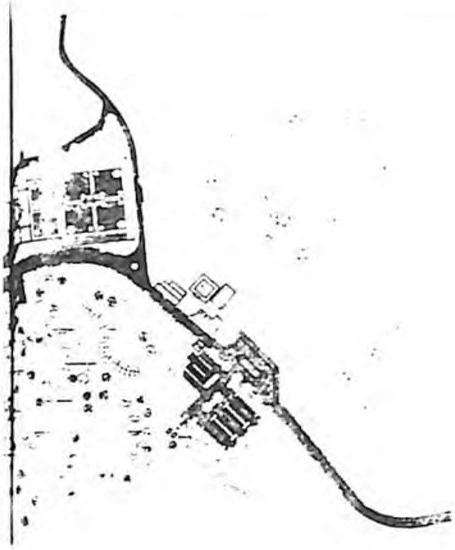


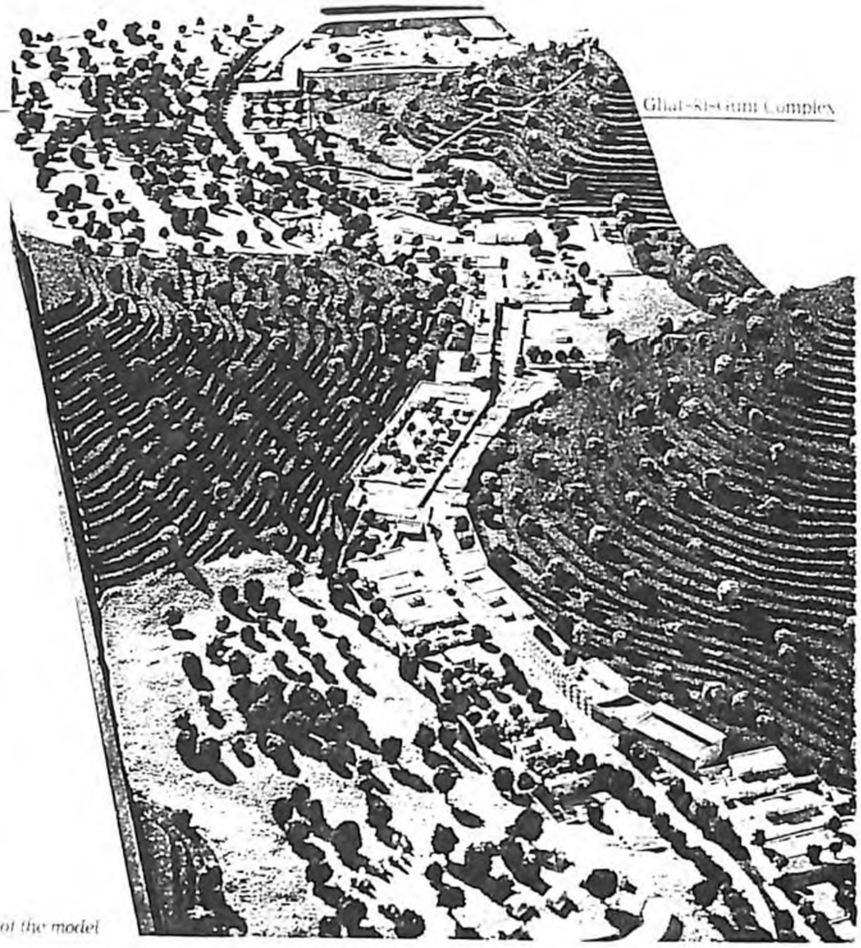
SITE PLAN



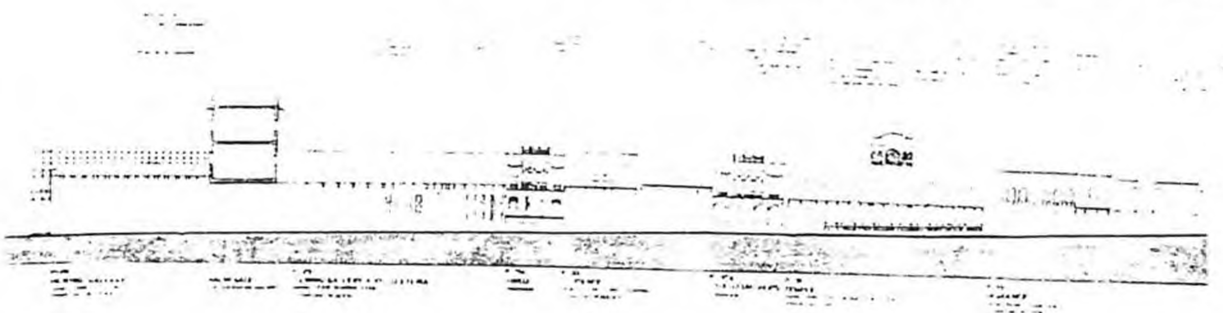
RAJ NIWAS BAGH, GROUND FLOOR PLAN

ELEVATION

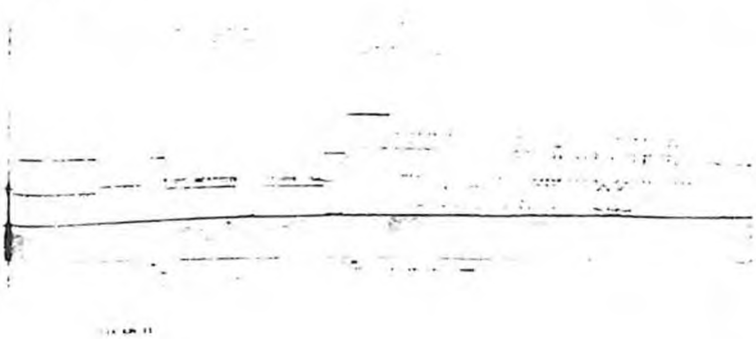


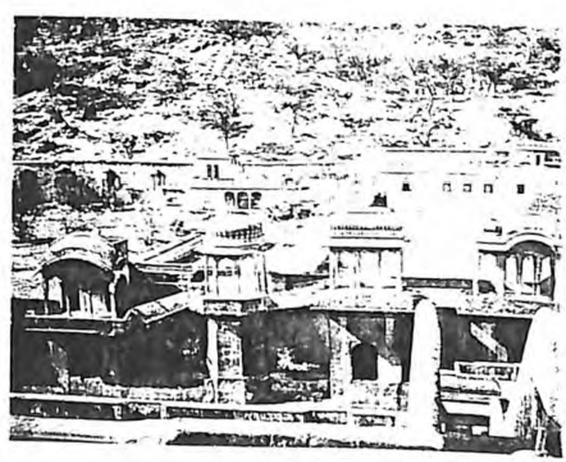


View of the model

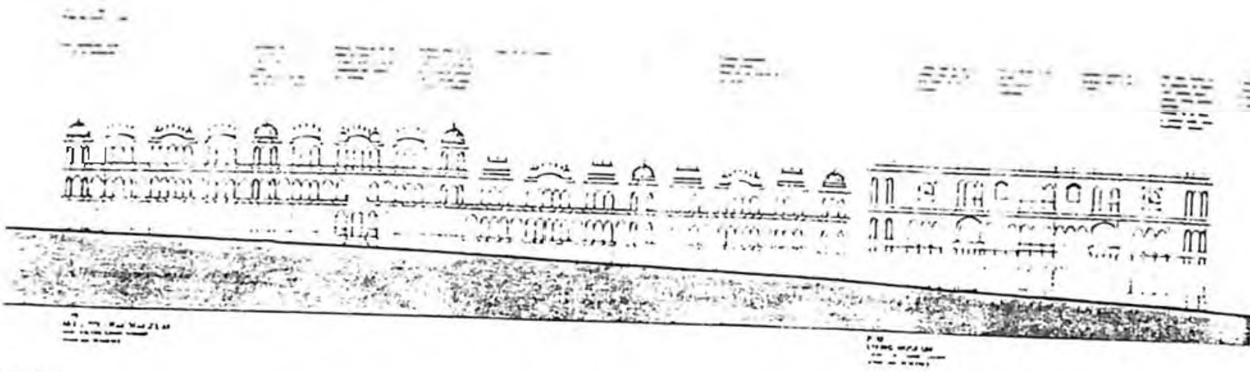


ELEVATION





ELEVATION



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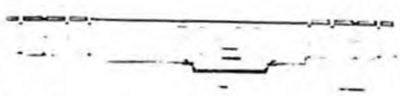

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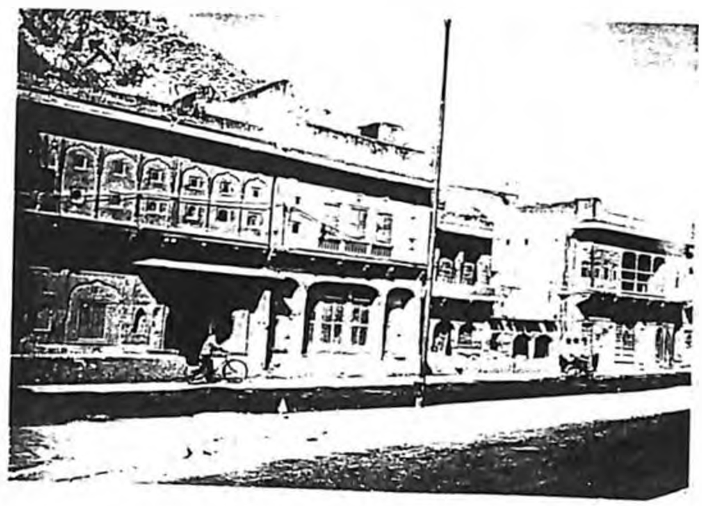
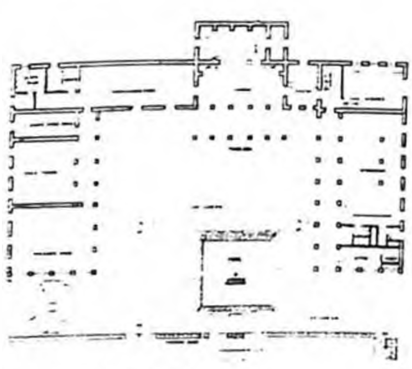
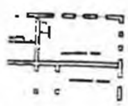


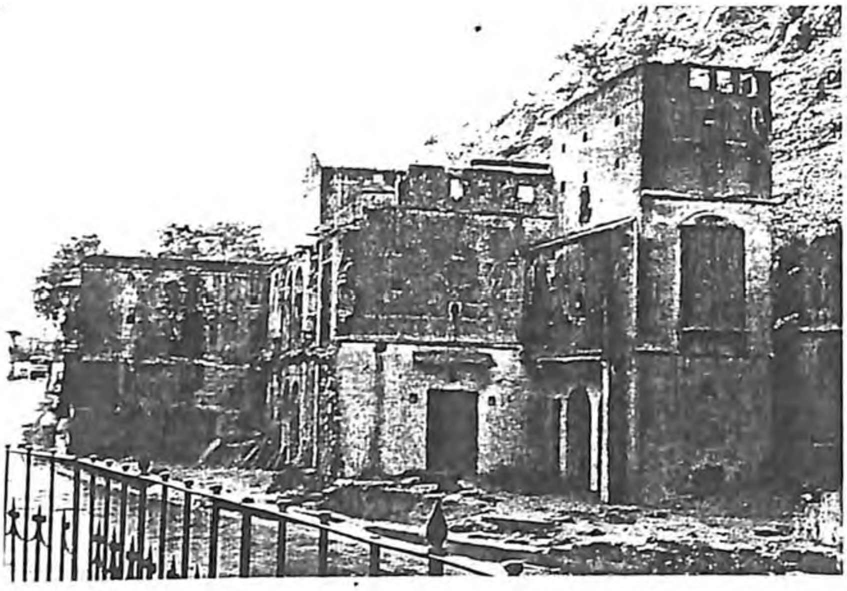


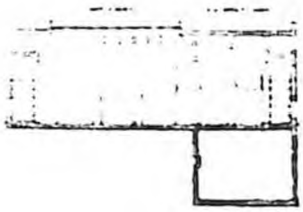
VIDHYADHAR KA BAGH (CLUB), GROUND FLOOR PLAN



MEZZANINE FLOOR PLAN

RESIDENCE OF GULAB CHAND LOHAWAL





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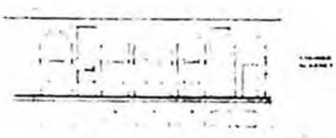

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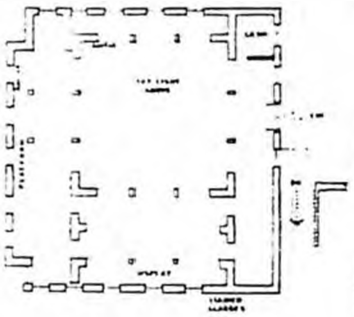
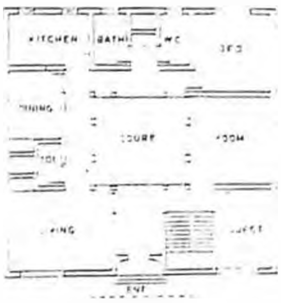


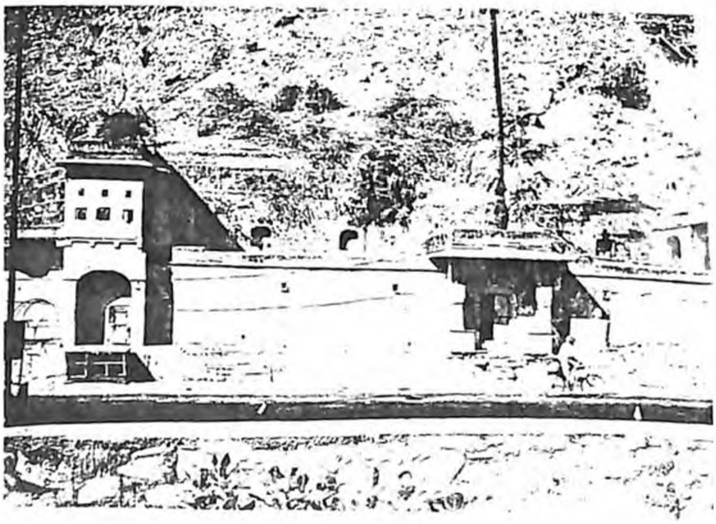
HANDICRAFT MUSEUM, PLAN

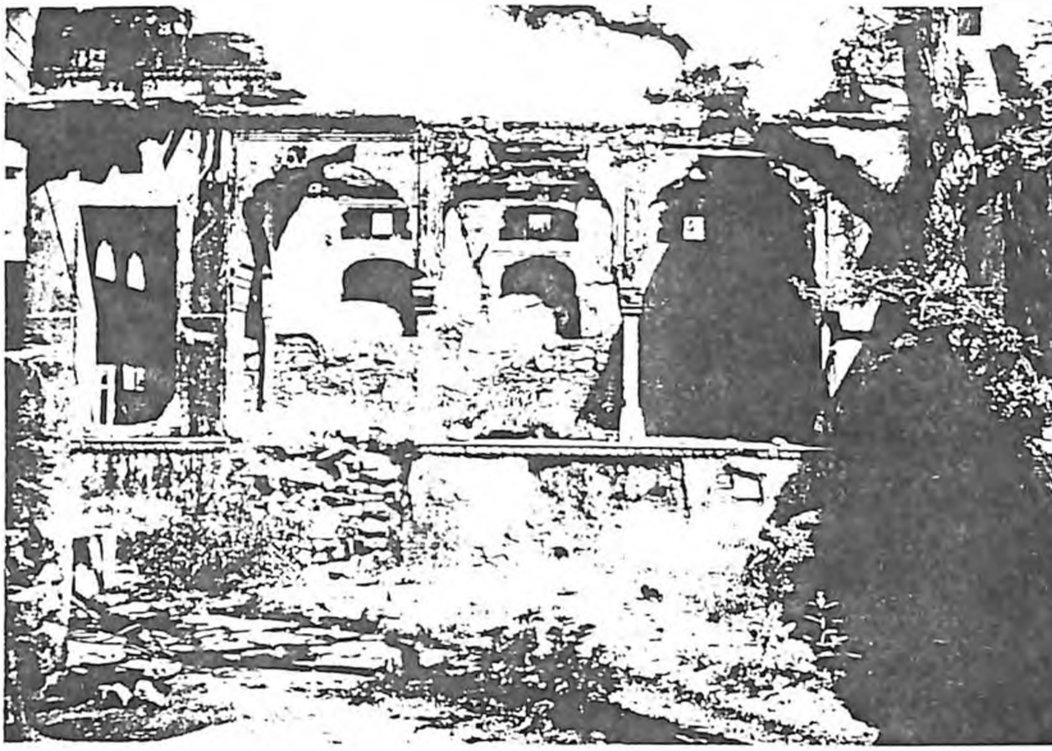


TYPICAL HAVELI,
GROUND FLOOR PLAN

TYPICAL SHOPS/HAVELI,
GROUND FLOOR PLAN

LIVING MUSEUM, ELEVATION





Cultural Zone

The cultural activities intensify as one moves into the traditional bazaar. The area stretching from Vidhyadhar to Sisodiya is [illegible] tourist interest and as [illegible] display centre, etc.

The Vidhyadhar [illegible] revived by landscaping [illegible] using the original elements — the [illegible], street furniture, fountains, etc. Similarly, the deserted Raj Niwas Bagh with the water cascades, terraces could be rejuvenated to its original glory incorporating Rajput architectural features. The tourist reception centre placed adjacent to the restaurant [illegible] the tourist with all the [illegible] information.

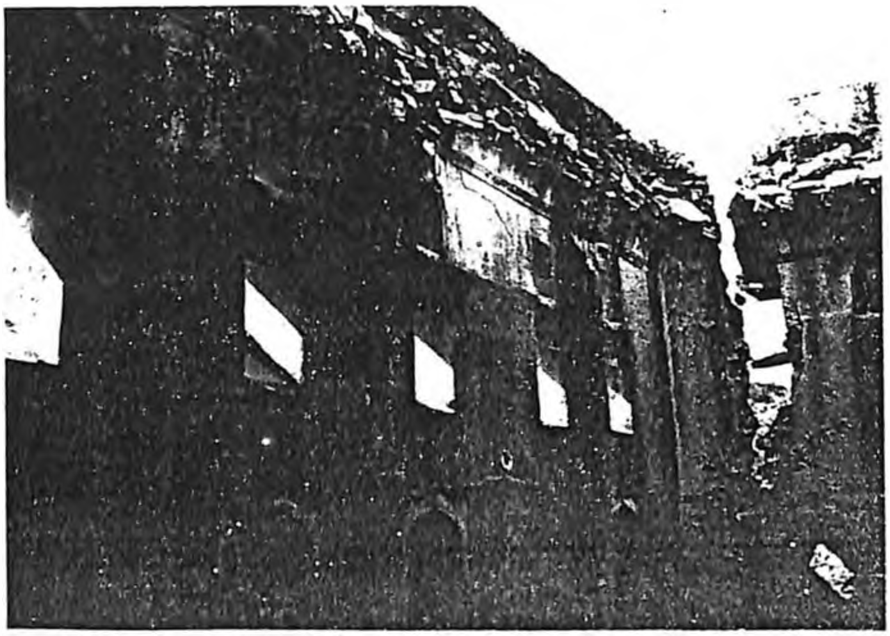
Sisodiya with its historical structure and huge garden will be revitalized. The large [illegible] have the capacity to hold the [illegible] history. The converging hills, undulating natural land forms, rock outcrops and sprawling vegetation opposite Sisodiya is most suited for developing an artisan village representing various regions of Rajasthan. The architecture and the landscape will be symbolic of that respective area.

Thus, the restoration of significant structures, the display of craftsmen, and provisions such as restaurants, museum etc have been put forth to foster tourism in Ghat ki Guni.

The development of this area suggests short as well as long term proposals defining areas of conservation and restoration, potential sites of recreational and tourist interest, sites of floral and faunal interest, areas of revived natural sources and their management.

[illegible]

Lime & yoghurt among natural finishes used to restore ancient Indian temple

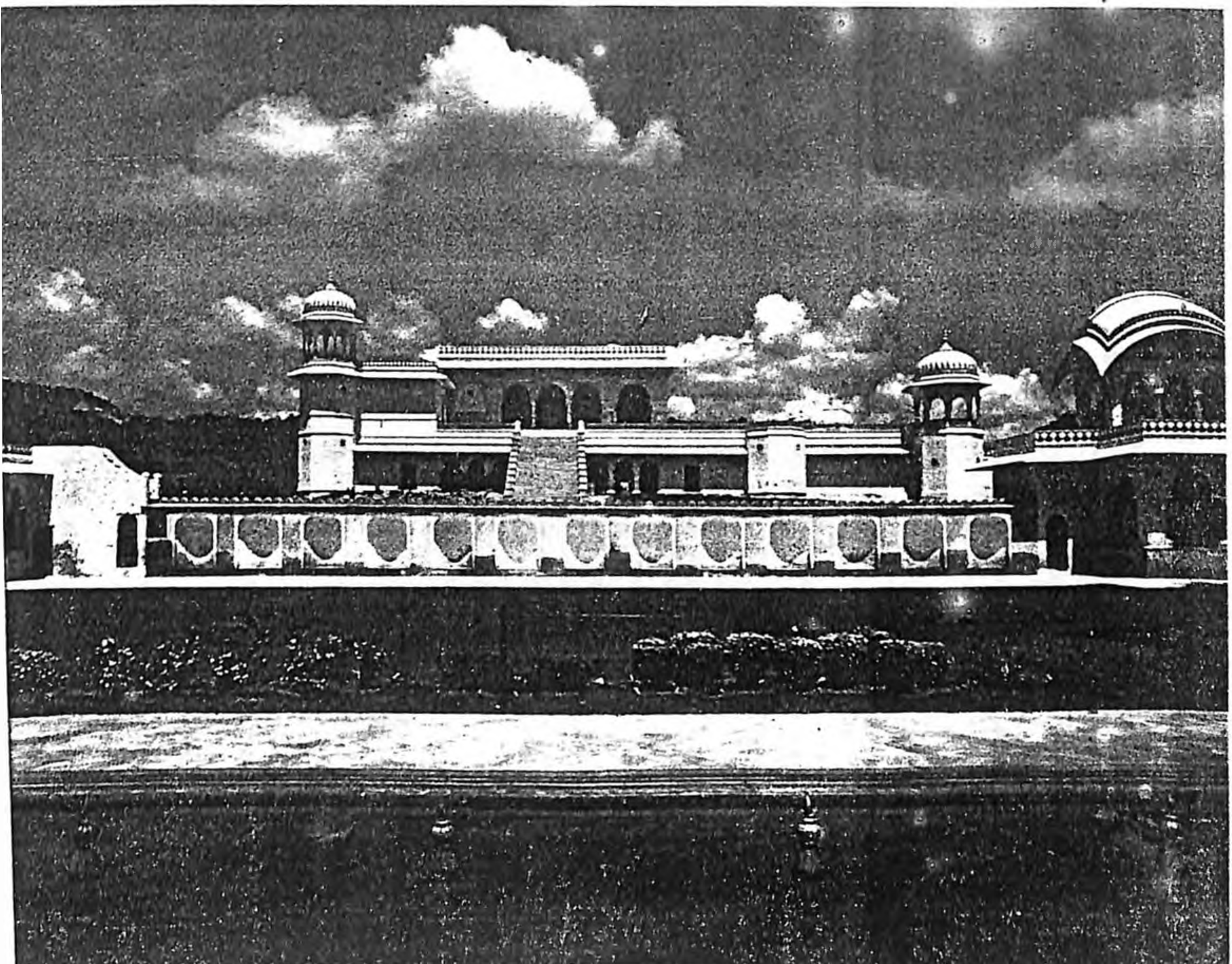


Dilapidated condition of a rear room in the 18th Century templex complex in Kanak Vrindavan valley.

CLOSE to the Indian city of Jaipur, called the Pink City because of its generous use of sandstone, is a temple complex dating back to the 18th Century. The complex is located in the Kanak Vrindavan valley and, for years now, was subject to decay and negligence.

That is, until industrialist/philanthropist G P Birla took up the challenge of restoring it to its former glory. According to project architect Rajiv Khanna, this is the first restoration project of its kind in India using age-old techniques and construction materials. "We shouldn't apply new techniques on old structures," said Mr Khanna, "in order to retain authenticity of the original. The idea is to revive forgotten arts and architecture of a certain period and it serves as an example for people to know their heritage."

Typical room interior before restoration


ovind Deoji - one of the two temples in the complex after restoration

View of Natwarji temple from Kanak Bagh, the temple garden.

HISTORICAL CONTEXT

Kanak Vrindavan is a natural valley stretching about 2 km that was originally under heavy forest cover. A river flowed through the area and its ruler, Raja Sawai Jai Singh, constructed a dam. Water collected in the dam gradually turned into a lake, subsequently leading to the loss of the forest.

Amer was the main town of the kingdom but about 1727 A.D., the foundations of Jaipur were laid. Today, it is the capital of the state of Rajasthan.

Jaipur attracted its fair share of inhabitants who contributed to the denudation of the forest. Instead of a perennial lake, this suffered from siltation and turned into a seasonal feature. Unauthorized encroaching, heavy grazing, and the use of fertilizers further disturbed the ecological system.

The temple complex, built about 1707 A.D., is located in the centre of the lake. It consists of two buildings: the Govind Deoji and Natwarji temples. An idol of Radha-Madhav had already been installed in the temple by the poet Jaidev of Bengal. Later, Raja Sawai Jai Singh added an idol of Vrindavan's ruling deity, Lord Govind Deoji, to this temple. The entire structure was subsequently gifted by the king to one of his priests who, along with his entourage made changes as required. After a lapse of time, their descendents moved out and covered the structure in masonry and plaster to bar intruders.

PAKISTAN

CHINA

■ DELHI

■ Jaipur

INDIA

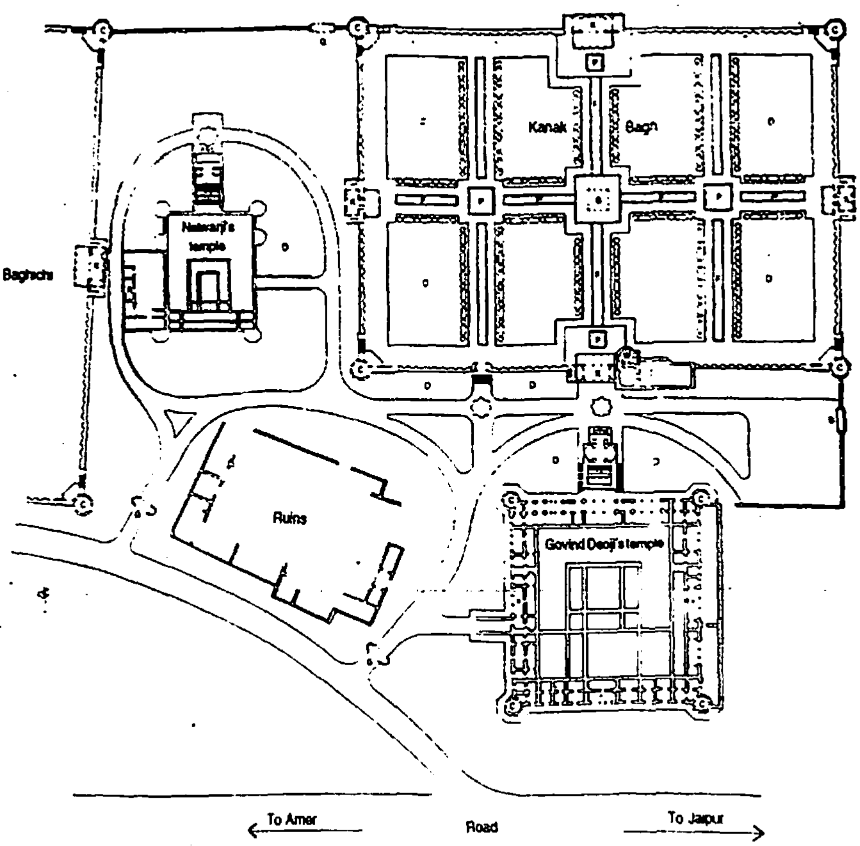
Arabian Sea

SRI LANKA

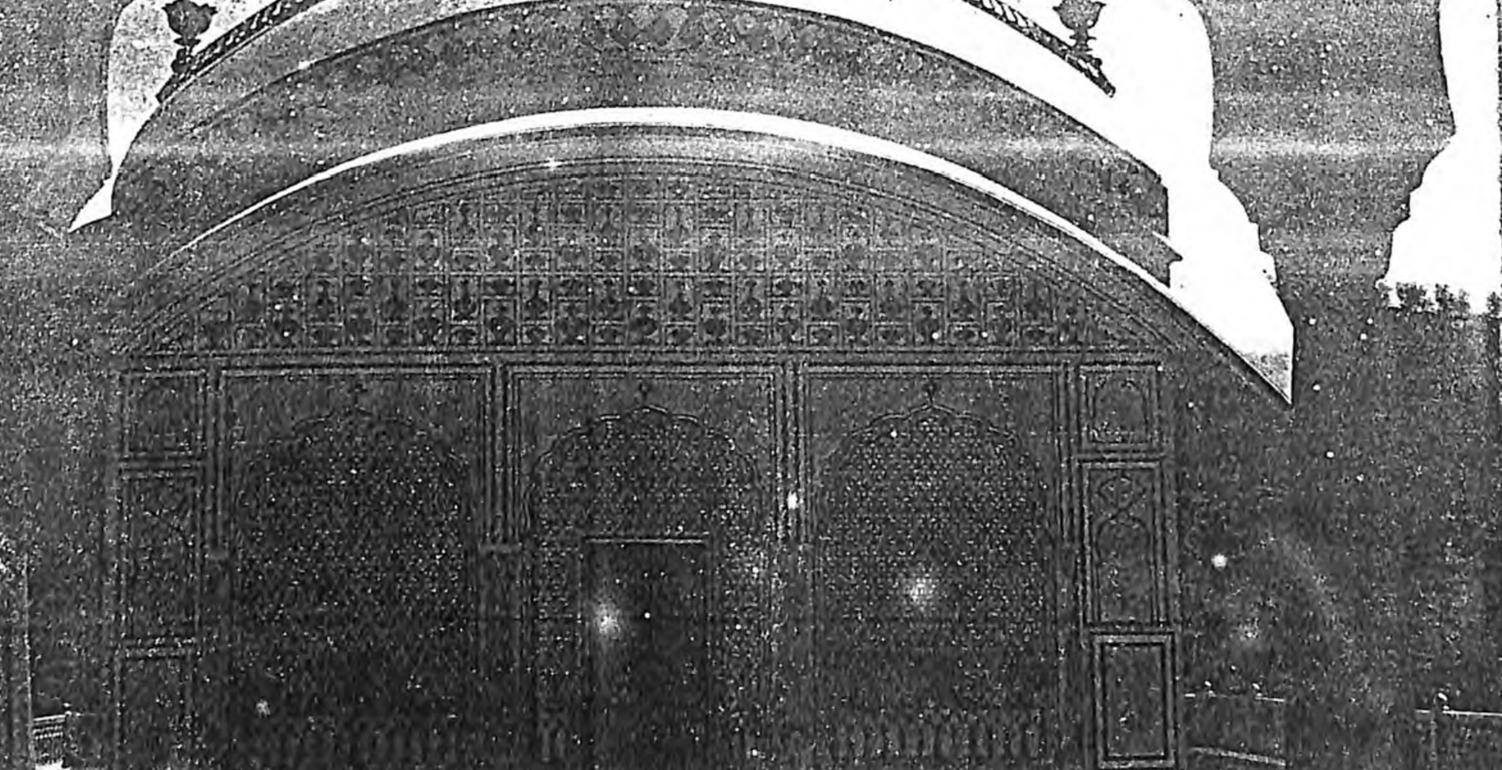
PLAN OF ACTION

The state government of Rajasthan originally commissioned Rajiv Khanna to prepare a masterplan for the site measuring under 30 sq. km. but later shelved this in view of more pressing priorities. Mr Birla stepped in at this point and was asked to submit a formal proposal within six months.

Once accepted, it was decided that work take place in phases. The first phase (1984-1991) concentrated on restoration of the temple and valley. The second and current phase, is to last 10 years and will see improvement of the lake and hilly areas, and provision of tourist facilities.



Ground floor plan of temple complex and facilities:
C – Chattri R – Room P – Pond F – Fountain
K – Kabani G – Gate W – Well



Restored kabani (arrow-shaped roof pattern over a covered ~ ani of Govind Deoji temple.

The temple complex

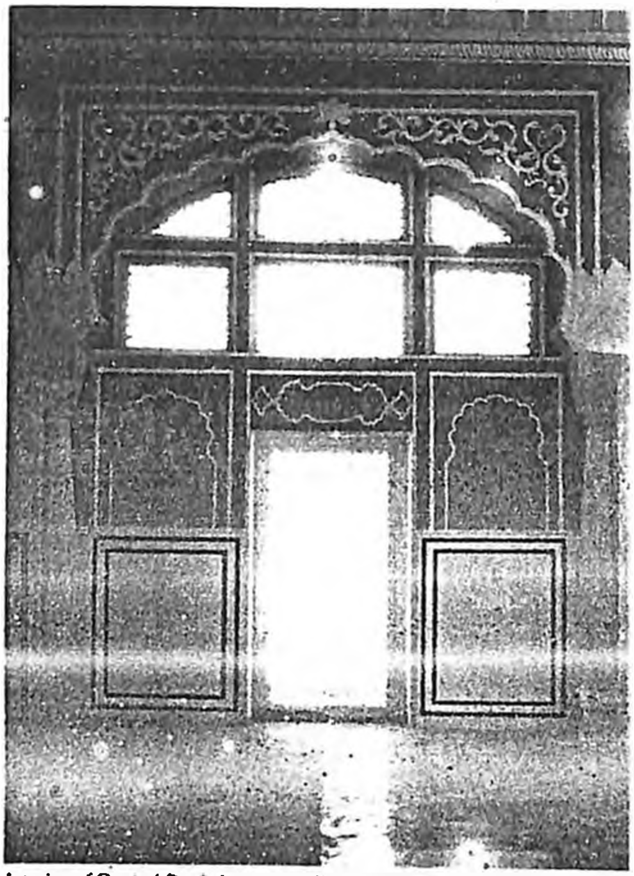
The temple complex held little material value to the king but is today recognized for its architectural style particular to Jaipur in the 18th Century. The complex is built according to the centuries-old Vastu Mandla Purusha temple architecture of India. Every room in the temple conforms to the position of a planet and follows a square pattern. Each part belongs to a particular deity with the main idol placed in the centre.

The structure, constructed of lime and stone, was subject to extreme temperature differences - ranging from 48 degrees Celsius in the day to four degrees Celsius at night. The cladding contributed to its deterioration, there being no aeration. Polluted water rose from the foundations, weakening the mortar so much that it crumbled upon human contact. Increased porosity precipitated a capillary action so that the interiors became damp.

The surrounding garden was based upon Persian and Rajputana influences with geometric channels divided into eight equal parts and a central axis.

Approach

The groundwork for Rajiv Khanna's work was a visit to museums. An historic map showed the location of the temple, lake, surrounding gardens and forested areas. This was followed up by visits to neighbouring



Interior of Govind Deoji featuring jali *(decorative pattern in the wall with perforations) and* aaraish *(special lime finish) flooring*

Jodhpur which has a distinctive architecture but shares some common elements. For example, the arches are different but how are the arches spanned, their normal span, and materials commonly used - it was such details that Mr Khanna ferreted out.

A study of the temple foundations revealed its geometry. In this instance, its highlight were *chattris* (dome on pillars over octagonal plan) in the corners with *kabani* (typical roof pattern over a covered plan) in the centre. Also evident were details such as *jalis* (decorative pattern in the wall with perforations, used as a screen and for ventilation), patterns and finishes. When the cladding was removed, 81 previously forgotten rooms were discovered inside the Govind Deoji temple.

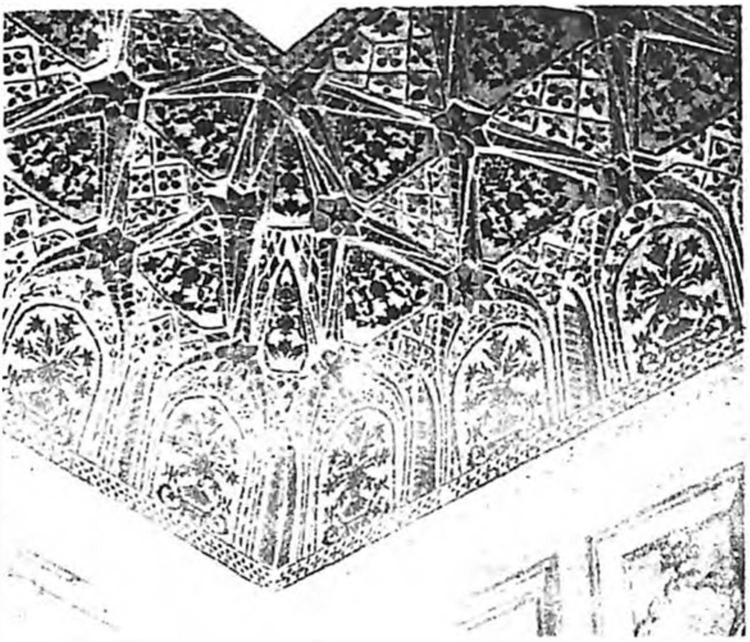
Mr Khanna spent one year experimenting with different traditional materials and methods. For example, the building has been constructed from lime but how was this lime prepared? Tradition has it that lime is processed for a minimum of two years and improves with age, somewhat like wine. During this time, the lime was stored in 15 to 20 drums and soaked in water. Women were hired to change the water daily and churn the mixture. After two years, the lime became as hard as brick.

Even application of the lime required antiquated instruments. Mr Khanna made copies of these implements after seeing them in museums.

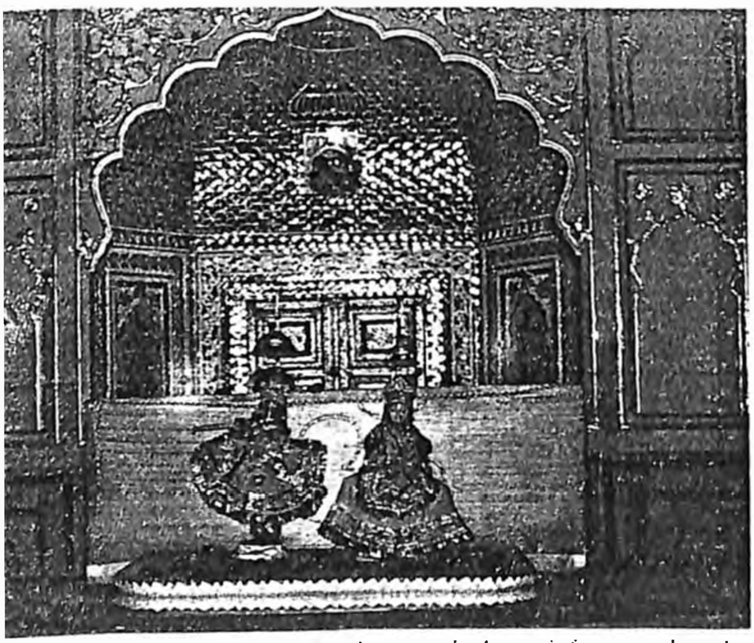
Locating people familiar with appropriate skills was an equally arduous task. Sometimes, the person had only partial knowledge and wasn't certain about the exact composition or its sequence. Some didn't wish to reveal skills passed down from father to son.

Arts prevalent during that time were revived: mirrorwork, *panniwork* (silver foil placed behind glass), goldenfoil work, stucco work, mother of pearl work, and sandalwood work.

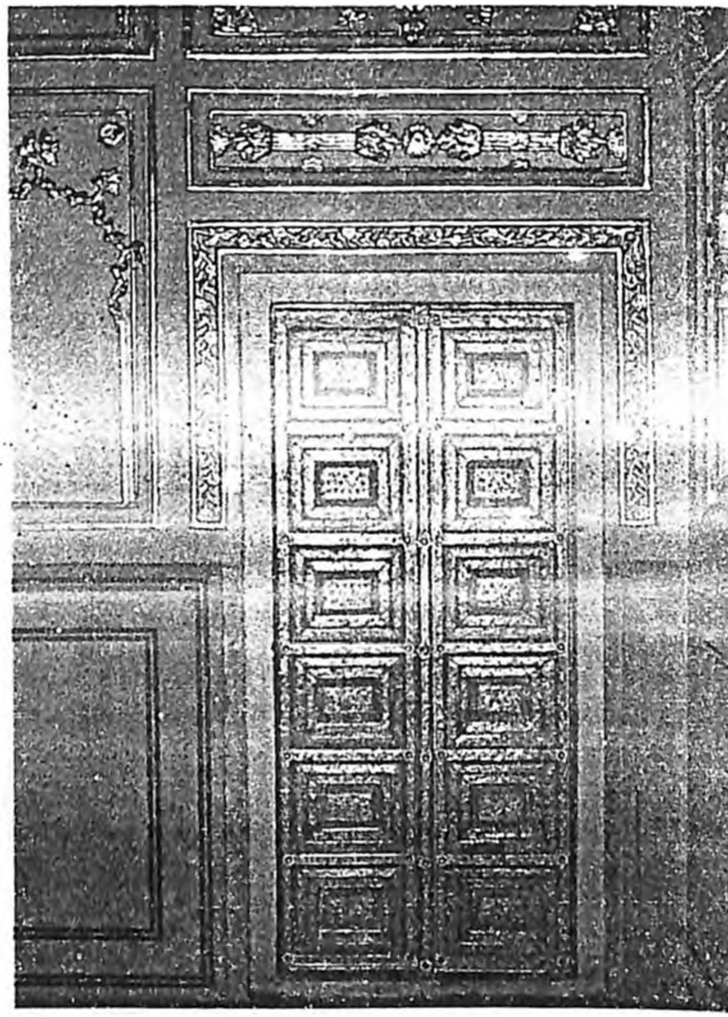
The mirrorwork (using flat mirrors and



Panniwork (a rare art using concave mirrors to reflect light) re-created in the ceiling of Natwarji. It takes one day to produce two square inches of the surface.



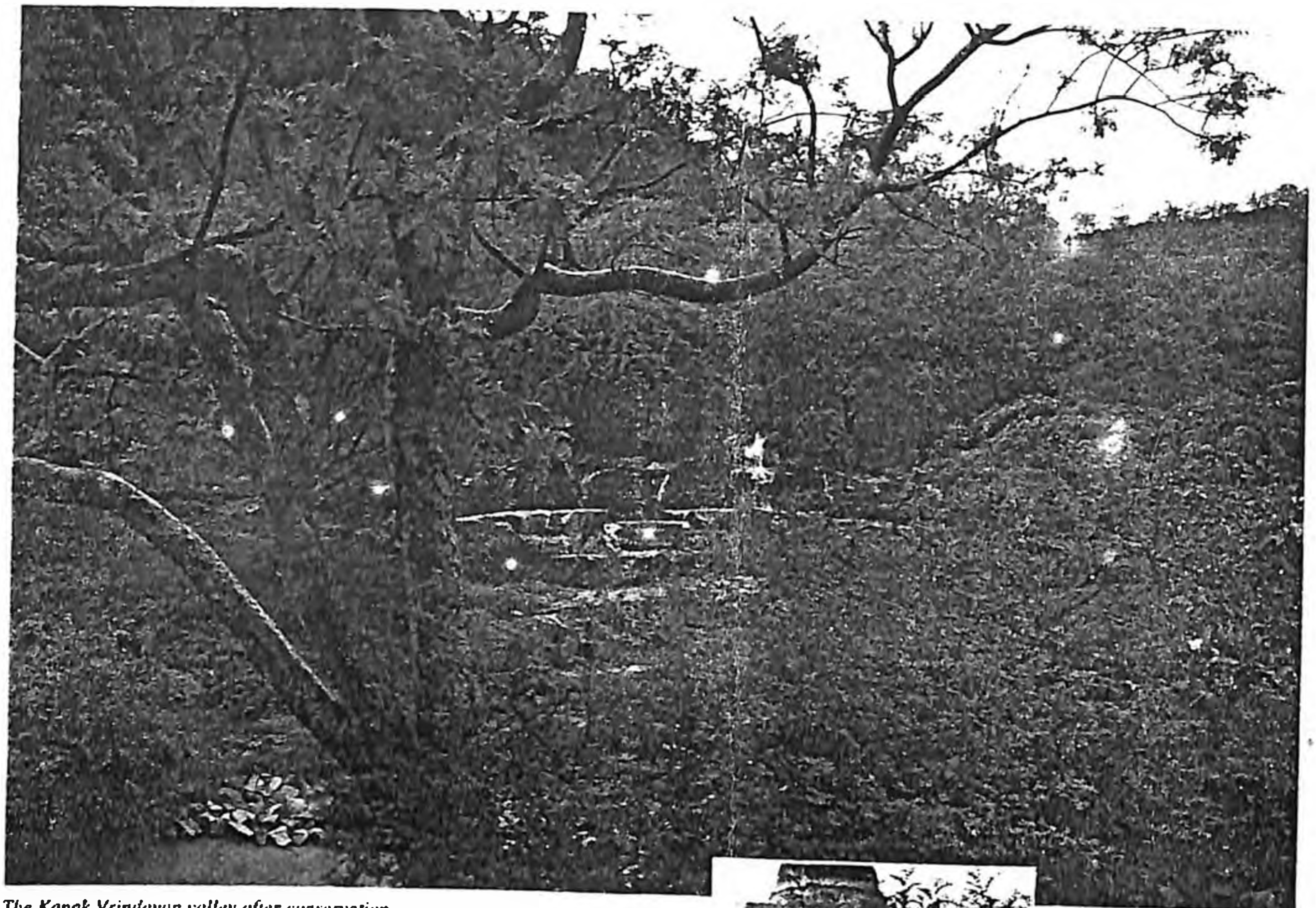
Idols of Radha and Natwarji viewed against a background of mirrorwork, used for the first time in architecture. Walls flanking the idols feature silverwork.



Silver door with intricate engraving and silverwork on the walls.

panniwork (based on concave mirrors to reflect light) is so elaborate that it took one day to create two square inches of the surface featuring intricate geometrical patterns over relief work. This is also the first time that mirrorwork has been put to architectural use.

Deciding the geometry of a particular design or colour combinations of that time, or work precedure - all such details had to be resolved. Examples of *meenawork* (copper mould with variously-coloured glass in-



The Kanak Vrindavan valley after conservation.

sets) is traditionally used in making ladies' ornaments. In this instance, these were bought from an old house and incorporated in the interior.

All colours and finishes were derived from nature. Colour, for example, resulted from rubbing stones with lime until the lime changed colour. Yoghurt was added to this and the mixture processed for about 1 1/2 years. The Natwarji temple was subsequently finished in a peach colour; and the Govind Deoji in Jaipur's favourite pink. Coconut water was used for glazing and fenugreek added to lime provided a waterproof finish for the roofing. Gum was used as a binding agent.

Missing stones were relaid and the lime mortar re-inforced. Entire floors were dug up and replastered. All exposed terraces and roofs were waterproofed. An *aaraish* (special lime) finish was used for the flooring. This is possible only in temples where people don't wear shoes.

Similar effort went into conservation of the surrounding enclosed garden. Plants conducive to the climate of Jaipur and prevalent during the 18th Century were selected. After digging two feet below the ground, the original design pattern was uncovered. Channels were dug up and the pipeline relaid with fountains.

Project architect Rajiv Khanna.

"Had I used modern techniques and materials, I could have finished the project in 1 1/2 years," said Mr Khanna. "No one has the patience to do this but these techniques are superb. We currently do not have any finish - exterior or interior - that can stand 10 years of this harsh climate but these withstood 300 years. Traditional methods may be better but these were more appropriate for a different time when people had patience."

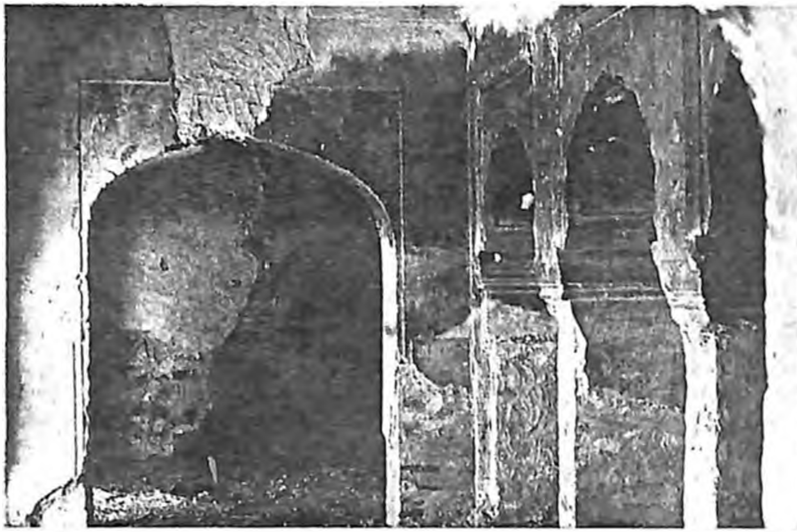
Press Reviews
of restoration projects

A RECIPE FOR RESTORATION

THE recipe's a bit out of the ordinary: molasses, curd, fenugreek and a splash of coconut water for that final glazed look. But this chef's concoction isn't for eating; it's meant for an entire building. A glittering temple complex actually, and it's nestled on the fringe of the Man Sagar Lake in Jaipur.

Just a few years ago this complex, built in the early 18th century, was a mouldering sprawl of ruins. The habitat was a wasteland — a jumble of rubble and dry twigs. "Nobody had heard the bell of the temple for three centuries," says architect Rajiv Khanna who recently restored it and is now doing the Galta complex of temples outside Jaipur. The reticent man behind both projects is industri

Natwarji temple before and after restoration (left); and finishing touches to the lime wash-coated *chhatri* of Galta temple



The original decaying Govindeoji complex (above); and the renovated complex after it was converted into a museum replete with miniatures depicting mythological scenes.

(From top) A lime *jali* being prepared; lime being ground with marble powder; and colours being made from crushed stones.

whole lot plastered over. Next came the cosmetic changes. The exteriors of both the Gowindeoji and Natwarji temples were restored to their original splendour using natural colours and materials. For period authenticity, buildings belonging to the same period in Jaipur, Udaipur and Jodhpur were used as models.

BUT for the nitty gritty — what goes onto the walls and floors — Khanna sought the old craftsmen. Unfortunately, a dying breed today who might well take their secrets to their graves. With their help, Khanna attempted to emulate the old builders. Lime was the most important ingredient of the ancient methods. It took two years to prepare the lime wash which provides the finish for the walls. And when the natural colours made from crushed stones are added to the mixture, it has to be churned for at least six months.

Time and patience were also needed for the mirror encrusted ceilings of the inner sanctums in the two temples. Each panel of the exquisite ceiling in the room housing the idols in the Gowindeoji temple took over nine months, at the rate of one day per 2 sq. inch. The jigsaw puzzle-like sandal wood or mother of pearl inlay doors and the silver plated doors were also time consuming.

The ancient "recipe" for a lime wash finish or terracing was a fascinating discovery. Molasses helps bind the lime mix, curd takes the dirt out, fenugreek acts as a waterproofing agent, jute fibre is used for reinforcement and to arrest surface cracking, and coconut water gives surface an extra shine.

Landscaping and conservation are important components of Khanna's work. He planted trees that have traditionally been associated with Krishna, like the *Barna* and *Kadam* trees and Aravali flora in the Kanak Brindavan Gardens. But the piece de resistance is the recreated path above the temple which was just rubble earlier.

Birla is now firmly on the restoration track. Next on his funding agenda is the Kamleshwaram peeth and a 1,000 year old Shiva temple in Varanasi. Says he: "Had I known that there were so many old temples which could have been restored, I would never build new ones." He couldn't be more right. The gleaming sparkling new marble Birla temple located below the magnificent old stones of the Lily Pool Palace looks as out of place as an igloo in a desert.

The original door of Natwarji temple; and (above) the restored door with inlay work.

alist philanthropist G.P. Bala. His motive: to restore the traditional culture of his native state to its pristine glory.

Today, the Govindeoji temple complex with its nouveau pale yellow domes and wine-coloured painted abstractions leads into the freshly reconstituted Kanak Bagh — a mini Mughal Garden. It's not exactly restoration though. Khanna has transformed the ruins by using the age-old techniques of construction and decoration originally employed to build these temples that house the idols of Radha Madhav which Raja Sawai Jai Singh brought from Vrindavan to Jaipur around 1714 A.D.

The task was daunting, much of it "trial and error" — and costing about Rs 2 crore. Floors were dug up and relaid, old stones put back, and the

The Zenana Kund in a state of disrepair; and (below) the Zenana and Mardana Kund after they were restored with a traditional screen wall decorated with frescoes and relief work.