

Curious Seen:
Baolis of the Delhi Sultanate

by


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Abstract

Hydraulic structures are a significant component of the architecture of the Delhi Sultanate (c.1200-1526). The uncertainty of the water supply in the extremes of the monsoon climate made construction of waterworks necessary for the urban population of Delhi. Royal patronage of major hydraulic structures such as dams and large reservoirs can be linked to historical records of shortage of rainfall and droughts during the Sultanate.

Stepwells or *baolis* are unique hydraulic structures, consisting of wells with attached stepped tanks, found in northern and western India. Eighteen Sultanate period *baolis* have been identified in Delhi. These are important in the architectural history of the period because they represent the adaptation of an indigenous Hindu architectural form by Muslim patrons. Architectural construction and details indicate that these structures were influenced by the same trends and regional variations in architecture as other buildings of the period.

A variety of patrons including aristocrats, both men and women, and merchants commissioned the construction of *baolis*. Epigraphical evidence shows that the *baolis* were more than simple water storage facilities, and that they served important social and religious functions for both the Muslim and Hindu communities.

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Note on Transliteration

Proper names have been written in simplified form without diacritical marks, on the understanding that readers familiar with the names will know the spelling while readers unfamiliar with the names find the diacritical marks more confusing than helpful.

Introduction

“In India’s monsoon climate, with its extremes of wet and dry seasons, the relief or prevention of famine was a major challenge to the imperial rulers.”¹

“The majority of persons who have commented on the great builders of Asia...are far more articulate on the non-hydraulic than on the hydraulic achievements.”²

These two statements reflect a contradiction in the history of architecture in India. Securing an adequate water supply for domestic and agricultural use has been essential throughout Indian history. The climatic extremes of the monsoon create specific water control problems: during the short wet season, the heavy rainfalls produce a water surplus that must be contained to provide water for the rest of the year when the lack of rain creates a water deficit. Although a variety of hydraulic structures were developed to obtain and store water, some of which are quite elaborate, they have received relatively little attention from architectural historians. The whole field of hydraulic architecture in South Asia deserves more investigation but, in this thesis, I have limited my study to stepwells of the Delhi Sultanate.

Stepwells or *baolis* are unique hydraulic structures found in northern and western India. They are water wells that are architecturally

elaborated by the addition of a stepped tank. In addition to the fact that they are interesting structures, the stepwells merit research for several reasons. In important respects the architecture built for Muslim patrons in India is an imported architecture. The principal Islamic monuments (e.g. mosques) did not exist in India before there was a Muslim population. The development of Indo-Islamic architecture, at least initially, was the transformation of a foreign architecture by local construction and decorative techniques. The stepwells, on the other hand, were indigenous Hindu structures which, after the establishment of the Delhi Sultanate, were built by Muslim patrons. The stepwells built for Muslim patrons used the construction and decorative techniques characteristic of Sultanate architecture. There are relatively few examples of civic architecture from the Sultanate period. Stepwells provide an opportunity to study civic architecture and architecture built by non-royal patrons. I have focused my attention on the Sultanate stepwells in Delhi to keep the project to a manageable size. In addition, the numerous extant Sultanate buildings in Delhi provide an architectural context for the stepwells.

The history of architecture is also the history of its physical, social and cultural context. We understand the setting in which buildings were constructed by observing extant structures, by studying contemporary and other historical documents, and through interpretation and analysis of the information.

It is beyond the scope of this thesis to provide an extensive analysis of Delhi Sultanate historiography.³ However, it is appropriate to do a general review of the available written accounts. There are numerous

contemporary histories of the Sultanate period.⁴ Because the historians were all associated with the royal court, they were principally interested in recording events associated with the imperial authority and the ruling elite. There are few references to the non-political features of society as a whole.

Some of the histories are available, at least in part, in translation in *The History of India as Told by its Own Historians* translated and edited by H. M. Elliot and J. Dowson (1877).⁵ There are faults in this work, both in the editors' selection of extracts from the original texts and in errors in translation. Despite these flaws the *History of India* is still a useful reference for the history of the Sultanate.

The *Ta'rikh-i Firuz Shahi*⁶ completed by Ziya al-Din Barani in 1357 is the principal source for the history of the Delhi Sultanate between 1266-1357. As a young man Barani had been a member of the royal court, but ended his days in exile. For Barani the *Ta'rikh* had a didactic purpose. It encompasses not only the annals of the sultans, but also the rules and regulations by which they should live. Barani was an old man when he compiled the *Ta'rikh* from memory. Consequently some dates and sequences of events are not reliable. It is valuable as a history of court life of the time, and makes only brief references in the text to the physical form of the city and its architecture.

Amir Khusrau (1253-1325) is usually considered a court poet rather than an historian. However, in his chronicles of court life he covers a wide range of subjects including descriptions of architecture commissioned by the sultans.⁷

An excellent source of architectural information is the *Rihla*⁸ (Journey) of Ibn Battuta, a Moroccan theologian, traveller and writer who lived in Delhi for ten years (1333-1343). He had an official position at the court and has left descriptions of many aspects of court life. He was also an observer of customs of the Hindu population. Although his memoirs were not written until he returned to Morocco (1355), his descriptions of urban architecture in Delhi are valuable.

Several histories of the second half of the fourteenth century record royal architectural patronage. One is Sultan Firuz Shah's (r.1351-1388) own account, *Futihat-i Firuz Shah*.⁹ In part, it was written to show that he had endeavoured to be a pious and dutiful ruler. Firuz Shah records many of his architectural commissions, including numerous hydraulic projects. Another document of the period was written by Shams al-Din Siraj 'Afif early in the fifteenth century, and is usually titled *Ta'rikh-i Firuz Shahi*,¹⁰ although 'Afif did not give this name to the work.¹¹ The *Ta'rikh* is a biography of Firuz Shah's reign. 'Afif's purpose was primarily to reveal the sultan's virtues and merits as a ruler. He does record many of the architectural projects undertaken by Firuz Shah. The anonymously written *Sirat-i Firuz Shahi* was compiled during Firuz Shah's reign, probably as a royal commission.¹² It also details many of the sultan's building projects.

Yahya ibn Ahmad Sirhindi's *Ta'rikh-i Mubarak Shahi*¹³ is valuable as the primary source of information for the period 1388-1434. It is, for the most part, a chronicle of events: warfare, political intrigue, rebellion and the rise and fall of rulers. He recorded little architectural information. There are more detailed descriptions of Delhi architecture,

at the end of the fourteenth century, in the autobiography of Timur, *Mulfuzat-i Timuri* or *Tuzuk-i Timuri*.¹⁴ Timur captured and sacked Delhi in 1398. In his report of the capture of the city he notes many aspects of the urban architecture. The *Zafarnamah*¹⁵ (Book of Victory) of Saraf al-Din 'Ali Yazdi (d.1446) is a partial biography of Timur and repeats much of the information in *Mulfuzat-i Timuri*.

The main authority for the late Sultanate or Lodi dynasty (1451-1526) is the *Tabaqat-i Akbari* written by Khwaja Nizam al-Din Ahmad in 1594.¹⁶ The *Tabaqat* is a history of Muslim India from the first invasions, in the late tenth century, until the 38th year of the Mughal emperor, Akbar's reign (1594). Although it was written almost a century after the Lodi period, and contains chronological errors, it is still a valuable reference for events of the period. The architectural information is scant and scattered through the text.

There were commentaries on Delhi and Indian life, derived from accounts of travellers and traders, written outside of India. One such document is the *Masalik al-absar fi mamalik al-amsar* written by an Arab scholar, Shihab al-Din 'Abbas al-'Umari, in Damascus in the 1340s.¹⁷ Al-'Umari never travelled to India and derived his descriptions from merchants and scholars whom he considered reliable sources. He writes about activities of the sultans and court, aspects of daily life, and describes the cities with data on buildings and hydraulic structures.

The study of Indian architecture began in the colonial period. P. Joshi in "Problems in South Asian architectural historiography," *Architecture + Design* (5(1989): 53-59) discusses some of the factors which influence the descriptions and interpretations of Indian

architecture. Many of the early descriptions were coloured by the writers' Eurocentric views. It is important to be aware of these biases because some of the early texts are still used as references by modern writers. Problems relating specifically to the study of Muslim architecture in India are presented by R. Nath in "On the study of Indo-Muslim architecture, *Indica* (22 (1985) 29-57.

Numerous publications describe Delhi Sultanate architecture, but these vary widely in the detail with which they cover the subject, and very few discuss the hydraulic architecture of the period. The modern study of Sultanate architecture began in the 19th century with surveys of Indian architecture, and the majority of references are still to be found in general studies. Many of the early references are found as observations in travel diaries. By the middle of the 19th century, architectural guidebooks with lists and descriptions of buildings of Delhi (but not limited to Sultanate buildings) were being published. Some of these are still considered basic texts, and the descriptions are used by modern historians. Examples include, Carr Stephen, *The Archeology and Monumental Remains of Delhi* (first published in 1876, reprinted 1967)¹⁸ and G. R. Hearn *The Seven Cities of Delhi* (1906)¹⁹ among numerous others. Not all the early works were published in English. The 1846 *Athar al-Sanadid* of Sayyid Ahmed Khan published in Urdu is also a useful list of Delhi Islamic buildings.²⁰ Publications by the Archeological Survey of India are an important source of architectural information. A monumental survey of archeological and architectural of northern India, which began in 1862, was published in 23 volumes between 1862 and 1884 by A. Cunningham. These early architectural catalogues are useful

because they can give evidence of the subsequent deterioration of buildings. Y. D. Sharma's *Delhi and its Neighbourhood*, a recent Archaeological Survey of India publication,²¹ still uses the catalogue format.

More interpretive studies of the Sultanate traditions have been included in a number of surveys of Indian and Islamic architecture, although some of the early studies have been criticized for their colonial, orientalist biases. C. Tadgell's recent *The History of Architecture in India*²² is a useful modern, interpretative study of Sultanate architecture. There are good descriptions of Sultanate buildings in J. Hoag's *Islamic Architecture*. Ettinghausen and Grabar's *The Art and Architecture of Islam 650-1250*²³ contains descriptions of some of the earliest Sultanate structures. Later Sultanate buildings are described by Sheila S. Blair and Jonathon M. Bloom in *The Art and Architecture of Islam 1250-1800*. A limitation of these texts is that as surveys they can only describe a few major monuments and for the most part cover the same monuments.

It is only relatively recently that Sultanate architecture has been studied extensively as a separate architectural tradition. The most comprehensive survey of Sultanate architecture is the Japanese three volume publication by T. Yamamoto, M. Ara and T. Tsukinowa, *Delhi: Architectural Remains of the Sultanate Period* (in Japanese).²⁴ This is an extensive photographic survey of virtually all the architectural remains of the Sultanate in Delhi.²⁵ Another important contribution to the field is R. Nath's *History of Sultanate Architecture*.²⁶ This work covers the development of architecture during the Sultanate not only in Delhi but also in other areas of Muslim India. The work is in part a descriptive

catalogue, but he does try to place the buildings in their social, religious and geographical context. An earlier descriptive overview can be found in two articles by J. Burton-Page in *Encyclopedia of Islam*: “Dilhi” and “Hind-Architecture”.²⁷

There are still relatively few studies of specific sites or monuments. In “The Tughluqs: master builders of the Delhi Sultanate” (*Muqarnas* 1[1983]:123-66) A. Welch and H. Crane present a comprehensive topological survey of the architecture built between 1320 and 1388. The Archeological Survey of India has published some monographs on individual sites, for example: J.A. Page, *A Memoir on Kotla Firoz Shah*, Memoir of the ASI no.52 (Delhi, 1937) and J. A. Page, *An Historical Memoir on the Qutb: Delhi*, ASI Memoir no.22 (Calcutta, 1926). These include site plans, building descriptions and some historical information. The 1946 excavation report, “Adilabad: A part of the “fourth” Delhi”²⁸ by H. Waddington describes a royal citadel. It also provides some information on urban development and mentions some water works.

In general, architectural historians have not studied the hydraulic architecture of Delhi. Some of the architectural catalogues mention a few of the water works but by no means all of them.²⁹ The most complete reference on Sultanate waterworks is Volume 3 of *Delhi: Architectural Remains of the Sultanate Period*. It includes a survey of fifty-two hydraulic structures, with more detailed studies of eight. I.H. Siddiqui discusses Sultanate waterwork construction, irrigation methods and the social importance of water in “Waterworks and irrigation system in India during pre-Mughal times,” *Islamic Culture* (1984: 1-21). Some of the major waterworks of the Tughluq dynasty have been described and placed in

historical context by A. Welch in “Hydraulic architecture in medieval India: the Tughluqs,” *Environmental Design* (1985: 74-81).

Waterworks of the Sultanate period in other parts of India have received some study. In “Water structures of the Sultanate of Gujarat 1407-1573,” *AAQ* (Architectural Association Quarterly) 13(4) 1982: 34-40, Yasmin Shariff briefly describes a variety of water structures. A further discussion of the various Gujarati waterworks and their historical setting is given in G. Michell and S. Shah, *Ahmadabad*.³⁰ The chapter on public works in R. Nath’s *The Art of Chanderi* briefly describes the Sultanate period waterworks in this northern Madhya Pradesh town. K. Rotzer discusses some of waterworks of central south India in “Bijapur: alimentation en eau d’une ville musulmane du Dekkan aux XVIe - XVIIe siècles”, *Bulletin de l’Ecole Francaise d’Extreme-Orient* 73(1984): 125-196.

There are Hindu architectural texts that include directions for the location and construction of wells and other waterworks. The twelfth century *Aparajitaprccha* has a chapter devoted to wells, stepwells and ponds.³¹ There do not seem to be similar Indian Muslim texts of the Sultanate period, even though there are surviving texts containing hydraulic information from other Muslim countries.³²

To date there are relatively few studies of *baolis*. There is a brief entry in the *Encyclopedia of Islam* under *baoli*.³³ Jutta Jain-Neubauer’s study of *The Stepwells of Gujarat* is still the most extensive single publication on the subject. She surveyed about 60 stepwells and presents detailed descriptions of structural elements and ornamentation, and discusses the historical context of thirty-four of the wells. The recently published *The Queen’s Stepwell at Patan*³⁴ by Kirit Mankodi

describes in detail the architecture and sculptural ornamentation of this large stepwell in Gujarat. The stepwells in Gujarat have attracted the most attention because they are very elaborate and highly ornamented structures.

Matsuo Ara identified eighteen Sultanate stepwells in Delhi. These are catalogued in Ara, "The *baolis* of the Sultanate period of Delhi. Historical studies on the monuments of the Delhi Sultanate period (V)," *The Memoirs of the Institute of Oriental Culture* 44[1967]: 1-108 (in Japanese) and in *Delhi: Architectural Remains of the Delhi Sultanate Period*, vol. I and III. Ara's catalogue, which is primarily a descriptive list, was the starting point of this thesis. I have enlarged on Ara's preliminary studies by discussing the *baolis* in the physical, architectural and social contexts of the Sultanate period.

The thesis is divided into five parts. Chapter one will examine the physical context of Sultanate architecture. The physical environment has a significant influence on the design of architecture, particularly on utilitarian structures such as water works. From contemporary documents it is possible to derive some data on the climate during the Sultanate. In this chapter I will review the climate history and discuss the various kinds of hydraulic structures that were constructed to ensure a water supply.

The second chapter will describe the historical context of the city. An outline of Sultanate dynastic history will be presented in the context of the urban development of Delhi. The location of significant urban water works will be examined as an element in the growth of the city.

The architecture of the stepwells will be studied in chapter three. Included will be the main architectural elements of the stepwells, and the variations in form and decorative detail. The descriptions in this chapter are based on observations made during field work. A brief survey of Sultanate architecture and the relationship between stepwells and other contemporary buildings will be examined in chapter four.

The fifth chapter will present a social context for the stepwells. Patronage (who built the stepwells and why) will be studied primarily from epigraphical evidence, and the social function of the wells will also be considered.

There are two appendices. The first is a catalogue of the eighteen Sultanate stepwells of Delhi, and three related structures. Six epigraphs from Sultanate period wells are quoted in Appendix two.

Introduction: Notes

- (1) R.P. Tucker, *The Ends of the Earth: Perspectives on Modern Environmental History* (Cambridge, 1988), 119.
- (2) Karl A. Wittfogel, *Oriental Despotism: Comparative Study of Total Power*. (New Haven: Yale University Press, 1957), 42-43. Wittfogel's ideas on the interconnection of political systems and the development of irrigation agriculture have been disputed by several scholars. See, for example, T.E. Downing and M. Gibson, ed., *Irrigation's Impact on Society*, (Tuscon, 1974) and W.P. Mitchell, "The hydraulic hypothesis: a reappraisal", *Current Anthropology* 14(1973): 532-534.
- (3) Reviews and criticisms of the histories have been explored by several authors, see for example: H. Mukhia, *Historians and Historiography During the Reign of Akbar* (New Delhi, 1976) The first chapter is a discussion of Sultanate historiography. A. M. Husain, *Tughluq Dynasty* (New Delhi, 1976) has an extensive list, 548-587 and discussion of contemporary and non-contemporary sources. P. Hardy, *Historians of Medieval India* (London, 1966) analyses the work of five Sultanate authors. A. Welch and H. Crane in "The Tughluqs: master builders of the Delhi Sultanate", *Muqarnas* 1983 discuss the histories as sources of architectural information in a bibliographic note, 163-166.
- (4) A. M. Husain in *Tughluq Dynasty* (New Delhi, 1976) lists seventeen contemporary sources, 548-580.
- (5) Originally published in 1877, it has been reprinted twice, in 1952 and 1966. The edition that I had available is the 1966 edition published in 30 volumes by Susil Gupta Ltd. of Calcutta.

- (6) Elliot and Dowson, *History of India* vol. 14.
- (7) Some of his writing has been translated by R. Nath and F. Gwaliari in *India as Seen by Amir Khusrau (in 1318 A.D.)*, (Jaipur, 1981).
- (8) translated by H.A.R. Gibb as *The Travels of Ibn Battuta* (Cambridge, 1971)
- (9) Elliot and Dowson, vol. 15.
- (10) Elliot and Dowson, vol.15
- (11) Hardy, 40.
- (12) A.M. Husain, 579.
- (13) Elliot and Dowson, vol. 6.
- (14) Elliot and Dowson, vol. 13
- (15) translated in part in Elliot and Dowson, vol. 13.
- (16) translated by B. De, (Calcutta, 1973), first edition 1911.
- (17) The chapters on India have been translated by I. H. Siddiqui and Q. M. Ahmad as *A Fourteenth Century Arab Account of India Under Sultan Muhammad bin Tughluq* (Aligarh, 1971). Al-Umari died in 1348. His account includes events up to 1344.
- (18) Carr Stephen, *Archeology and Monumental Remains of Delhi* (Allahabad: Kitab Mahal, 1967)
- (19) G.R. Hearn, *The Seven Cities of Delhi* (London, 1906).
- (20) R. Nath has published an English abridgement of this work as *Monuments of Delhi: historical study* (New Delhi, 1979).

- (21) New Delhi, 1990 (1964)
- (22) London: Architecture Design and Technology Press, 1990
- (23) Penguin Books 1978, part of the Pelican History of Art series
- (24) Tokyo Daigaku, Indo Shiseko Chosa Dan, *Deri shoocho jidai no kenzobutsu no kenkyu*, Indo Shiseki Chosa Dan (Institute of Oriental Culture, University of Tokyo) 1968-1970. An English summary and outline of *Delhi: Architectural Remains of the Sultanate Period* is provided by M. Ara and T. Tsukinowa in "Outline of surveys and studies of the architectural remains the Delhi Sultanate," *Acta Asiatica* vol.43 (1982), 92-109. An unpublished translation, of most of the text, by Hiromi Chino, was made available by A. Welch.
- (25) The survey includes about three hundred structures.
- (26) R. Nath, *History of Sultanate Architecture* (New Delhi: Abhinav Publications, 1978)
- (27) *Encyclopedia of Islam*, (Leiden: E. J. Brill, 1965), "Dilhi" vol. 2, 255-266; "Hind-Architecture" vol. 3, 441-452.
- (28) *Ancient India*, 1(1946): 60-76.
- (29) For example: R. Nath, *Monuments of Delhi*, refers to eight structures; Carr Stephen mentions seven; Y.D. Sharma includes nine.
- (30) S. Shah "Tanks and step-wells," *Amadabad* G. Mitchell and S. Shah (Bombay: Marg Publications, 1988) 128-143
- (31) A full discussion of the texts and the information they contain is given in J. Jain-Neubauer, *The Stepwells of Gujarat* (New Delhi: Abhinav, 1981) 12-15. The *Aparajitaprccha* deals with architectural tradition in

northwest Gujarat. A list of the varieties of water structures is also given in D. N. Shukula, *Vastu-Sastra: Hindu Science of Architecture*, 1960 vol.1, 392.

(32) These are discussed in more detail in: Donald R. Hill, "Information on engineering in the works of Muslim Geographers", *History of Technology* 9(1984): 127-142.; C. Edmund Bosworth, "Some remarks on the terminology of irrigation practices and hydraulic constructions in the eastern Arab and Iranian worlds in the third-fifth centuries A. H." *Journal of Islamic Studies* 2:1 (1991); 78-85.

(33) J. Burton-Page, *Ba'oli* in Vol.1, 1024.

(34) Project for Indian Cultural Studies, Publication III, Bombay, 1991.

Chapter 1: Geographical Context of Sultanate Delhi

It is not possible to understand the function and structure of hydraulic architecture without placing it in geographical and ecological context. Climate dictates the type of water structures that are appropriate for a location.

Delhi is located on the right bank of the Jumna River at a point where the river is deflected to the southeast by the northern tip of the Aravalli Hills. For most of its history the city has been contained within a triangle formed by the river on the east and outcrops of the Aravallis on the west and south. Establishing a city at this location had many advantages. Here the Indo-Gangetic plain narrows to a 150 km wide corridor between the Himalayan foothills and the Deccan plateau. The flat land of the plain permits easy travel, and the corridor was an historically important route for traders and invading armies. In the west and south of the triangle were several good defensive sites where the hills could be quarried for building stone. From a secure citadel at Delhi a ruler could command authority over passing armies or demand tax from traders. The city population could also take advantage of the agricultural production of the rich alluvial land to the east.

The climatic conditions also have an influence on the city. The monsoon is a seasonal reversal of continental and maritime winds and associated rain. In northern India it produces four seasons, but these are not directly analogous to the four seasons of north temperate regions. The winter period in January and February, is relatively cool with a small amount of rainfall called the little monsoon. March to May is an extremely hot and dry period. Between June and September the

southwest monsoon brings lower temperatures and heavy rainfall. The post monsoon period, October to December, is warm and dry.

Delhi is located in a semi-arid region. The southwest monsoon accounts for 80-85% of the average annual rainfall of about 675mm.¹ The winter monsoon brings a small percentage of the total but is very important for winter crops. Averages can be deceptive. The monsoon is a climatic pattern but the total yearly rainfall can vary widely. For instance, in the 66 year period between 1875 and 1940, annual rainfall varied between 260 mm and 1510 mm.² The maximum and minimum values were recorded five years apart.³ On average there are about fifty days a year with measurable precipitation.⁴ In Delhi very heavy falls of 40 mm or more in a day are not uncommon during the southwest monsoon.⁵

The summer monsoon is the primary source of water for agriculture and hence for the support of the population. In semi-arid regions wells and reservoirs, which store rain water, are essential for agricultural and domestic use. The water availability period (that is, the period when rainfall and soil moisture exceed the loss from evaporation) at Delhi is approximately 100 days.⁶ Beyond this period crops suffer from water stress, and irrigation is necessary. In years with low rainfall agricultural production can be drastically reduced. Heavier than usual rainfall can be as serious a problem as drought because it may delay planting or destroy crops already planted.

The seasonal rainfall at Delhi made the construction of waterworks necessary. For two-thirds of the year the population depended on stored water for domestic and agricultural purposes. Several kinds of structures

were built to fulfil the water supply needs. In the rainy season runoff could be retained by dams. The distribution of the rainfall, i.e. a great deal of precipitation in a short period, means that there is a very high level of runoff. Therefore dams designed to collect surface water were very practical. The flooded land behind the dams made large shallow lakes. This flooding would have prolonged the growing season by increasing soil water content. Without supplemental water the soil moisture is very quickly depleted at the beginning of the dry season.⁷ Rain water was also contained in large reservoirs and tanks, frequently referred to as hauz (also transliterated as haud). The term hauz generally seems to apply to excavated reservoirs with surrounding embankments. These were used for both domestic and agricultural purposes and, in good seasons, would hold water for the whole year.

The most frequent source of water was the simple shaft well. Wells are designed to utilize ground water. The water table level and volume of available water can change with the seasons and the amount of rainfall. Villages, and communities in larger settlements, were usually organized around a well. The well was, and in many villages still is, a vital social focus for the community.⁸ More specialized structures such as stepwells and retreat wells were also built (these will be described in more detail in chapter three). Water supply in some areas was improved by the construction of canals. The Jumna River was, and remains, an important source of water for Delhi but, in the Sultanate, carrying water from the river to settlements in the hills was not always practical.

The hydraulic structures are a significant component of the extant remains of Delhi Sultanate architecture. About fifteen percent of the

monuments catalogued in Delhi: Architectural Remains of the Delhi Sultanate are waterworks. No trace remains of several other hauz referred to in historical documents.⁹

It can be very difficult to construct a picture of the climate of the past. The information on weather from historical documents may be limited and difficult to interpret.¹⁰ The precision of historical weather data may be influenced by several factors. What the author chose to record can be influenced by personal and cultural attitudes. Frequently, in political and social chronicles only extreme weather conditions are recorded. The measure of the severity of the weather can be very subjective. It can be difficult to determine if the author is recording local weather phenomena or more widespread effects. It is important to know if the writer experienced the weather conditions first hand or is copying some other record. There may be inaccuracies or errors in dates of weather records. Words used to describe weather may be imprecise and can change or become obsolete.

The importance of the monsoon rain was recognized very early in India. A succinct statement of the significance of rain is given at the beginning of the chapters on weather in the Brhatsamhita (c.600 A.D.):

Living beings depend on food for their existence. The availability of food depends on the monsoon. Therefore, the rainy season deserves careful investigation¹¹

Investigation of the monsoon had begun much earlier. Observations of weather and explanations of rainfall processes are preserved in Vedic texts (c.1000 B.C.).¹² Numerous post-Vedic texts record weather observations, rainfall measurements, rainfall distribution and droughts.¹³ The information gathered was used to forecast rainfall and

crop success. Crop failure and famine were disastrous for the agricultural based communities. In the Brhatsamhita of Varahmihira, an encyclopedic reference of the Gupta period, both excessive rainfall and drought are given as reasons for crop failure, and consequent famine.¹⁴

Records of rainfall in extant Delhi Sultanate texts are more limited. The texts are chronicles of the rulers' accomplishments and were not intended to be accounts of the physical environment. References to weather are generally reports of extreme conditions. Although limited, this information is useful, since weather extremes are critical and have a significant impact on life. The fact that these texts do not record average rainfall does not mean that the population was not aware of the patterns of the monsoon. It may be that information which was considered common knowledge was not deemed appropriate for inclusion in these histories.

The monsoon is affected by global weather systems. Prior to 1200 A.D. strong atmospheric circulation in the northern latitudes would have allowed the monsoon rains to extend into northern India.¹⁵ Towards the end of the thirteenth and into the fourteenth century a general pattern of weak atmospheric circulation would have suppressed the northward extent of the monsoon rains.¹⁶ This would have caused increasingly erratic rainfall in northern India.

Periodic droughts and famines were commonplace during the Sultanate. A severe drought occurred in the early Sultanate, during the reign of Altamsh (1210-1236), causing the death of many people in Delhi.¹⁷ The date and duration of the drought are not recorded.

In 1290 there was a “scarcity of rain”¹⁸ causing food shortages in Delhi and the surrounding area. The drought continued for two years. Barani notes that the shortages were so severe that Hindus from the country came into Delhi and, finding no relief in the city, drowned themselves in the Jumna.¹⁹ A few years later, in 1296, there was excessive rain such that “the Ganges and the Jumna became seas, and every stream swelled into a Ganges or a Jumna; the roads also were obstructed with mud and mire.”²⁰ The effect on the population was not recorded.

In the reign of ‘Ala al-Din Khalji (1296-1316) royal granaries were established and the price of grain was fixed to ensure a reliable food supply for the city. Barani explains that if the “rains had fallen regularly and the seasons had been always favourable”²¹ this would not have been remarkable. However, in some years the rains failed. Unfortunately Barani does not indicate the dates or extent of the droughts. The price fixing and grain rationing were instituted to protect the city inhabitants and there is no record of how the rural population fared during the droughts. In the last years of Khalji rule (1316-1320) there were no crop failures recorded, suggesting that there was adequate rainfall.²²

Early in the fourteenth century harvests failed in many parts of the northern latitudes.²³ In the 1320’s and 1330’s there were a series of prolonged droughts throughout Asia.²⁴ It was in this period that the worst famine of the Delhi Sultanate occurred. Between 1326 and 1340 several thousand people died in the country ruled by Delhi.²⁵ Although political and social unrest may have contributed to the famine, lack of rain in several years was the principal cause. The severity of the disaster

can be best expressed in the words of an observer:

The Sultan proceeded to Dhar, ... then pursued his journey through Malwa. Famine prevailed there, the posts were all gone off the road, and distress and anarchy reigned in all the country and towns along the route. When the Sultan reached Delhi, not a thousandth part of the population remained. They found the country desolate, a deadly famine raging, and all cultivation abandoned. He employed himself some time in restoring cultivation and agriculture, but the rains fell short that year and no success followed. At length no horses or cattle were left; grain rose to 16 or 17 jitals a sir, and the people starved. The Sultan advanced loans from the treasury to promote cultivation, but men had been brought to a state of helplessness and weakness. Want of rain prevented cultivation, and the people perished.²⁶

Drought conditions were widespread over northwest India at this time. For instance, the Mihran, a large river in the Indus drainage system, was reduced to a minor tributary by 1350.²⁷ The effects of this drought and famine would have been felt for several years. Restoration of agriculture would have been slow because many of the farmers would have died, and stocks of seed and animals would have been drastically reduced.

Conditions improved in the second half of the fourteenth century. The reign of Firuz Shah Tughluq (1351-1388) is generally regarded as a prosperous period.²⁸ His contemporary biographer, Shams-i Siraj 'Afif writes; "By the blessing of God favourable seasons and abundance of the necessaries of life prevailed in the reign of Firuz Shah, not only in the capital, but throughout his dominions."²⁹ However, rainfall was not consistent through this period. "If occasionally prices rose from bad seasons, or from scarcity of rain...it was only for a short time...so that no dearth occurred."³⁰ It would appear that rainfall variation was either locally restricted or not prolonged enough to cause widespread effects.

Following the reign of Firuz Shah Tughluq there are few historical references to rainfall at Delhi. In 1398, Timur's army, after capturing Multan in western India, suffered the loss of many horses due to heavy rain "continually falling in torrents".³¹ It is not clear from the record if this was unusual rainfall.³² Delhi suffered "such a famine and pestilence...that the city was utterly ruined, and for those of the inhabitants that were left died, while for two whole months not a bird moved a wing" in 1399.³³ And, in 1423, a severe famine affected the whole of Hindustan.³⁴ The scarcity of weather records for the fifteenth century may derive from the historians' lack of interest in the subject rather than from lack of variation in weather conditions. But it is possible that there were only infrequent deviations from the norm. Sultan Sikander Lodi rescinded a grain tax in 1496 when a famine affected most of his empire.³⁵

The normal pattern of the monsoon and rainfall fluctuation had a profound impact on life during the Delhi Sultanate. Hydraulic engineering was an activity of great social importance and of significant interest to the ruling authorities. The prosperity of the state was directly dependent on water availability. The rulers commissioned the construction of numerous waterworks during the Sultanate. The urban development of Delhi included many of these royal commissions. In the next chapter the growth of Sultanate Delhi will be discussed with reference to the hydraulic architecture.

Chapter 1: Notes

- (1) This amount is about equal to the annual average at Victoria
- (2) The extreme variation in rainfall is highlighted by a standard deviation of 230 for the 66 year period.
- (3) H. Helm Clayton (ed.), *World Weather Records 1921-1930*, (Washington, 1934), 499.; H.H. Clayton and F.L. Clayton (ed.), *World Weather Records 1931-1940*, (Washington, 1947), 31.
- (4) Measurable rainfall is calculated as 2.5mm or more in 24 hours.
- (5) K.P. Rao, "The climate of the Indian subcontinent", in *Climates of Southern and Western Asia*. (World Survey of Climatology vol. 9) K. Takahashi and H. Arakawa eds. (Amsterdam, 1981), 94.
- (6) Rao, 116-117.
- (7) J. Lockwood, *World Climatology* (London, 1974), 169.
- (8) This aspect of village life is discussed by S.K. Chandoke in "The habitation patterns of Jat village," *Ekistics* 45 (1978), 231. The influence of water availability on settlement patterns is also covered by R.A. Malik in "Antecedents of irrigation development and settlement patterns in the Punjab," *Pakistan Geographical Review* 28 (1973), 34.
- (9) H.K. Naqui, *Agricultural, Industrial and Urban Dynamism Under The Sultans of Delhi 1206-1555* (New Delhi, 1986) lists seventeen *hauz* in Sultanate Delhi, 141-142.
- (10) For further discussion of the problems of analysis of historical documents see M.J. Ingram, D. J. Underhill and G. Farmer, "The use of documentary sources for the study of past climates" in T.M.L. Wrigley,

M.J. Ingram and G. Farmer, *Climate and History* (Cambridge, 1981), 180-213.

(11) Varahamihira *Brhatsamhita* quoted in A. S. Ramanathan, "Contribution to weather science in ancient India. VIII - Observations and measurements of meteorological parameters in ancient India" *Indian Journal of History of Science* 22(4)1987, 277.

(12) A.S. Ramanathan, "Contributions to 'weather science in ancient India' III. A conceptual model of the rainfall process (Vedic period)", *Indian Journal of History of Science* 22(1987), 1.

(13) A. S. Ramanathan, "Contributions to 'weather science in Ancient India' IV. A conceptual model of the rainfall process (post-Vedic period). *Indian Journal of History of Science* 22(1987), 7; Summaries are also given in A.M. Shastri's *India as Seen in The Brhatsamhita of Varahamihira*, (Delhi, 1969), Appendix III, "Textual evidence bearing on rainfall in ancient India", 485-499.

(14) A.M. Shastri, 266-267.

(15) John Gribben, *Forecasts, Famines and Freezes* (New York, 1976) p. 10. Climate history has been most thoroughly studied in Europe. Historical weather observations, records of settlement patterns, harvests, changes in alpine glaciers and northern sea ice have contributed to an understanding of European climate history. Tree ring and pollen analysis have contributed to the climate history of Europe and have also been used extensively in North America and Greenland. Records of droughts and floods occur in Chinese historical texts dating from as early as 2000 years ago. In many other parts of the world historical records are rare

and weather measurements have only been made recently. Extrapolating from modern weather patterns it is possible to estimate how global systems may have influenced the weather in South Asia in the past. There is an extensive bibliography on climate history. An overview of some of the areas of interest is found in: T.M.L. Wigley, M.J. Ingram, and G. Farmer (eds), *Climate and History* (Cambridge University Press) 1981; H.H. Lamb, *Climate, History and the Modern World* (London: Methuen) 1982; H. H. Lamb, *Weather, Climate and Human Affairs*, (London: Rutledge) 1988; and J. M. Grove, *The Little Ice Age* (London: Methuen) 1988.

(16) Gribben, 11.

(17) K.S. Lal, *Growth of Muslim Population in Medieval India* (Delhi, 1973), 43.

(18) Barani, *Tarikh-i Firuz Shahi*, (Elliot and Dowson, 1953 vol.14) p.59. Barani was writing about events that occurred during his lifetime.

(19) Barani, 59.

(20) Barani, 72.

(21) Barani, 114.

(22) Barani, 135.

(23) Jean M. Grove, 2. Between 1314 and 1319 harvests failed in most parts of Europe in part because of extreme weather conditions: colder winters and unusually hot or wet summers.

(24) R.S. Gottfried, "Black Death", *Dictionary of the Middle Ages* (New York, 1983) vol.II, 258.

(25) These dates are given by K.S. Lal, 43. Barani does not give precise dates. He does say that there was a lack of rain and that it continued for some years, 162.

(26) Barani, 168-169. As a comparison the price of wheat was fixed by 'Ala al-Din Khalji at seven and half *jitals*, barley at 4 and rice at 5 (Barani, 111).

(27) W. Gordon East, *The Geography Behind History* (London, 1965 (1938)), 54.

(28) See for example the summary of his rule in A. Welch, "Hydraulic architecture in medieval India: the Tughluqs," *AARP Environmental Design* 2(1985), 76.

(29) *Tarikh-i Firuz Shahi* of Shams-i Siraj 'Afif in H.M. Elliot and J. Dowson, *The History of India as Told by its Own Historians* (Calcutta, 1953), 85.

(30) 'Afif, 86.

(31) *Malfuzat-i Timuri* (an autobiographical memoir of Timur)

in H.M. Elliot and J. Dowson, *The History of India as Told by its Own Historians* (Calcutta, 1953), 30.

(32) Since horses are not well adapted to warm, humid climates the loss may have been to disease or other problems.

(33) Al-Badaoni, 359. This occurred after the sack of Delhi by Timur in December of 1398.

(34) Al-Badaoni, 385.

(35) Abdul Halim, *History of the Lodi Sultans of Delhi an* (Delhi, 1974),
231.

Chapter 2: Urban Context of Sultanate Delhi

In the first half of the fourteenth century the Arab historian and geographer, Shihab al-Din al-Umari wrote:

I inquired of Shaikh Mubarak about the city of Delhi, its condition and other affairs. He told me that Delhi is composed of many towns (integrated into one). Everyone is known by its own name. Delhi, being one of them, has given its name to all of them. It is extensive in length and breadth and covers an area of forty miles....Shaikh Bakr ibn Khallal says: This is about the buildings of Old Delhi. The quarters which have been built recently bear a different appearance. At present, Delhi consists of twenty-one towns.¹

This is a good description of the dynamic urban history of the metropolitan area of Delhi, and it applies as much today as it did in the fourteenth century. Cities are not static but change in shape and size through time.

Numerous sites within the Delhi triangle have, at different times, emerged as “the city” (fig. 1). Although the defensive locations in the hills, in the south and west of the triangle, were well supplied with a local source of building stone, the water supply at these sites was poor. The hills are relatively dry and the rocky soil made well digging difficult. Sites on the plain closer to the river had better access to water, both directly from the river and from wells. The river bank sites were, however, farther from sources of building material. Many of the cities were, in essence, citadels or palace fortresses which housed the royal court and which served as the focus for suburban villages that supplied them with food, supplies, and labour. Some remained occupied for extended periods; others were built and then abandoned within a few years.

There were several reasons for shifting the urban centre: water

supply was an important factor; defensive requirements changed with the political changes; fluctuations in population put pressure on the urban centre; and, for a ruler, a new city was a physical expression of power.

The royal cities and citadels were not the whole settlement history of the Delhi triangle. We know most about them because they contained substantial stone and brick structures which were more likely to survive, even if the ruins of one city became a quarry for subsequent building projects. In addition, descriptions of the buildings and life of the cities are found in the court histories and travelers' tales. We know much less about the structures or details of life outside the court. Village buildings were of less enduring construction, usually mud brick and wood. Village or rural life is rarely mentioned in the written record. To understand the habitation of the whole area we must therefore extrapolate from several sources. Some data can be obtained from inscriptions, from written records and from remains of structures built for the use of the general society. The most important of these structures were dams, sluice gates, wells, and cisterns, built to serve the varied water needs of their communities. Water supply was the primary limiting factor in population distribution and settlements are typically situated near sources of water. Waterworks which continue to provide usable water, will be maintained even if other factors cause a village to be abandoned. Therefore, surviving waterworks and the remains of others give a better indication of settlement patterns than may be inferred from other structures.

The earliest settlements were located along the river. Archeological evidence from Anangpur, 30 km south of New Delhi, shows that the area

was inhabited as early as 1000 B.C..² By the sixth century B.C. a city had been established along the river at the location of Purana Qila.³ This site has been identified with Indraprastha, the capital of the Pandavas, described in the epic *Mahabharata*. The literary account describes it as a fortified city on the banks of the “Yamuna” (Jumna) River. The population included Brahmin scholars, merchants seeking their fortune and skilled craftsmen. Indraprastha was connected by roads to major contemporary cities, and there were other towns, including market towns, close by.⁴ The city’s status as a major centre apparently declined over time, even though the archeological evidence suggests that the site continued to be occupied.⁵

The Tomar Rajputs are traditionally credited with the founding of Delhi. Although the early history of the Tomars is known only from bardic tradition, tangible evidence of their presence dates from the eleventh century at a settlement in the hills of the southeast corner of the triangle, near the modern village of Anangpur. The extent and nature of the settlement is not known. Though there are ruins of buildings and fortifications in the area, the best preserved remains are two hydraulic structures. One is a large stone dam, built across a narrow ravine, clearly designed to catch rain run-off.⁶ Foundation of the settlement and construction of the dam are attributed to the reign of the Tomar king, Anangpal, early in the eleventh century.⁷ About 2 km to the northeast is another structure designed to contain run-off from the hills. This is a large, semi-circular reservoir with stepped, stone embankments called Suraj Kund (or Suraj Reservoir). The name suggests that the construction of the reservoir was commissioned by King Sarajpala. It

probably dates from the middle of the eleventh century.⁸ The size of the structures suggests that they served a fairly large population.

In the same era, Anangpal built a new citadel, Lal Kot (or Red Fort), about 10 km west of Suraj Kund at a defensive position in the hills. Construction of Lal Kot was completed about 1060.⁹ All that remains of the fort are parts of the ramparts and traces of the surrounding walls.¹⁰ Part of the water supply for Lal Kot was a large tank, 52m by 46m by 12m deep, on the north side of the citadel.¹¹ It is still referred to as Anang Tal (Anang Tank) commemorating its builder Anangpal. It is now dry but was apparently still functional in the early fourteenth century.¹² There must have been other sources of water for the site, but this is the only one of which there is a record.

The Chauhan Rajput, Vigraharaja IV (c.1150-64), captured Delhi soon after he came to power. His grandson, Prithviraja III, also called Rai Pithora (1170-1192), enlarged Lal Kot to the north and east and created a new fortress known as Qila Rai Pithora. There is no record of other towns or villages that may have existed in the area at this time. However, Lal Kot and Qila Rai Pithora were probably at the centre of a sizable population since a large number of Hindu and Jain temples were located in the area.¹³ The ruler and his court would have depended on the support of a large agrarian population with its attendant markets and trading community. Although political authority was based at Lal Kot and Qila Rai Pithora, it is possible that the older sites near Suraj Kund were still occupied.

Near the end of the 11th century there had been an abrupt change in political and religious structure of northern India. Muslim armies had

arrived in South Asia early in the eighth century, but these early conquerors had not advanced beyond Sind. Arab Muslim merchants, trading across the Indian Ocean, from the 7th century resided in ports on the west coast but their presence in India was mercantile, not political. Sultan Mahmud of Ghazni,¹⁴ between 1001 and 1026, conducted almost annual raids from Central Asia into northern India. These raids were for material gain rather than for political conquest. After the death of Mahmud in 1030 the raids decreased, as internal conflicts prevented his successors from taking much interest in India.

A Muslim political presence was established in north India in 1160 when the Ghaznavids moved their capital to Lahore after they were pushed out of Ghazni by the expansion of the Ghurid empire. Because of increasing threats from Turkish and Mongol rulers to the west, Mu'izz al-Din Muhammad of Ghor (1162-1206) focused his political ambitions on India. In 1186 he defeated the Ghaznavids at Lahore. He then continued to expand his territory in northwestern India. After an initial defeat in 1191, in a battle at Tarain, northwest of Delhi in the Punjab,¹⁵ he overcame Prithviraja in 1192. He left his mamluk general, Qutb al-Din Aibak, as viceroy and returned to Ghor. In the same year Aibak captured Delhi and established his headquarters at Qila Rai Pithora. The fortress was a ready-made, secure stronghold for the minority, foreign rulers, and its occupation was a declaration of victory. While we do not know the size of the population of Delhi at the time of the Turkish conquest, there must have been a substantial number of skilled workers available, since Aibak began construction of the large Quwwat il-Islam mosque in 1192 immediately after the capture of Delhi. Muhammad of Ghor was

murdered in 1206 and Aibak returned to Lahore, which had been the capital of the Ghurid empires since 1186, to assume the role of ruler of Islamic India.

When Aibek died in 1210, Shams al-Din Altamsh (r.1211-1236), governor of Badoan, took possession of Delhi and assumed the role of Sultan. This was the beginning of the succession of dynasties known as the Delhi Sultanate that ruled much of northern India for three centuries. With Aibek's succession, Delhi changed from a newly conquered provincial city to an imperial capital. This new role influenced urban settlements in the Delhi triangle. Qila Rai Pithora was to remain the centre of Islamic Delhi for almost a century, although imperial building activities were initially confined to renovation and construction within the Rajput city and the surrounding area.

There is evidence that the early Islamic city suffered a water shortage. Qutb al-Din Bakhtiyar, a Sufi saint who settled in Delhi during the reign of Altamsh, is said to have chosen to reside in Gilukhari, a village near the river, because of "the scarcity of water in the city".¹⁶ In 1230 Altamsh commissioned the construction of a large reservoir, the Hauz-i Shamsi (or reservoir of Shams al-Din), to the south of the fortress to supply the city with water. Construction of the reservoir may have been prompted by a generally poor water supply at the site and an expanding urban population. However, the drought during Altamsh's reign (discussed in chapter 1) could also have been a contributing factor. Subsequent suburban development extended around the walls of the tank.

During the thirteenth century Delhi became increasingly important

as the centre of Muslim India. Some of this growth was due to surging Mongol power to the west.¹⁷

In the reign of Shamsu-d din the fear inspired by the slaughter and ravages of Changiz Khan, the accursed Mughal, caused many renowned maliks and amirs, who had long exercised authority, and many intelligent wazirs, to rally round the throne of Shamsu-d din....¹⁸

Altamsh actively encouraged the refugees to settle at Delhi.¹⁹ For the first century of the Sultanate the Mongol invaders presented a continuing threat. They sacked Lahore in 1241 and, in the next 80 years, invaded the Punjab and Hindustan a dozen times.²⁰ Many refugees fled to Delhi, including a number of princes from Khurasan, Turkistan, and Iran. Each came with a large retinue of followers, causing a rapid rise in the population of the city.²¹ As Delhi grew, it attracted traders, scholars, craftsmen, bureaucrats and others.

The community of the triangle was diverse. There were numerous suburban and rural villages located at some distance from the urban centre. The influx of population led to the establishment of suburban settlements between Qila Rai Pithora and the river to the east. Most of these new settlements were founded by the mainly Muslim immigrant population. One such suburb, located near the river at the present location of Nizamuddin in southeast Delhi, was named Ghayaspur.²² The name suggests that it was established during the reign of Ghiyath al-Din Balban (r.1265-86). Also from the reign of Balban is a bilingual Sanskrit and Hindi inscription (Appendix 2) that records the excavation of a well in 1276, near the village of Palamba, (identified with the modern village Palam) about 11 km northwest of Lal Kot²³ and about 20 km from the river. Since the Palam inscription is in Sanskrit and Hindi, and refers to

several Hindu gods, it can be inferred that the well was built in a Hindu community. Historical records do not indicate whether the communities remained divided by sectarian differences or whether there was some merging of the population.

Balban's successor, Mu'izz al-Din Kaiqubad (1286-1290), transferred the royal seat to a site about 10 km to the northeast, on the river. The new palace was called Kilugari after the village of that name, one of several suburban, riparian villages. Under Kaiqubad's successor, Jalal al-Din Khalji (1290-1296), the new city grew.

[The Sultan] made Kilughari his capital and fixed his abode there. He ordered the palace, which Kai-Kubad had begun, to be completed....The princes and nobles and officers, and the principal men of the city, were commanded to build houses at Kilu-ghari. Several of the traders were also brought from Delhi, and bazaars were established. Kilu-ghari then obtained the name of "New-town"...in three or four years houses sprung up on every side, and the markets became well supplied.²⁴

From this passage it is apparent that there was a pattern in the creation of the new city. The initial construction and the nucleus of the city was the royal palace. Following this, built by fiat of the sultan, were the aristocrats' and notables' houses. Since Jalal al-Din Khalji had overthrown the government by force, it is logical that he would need to keep the nobles nearby, where he could keep an eye on them and where he could make use of their talents. The Sultan also undertook to transfer the commercial centre of Delhi to his new town by bringing merchants and establishing bazaars. Villages sprang up around the new centre, which kept the markets "well supplied" with goods and services. The suburban settlements extended along the river as far as Purana Qila.²⁵

There is no evidence that the “old” city, at Qila Rai Pithora, was not still occupied.

The shape of the city changed again under 'Ala al-Din Khalji (1296-1316). Mongol attacks on India advanced into Sultanate territory. Delhi was threatened in 1295-1300 and suffered a two month siege in 1303.²⁶

...Great anxiety prevailed in Delhi, and the people of the neighbouring villages took refuge within its walls. The old fortifications had not been kept in repair, and terror prevailed, such as never before had been seen or heard of.²⁷

To meet the needs of defence, 'Ala al-Din enclosed part of the plain to the northeast of Old Delhi (Qila Rai Pithora).

He...built a palace a Siri. He took up his residence there, and make it his capital, so that it became a flourishing place. He ordered the fort of Delhi to be repaired...²⁸

Siri became, in essence, the new, administrative centre of Delhi, and of the Sultanate empire. But individual settlements within the triangle were still recognized as distinct towns; for example, Barani refers to "Ghiyaspur, Indarpat, Kilughari, and towns four or five kos from Delhi..." and to "villages ten or twelve kos distant."²⁹ Barani makes a distinction between the settlements, or towns, near the urban core and the more distant, and probably more rural, villages.³⁰

Siri had the advantages of being close to the sources of building stone and, at the same time, having relatively good access to water. Excavating wells would have been easier in the alluvial soil of the plain at Siri than in the hills around the old city. To meet the demands for water in the old city, 'Ala al-Din re-excavated the Hauz-i Shamsi. He also constructed a new reservoir, Hauz-i-'Alai, (now called Hauz Khas) about 3 km north of Qila Rai Pithora. The tank, which covered an area of about 30 hectares,

was some distance from the city, but the site may have been chosen because of an existing natural catchment. There is no direct evidence but it seems probable that the work on the two reservoirs was prompted by the poor rainfall and droughts that occurred during the reign of 'Ala al-Din.

The next period of city building occurred during the Tughluq dynasty. Ghiyath al-Din Tughluq (r. 1320-1325) built a fortress city on a rocky escarpment about 7 km east of the "old" city. The Sultan "made Tughluqabad his capital and the nobles and officials, with their wives and families, had taken up their abode there, and had built houses."³¹ The elevation of the hill was incorporated into the defence works, and the site was quarried for building stone. At the highest point was a palace; below it was the walled upper town; and on the plains to the north and east was the walled lower town.³² The city walls delineate an irregular trapezoid enclosing an area of approximately 120 hectares. Ruins of stone buildings remain in the palace and upper town. Little survives of the lower town, but aerial photographs (fig. 3) show traces of intersecting streets. The photographs also show that there was "urban sprawl" outside the city walls to the east.³³ Tughluqabad was large enough to accommodate the royal court, the Sultan's army, and the servants necessary for running the complex, but it may be that, like Kilugari, it remained a royal seat and did not involve shifting the bulk of the population of urban Delhi.

Remnants of the city water supply still exist. Traces of six shaft wells have been found within the town walls.³⁴ Within the palace precinct is a very deep tank, now partly ruined (fig. 59). There is a

somewhat smaller tank in the upper town(fig.60). On the plain below the city walls, on the south side of Tughluqabad, is a dam with a sluice gate (fig. 61), commissioned by Ghiyath al-Din, to provide water for the city and for irrigation. The drought conditions of the 1320s would have made the waterworks essential.³⁵

While the Sultan was involved with building a new city, other sites within the triangle still had important functions. Some settlements, particularly those away from the urban centre, achieved a degree of independence from the city. For instance, Shaikh Nizam al-Din Auliya, a Chhisti saint, established a sufi centre near Ghayaspur in 1321. The Chhisti sect was one of most popular and influential mystic orders of Islam in the early Sultanate.³⁶ The Chhisti tenets included rejection of personal property, non-violence, and avoidance of contact with political power and the state. Given the Chhistiya order's suspicion of royal authority, it is to be expected that Nizam al-Din Auliya's *dargah* was established at a distance from the royal centre. A *dargah* is a shrine, typically incorporating the tomb of a *pir* or saint, that is centre for religious teaching and often an important pilgrimage destination. *Dargahs* are frequently built away from other settlements. However, the *dargah* itself can become the hub of a community. The *dargah* of Nizam al-Din Auliya is now located in the community of Nizamuddin in southeast Delhi.

Muhammad Tughluq (r.1325-1351) added a second palace, or citadel, to the Tughluqabad complex. Adilabad is connected to Tughluqabad by a causeway that is an extension of the dam on the south side. The Sultan was an ambitious city builder. He established a second

capital at Daulatabad, in the Deccan, between 1328 and 1337, to better direct his military campaigns against the Deccan provinces.³⁷ In many respects Daulatabad was very similar to Tughluqabad. It was a fortified city on three levels: the inner citadel stood on an isolated rocky hill surrounded by a moat; below it was the upper town containing the large Jami mosque and palatial mansions; and spreading out on the plains was the walled lower town.³⁸ Construction of the city, building new residences, and the cost of moving the court to Daulatabad was covered by the state treasury.³⁹ Parts of the city water works remain. A large reservoir was located within the city walls of the lower town. And there are traces still of an elaborate system of pipes for water supply and drainage within the town.

The construction of the second capital was a controversial point in Delhi's history. Ziya al-Din Barani, a contemporary historian whose *Ta'rikh-i Firuz Shahi* was completed in 1357, states that Muhammad forced the population of Delhi to move to Daulatabad and that Delhi was deserted.

The city, with its sarais, and its suburbs and villages, spread over four or five kos. All was destroyed. So complete was the ruin, that not a cat or a dog was left among the buildings of the city, in its palaces or in its suburbs.

We do not know how much of the populace of the Delhi triangle was, in fact, affected by this move. Barani says that an area of four or five kos was affected, but there were villages, within the triangle, ten or twelve kos from the centre; however, he seemingly does not include these. The community that was moved may have been a portion of the royal court, including administrators, bureaucrats, craftsmen, scholars, merchants

and servants, who would have formed the core of the Daulatabad administration, and who lived in the royal city and its immediate surroundings. Barani's account of total desolation appears exaggerated, and there is evidence that the city continued to be occupied.

Barani also writes that "the Sultan brought learned men and gentlemen, tradesmen and landholders, into the city (Delhi) from certain towns in his territory, and made them reside there."⁴⁰ This implies that after the government was removed to Daulatabad, Delhi was not left lifeless. Records show that villages in the Delhi triangle were still occupied in this period. A Sanskrit inscription dated 1327 (Appendix 2) records that "...on the west side of Indraprastha there is a village known by the name of Nadayana, to the north of this village Sridhara caused a well to be made."⁴¹ Another inscription (Appendix 2), dated 1328, also records the excavation of a well in the "village of Saravala in the *pratigana* (district) of Indraprastha".⁴² The village was in south Delhi. These inscriptions record the presence of two Hindu villages concurrent with, but outside of, the urban development of Muslim Delhi. There were unquestionably many more of these outlying villages. Pressure from Mongol raiders in northern India made it expedient for Muhammad to return to Delhi, and in 1335 he allowed the former residents to return to Delhi.

Barani's account does not identify which 'Delhi' was vacated. Y.D. Sharma suggests that it was Tughluqabad.⁴³ However, Muhammad's urban development plans for Delhi focused principally on the expansion of "old" Delhi, i.e., the city surrounding the settlements at Qila Rai Pithora. He enclosed the area between Siri and "old" Delhi with massive

walls, and this enclosed area was known as Jahanpanah. Apparently the construction of Jahanpanah occurred at the same time as the occupation of Daulatabad. Ibn Battuta, the fourteenth century Moroccan traveller and geographer, described Delhi as he saw it when he arrived in 1334:

The city of Dihli is of vast extent and population, and made up now of four neighbouring and contiguous towns. One of them is the city called by this name, Dihli; it is the old city built by the infidels...The second is called Siri...The third is called Tughlaq Abad ... The fourth is called Jahan Panah, and is set apart for the residence of the Sultan Muhammad Shah, the reigning king of India, to whose court we had come.⁴⁴

A year before the former residents were permitted to return from Daulatabad, Delhi was a well populated city, and the new royal enclave had been established.

On the northwest, the city wall followed a course close to the Hauz Khas reservoir, and one of the city gates provided convenient access to the reservoir.⁴⁵ The south wall functioned as a dam, stopping a stream that flowed north across the plain. In the summer rains a vast lake was created by flooding to the south of the city. A large sluice gate, called Satpula, (fig.62, 63) regulated water flow into Jahanpanah suggesting that some of the enclosed area was agricultural land, or that the stream was used for domestic purposes by the residents. Satpula (c.1343) is a very imposing structure and appears almost impracticably large.⁴⁶ The severe droughts and famines in the 1320s and 1330s devastated the economy of the city, and it can be argued that Satpula is as much a public statement of the Sultan's attempts to ameliorate the disastrous conditions as it is a functioning sluice gate.

The droughts and famines, and recurrent military campaigns

against Mongol attacks in northern India and against rebellious provincial leaders in the 1340s depleted the empire's resources and reduced the prosperity of the city during Muhammad's reign. Under the succeeding ruler, Muhammad's cousin, Firuz Shah (r.1351-1388), Delhi flourished. The prosperity was related to the improved weather conditions, his predecessor's success in stopping the Mongol attacks, and Firuz Shah's lack of interest in empire building; he did not expend resources on trying to stop the secession of the independent sultanates.

According to his contemporary biographer, Shams-i Siraj 'Afif, whose *Ta'rikh-i Firuz Shahi* was written in the early fifteenth century, Firuz Shah had three interests: hunting, directing the affairs of state and building.⁴⁷ He "excelled all his predecessors on the throne of Delhi in the erection of buildings....he built cities, forts, palaces, *bands* (dams), mosques, and tombs, in great numbers."⁴⁸ He established his capital, Firuzabad, on the right bank of the river, early in his reign. The city developed in a linear fashion along the river to the north of Kilugari, and evidently the growth followed the same pattern as in previous royal developments; first a palace was erected; then the houses of the nobles; then the supporting villages.

The Sultan having selected a site at the village of Gawin, on the banks of the Jumna, founded the city of Firozabad....Here he commenced a palace,...and the nobles of his court having also obtained houses there, a new town sprang up, five kos distant from Delhi. Eighteen places were included in this town....⁴⁹

The palace complex, Firuz Shah Kotla, was north of Purana Qila. Some of the building material for the new city came from the ruins of the old.

In this old city (Delhi) there were seven fortifications (*hisar*), built by famous sovereigns; but these buildings were old and

falling to decay, and they furnished an inexhaustible supply of bricks. The trader's animals were sent to this place for a day ... and had to convey one load of bricks from thence to Firozabad.⁵⁰

Unfortunately, 'Afif does not specify what he meant by old Delhi so it is not clear where the building material was taken from, although he probably was referring to the original development around Qila Rai Pithora.

The sultan's attention was not limited to new constructions and he undertook the repair of many old buildings throughout the Delhi triangle. Among the structures repaired were the two tanks, Hauz-i Shamsi and Hauz Khas. In his autobiography, *Futuh-at-i Firuz Shah*, Firuz Shah wrote:

The Hauz-i Shamsi, or tank of Altamsh, had been deprived of water by some graceless men, who stopped up the channels of supply. I punished these incorrigible men severely, and opened again the closed up channels.

[and] The Hauz-i 'Alai (Hauz Khas), or tank of 'Alau-d din, had no water in it, and was filled up. People carried on cultivation in it, and had dug wells, of which they sold the water. After a generation had passed I cleaned it out so this great tank might again be filled from year to year.⁵¹

The re-excavation of the reservoir took place in 1352. At the time the reservoir and a village, housing mostly Muslim families, located on the southeast side of the reservoir were surrounded by 2,200 *bighas* of agricultural land.⁵² Firuz Shah expanded the development at the site by establishing a madrasa on the south and east walls of the reservoir. The complex also includes Firuz Shah's tomb situated at the southeast corner of the tank. There was further suburban development around the reservoir, similar to what took place at the Hauz-i Shamsi in the early

thirteenth century, so that by the end of the fourteenth century there were buildings on all four sides of the tank.

Firuz Shah's architectural enterprises were not limited to Delhi. Several towns were established or developed during his reign, including: Hisar-i Firuza, Fatehabad, Firuzabad, Jaunpur and several towns named Tughluqpur.⁵³ The city of Hisar-i Firuza (modern Hisar) was located 150 km northwest of Delhi at a strategic point on the route between the capital and Multan in an arid district. The construction of the city was recorded in detail by 'Afif.

I heard from my father that Sultan Firuz Shah, after his return from the country of Bengal, was in the vicinity of Hisar-i Firuza for two and a half years engaged in efforts of all kinds for the care of the country, and opened the doors of benevolence towards the people. The construction of the city of Hisar-i Firuza took place at this time...at the place where the city now stands there were two large inhabited villages. One was Greater Laras, and the other Lesser Laras...When His Majesty King Firuz saw the land round Greater Laras it pleased him greatly, and from his blessed mouth came the words 'How good it would be for a town to be built here'. This was because this area had, by the wisdom of the Lord of the two worlds, always been deficient in water, to the extent that in the summer weather, when travellers from Iraq and Khurasan reached that place they used to buy four *chitals* of water in a pitcher for cash. This shows the extent of the shortage of water in the area.

In the same place Sultan Firuz Shah said 'I trust in the Lord of the two worlds that if I, the hopeful slave of the Lord, build a city here for the benefit of the virtuous Muslims, the Lord most high, with his supreme power will cause water to appear in the land...For several years Sultan Firuz Shah, together with the nobles in his service and the courtiers, was occupied with the work. Rocks were brought from the mountains of Narsay, and using slaked lime mixed with sand they built a wall of immense length and enormous thickness and great height. Each of His Majesty's noblemen and commanders was made responsible for a quarter (of the

town). Each one of them... busied himself with the construction works on the land in his appointed quarter... After completion of the fort they dug a moat... Inside the fort they dug a great tank, and made its water flow into the moat, so that the water of the moat was replenished from year to year...when His Majesty King Firuz saw the extreme shortage of water, he made a blessed resolution to bring water to the area. [He] took it upon himself to strive in every way, and brought from two streams to the vicinity of Hisar-i Firuza. Canals were brought from the river Jumna, and from the head of the Sutlej. From the River Jumna, at Karnal, two canals, the Rajiwah and the Ulughkani, were taken for eighty *kuruh* [a *kuruh* is about three km] to the town of Hisar-i Firuza...

His Majesty King Firuz completed the construction of the town with gladness and delight. He established many gardens, and had numerous saplings planted, with the result that all types of fruit were to be found in those gardens; fruit bearing trees; grains; citrus trees; and all kinds of flowers together with plenty of sugar cane, both of the black and the red variety ... Before this, in the Hisar region there had of course been an autumn harvest, but the spring harvest was unreliable, because wheat will not grow without water. When His Majesty Firuz Shah brought an abundant supply of water from a great distance in the canals to Hisar-i Firuza there were completely reliable harvests in both seasons... As a result it became a great city, well built, prosperous and verdant... When a copious supply of water was brought to Hisar-i Firuza via these long canals, a huge amount of water accumulated. Any one who wished to make a pottery-lined well (*chah-i pukhta*) near his fields or orchard only had to dig for four yards and water appeared.⁵⁴

'Afif's account is a valuable record of the city building process: the decision by the Sultan to build a city; the role of members of the court in the construction; and the necessity and difficulty of ensuring a water supply. Getting water to Hisar-i Firuza was more difficult than for the urban expansion at Delhi because the new city was not located near a river and there were no established reservoirs in the area as there were at Delhi.

During Firuz Shah's reign the prosperity of the empire was such that "not one village remained waste, even in name, nor one span of land uncultivated."⁵⁵ Delhi was a thriving city with extensive urban developments surrounded by areas of cultivated land. The extent of the sultan's construction in the Delhi area suggests that the suburban and urban areas within the triangle were well populated. This is supported by 'Afif's comment that;

people used to go for pleasure from Delhi to Firozabad, and from Firozabad to Delhi, in such numbers, that every kos of the five kos between the two towns swarmed with people, as with ants or locusts... Such was the prosperity of the district.⁵⁶

Al-'Umari described Delhi as

surrounded on three sides by gardens in straight lines, each one stretching to the extent of twelve miles. The western side is without gardens on account of the range of Lahaba (Aravali) hills... in Delhi and its suburbs... there are huge buildings (and) extensive bazaars in the city.⁵⁷

The importance of the suburban agricultural land is emphasized by the fact that Firuz Shah laid out 1,200 gardens in the villages around Delhi and repaired thirty gardens that had been established by 'Ala al-Din.

According to 'Afif,

Those who constructed gardens were given permanency on their land without conditions or enquiries. *Band Salora* had 80 gardens while *Chittor* had 44 gardens to its credit. Large diversity of fruits was grown in these gardens. Among the fruits grown, grapes of different types, both black and white, as well as *Chittori* grapes, apricots and peaches were very common. Abundance of grapes reduced the market price to one *Jital* per seer. These gardens gave 160,000 *tanka* into the state treasury. What garden owners earned was besides this amount.⁵⁹

The urban development put pressure on the surrounding

countryside, and it was necessary to preserve wild land for the Sultan's passion for hunting. 'Afif noted that the hunting of

nil, gaos, etc., was carried on principally in the neighbourhood of Badaun and Anwala, where these animals were found in great numbers. This district was waste [not cultivated], but well furnished with water and grass. No other such waste was to be found near Delhi. ... Orders were given for its being retained waste for hunting purposes, otherwise it would quickly have become peopled and cultivated under the prosperous and fostering government of Firoz.⁶⁰

Badaun is about 150 km east of Delhi, and it is not clear from this text how close to Delhi the hunting preserve was located. It may be that the specific habitat required by these animals was threatened by the urban and agricultural development around Delhi. Four small buildings on or near the ridge, to the west of Delhi, have been identified as hunting lodges built by Firuz Shah,⁶¹ indicating that there were still wild areas in the hills, which probably were not suitable for cultivation. There are remnants of dams and reservoirs near the hunting lodges which would have provided water to maintain the populations of the wild animals. 'Afif's comment, however, suggests that the amount of suburban wild land was limited.

Delhi experienced another major change at the end of the fourteenth century. For ten years after the death of Firuz Shah in 1388, political authority fragmented into a succession of five rulers. On December 15, 1398, Timur and his entire army camped on the plain north of Siri, close to Hauz Khas. After two days of fighting Timur captured Delhi.⁶² The importance of this city water work is reflected both in the fact that Timur chose to pitch his camp next to it and that it is one of the structures that

he described in detail in his memoirs.

The whole of Sultan Mahmud's army was defeated; part was slain, and part had found refuge in the fort, and I, exalted with victory, marched towards the fort. When I reached its gates I carefully reconnoitred its towers and walls, and then returned to the side of the *Hauz-i Khass*. This is a reservoir, which was constructed by Sultan Firoz Shah, and is faced all round with stone and cement (*gach*). Each side of that reservoir is more than a bow-shot long, and there are buildings placed around it. This tank is filled by the rains in the rainy season, and it supplies the people of the city with water throughout the year. The tomb of Sultan Firoz Shah stands on its bank...I had pitched my camp here.⁶³

A week after the occupation of the city, fighting broke out between the occupying army and the inhabitants of Delhi. For four days the "Turks fell to killing and plundering."⁶⁴ "Excepting the quarter of the *sayyids*, the *'ulama*, and the other Musulmans, the city was sacked".⁶⁵ "The three cities of Delhi, by name Siri, Jahanpanah, and Old Delhi, had been plundered."⁶⁶ Timur considered the fort at Firozabad, three kos away, a separate entity. Timur only remained in Delhi for fifteen days before leaving to continue his campaign in Hindustan.

After Timur's invasion northern India was in chaos. There was fighting between the provincial governors, ambitious nobles and the Sultan. The Delhi empire shrank as the outlying provinces became independent states. The sultan of Delhi ruled little more than the city of Delhi and a few neighbouring villages. In 1414, Khizr Khan defeated the last of the Tughluq rulers and established the rule of the Sayyid dynasty which prevailed until 1451. Khizr Khan established his court at Khidrabad, on the Jumna, near Kiloguri.⁶⁷ His successor, Mubarak Shah (r.1421-1433), also laid the foundation of a city on the banks of the

Jumna. He was murdered on the site, before the completion of the city, when he had gone to “see the progress of the buildings.”⁶⁸ Mubarak’s tomb was built west of the river, at the village of Mubarakpur.⁶⁹ Nothing remains of either royal residence.

At the end of the Sayyid period Delhi lost favour as the residence of the ruler. The last of the Sayyids, ‘Ala al-Din (r.1443-1451), in 1447, went to Badaun and,

after staying there some time, returned to Delhi; (and) said he was much pleased with Badaun, and wished to stay there always. Hisam Khan (the *wazir*), in all sincerity, told him it was impolitic to leave Delhi, and to make Badaun the capital.⁷⁰

In 1451 Bahlol Lodi assumed control of Delhi as the first ruler of the last of the Delhi Sultanate dynasties. There was limited urban development in Delhi in this period, and in 1506, the Lodis moved their capital to Agra. The Lodis reigned until 1526, when Babur, a descendent of Genghis Khan and Timur, defeated Ibrahim Lodi and founded the Mughal empire. Beginning with the Lodis, and continuing under the Mughals, the imperial capital ceased to have a purely physical definition. That is, the capital became the location of the ruler and his court at a particular point in time rather than a fixed physical location.⁷¹ For the next 130 years the capital shifted from Delhi to Agra and to other sites as successive rulers moved about. Delhi was re-established as the capital during the reign of Shah Jahan (1628-1658) with the construction of Shahjahanabad.

Most of the architectural remains of the Sayyids, and the succeeding Lodi dynasty, are numerous mausolea. This reflects the architecture that

has survived not the architecture that was built. There are no surviving, large scale, hydraulic structures such as dams or large reservoirs, from this period, but existing waterworks would have continued to be an important source of water. The social significance of the preexisting waterworks is reflected in the choice of sites for the construction of tombs. The greatest concentration of tombs are south of the old city near the Hauz-i Shamsi, in the area surrounding Hauz Khas, and west of Nizamuddin (the old town of Ghayaspur). In other words, the reservoirs were desirable locations, for ambitious builders who wanted to make their mark on Delhi, to construct impressive and expensive memorials. But it should not be assumed that Delhi died. The construction of numerous tombs in the city indicates that there was still a population of builders, stonemasons and other craftsmen, available, and profiting from the work.

Even though Agra replaced Delhi as the principal city, Delhi remained under Lodi rule. A royally appointed governor ruled Delhi and it is safe to assume that many government institutions would have remained in the city. Delhi's strategic position on the corridor connecting south and west Asia would still have given its population a commercial and military advantage. Traders would have continued to carry on business. The many serais and inns catering to travellers would still have had customers travelling from Delhi to Agra and other cities. Religious institutions, mosques, madrasas and dargahs, fulfilled a role for the population as a whole and not just for the government. For many people in the city or in the suburban villages life revolved around the interactions of the local community.

In the three centuries of Sultanate rule Delhi changed many times. Although the changes were driven by political and social pressures some basic requirements remained. Throughout the period it was necessary to ensure an adequate water supply. Construction and maintenance of large scale hydraulic projects were significant components of royal architectural patronage. There were numerous smaller waterworks constructed during this period as well and the establishment of reservoirs, fountains, stepwells, and other waterworks continued to be regarded as a signal mark of piety. Although they are not documented in the contemporary histories, they also had a significant role in the lives of the city inhabitants.

Chapter 2: Notes

- (1) *Masalik al-absar fi mamlik al-amsar* of Shihab al-Umari (trans. I. H. Siddiqi and Q. M. Ahmad as *A Fourteenth Century Arab Account of India under Sultan Muhammad Bin Tughluq*, (Aligarh, 1971), 14-15. Al-Umari never travelled to India but compiled his information from reports of travellers.
- (2) A. K. Sharma and S. B. Ota, "Anangpur - the palaeolithic site near Delhi", in B. U. Nayak and N. C. Ghosh, eds. *New Trends in Indian Art and Archeology*, Vol. I (New Delhi) 1992.
- (3) A. K. Narain, "On the proto-history of Delhi and its environs" in R. E. Frykenberg, ed. *Delhi Through the Ages*. (Delhi, 1986), 14. The river channel is farther east now than it was in the past, so that the site is not now on the river.
- (4) Narain, 13-14.
- (5) Y. D. Sharma, *Delhi and its Neighbourhood*, (New Delhi, 1990) p. 10.
- (6) Sharma, 100-102.
- (7) Precise dating is difficult. The association with Anangpal comes from the name of the village of Anangpur. There were two kings named Anangpal. Anangpal I, the founder of the dynasty, ruled in the eighth century. Anangpal II ruled from 1051 to 1081. The eleventh century date is usually accepted for the settlement. Narain, 3-4; R. Nath, *Monuments of Delhi*, (New Delhi, 1979), 81, 83.
- (8) Nath, 83.
- (9) A. Cunningham, *Archeological Survey of India Report 1862-63*, (Delhi,

1972), 152.

(10) Sharma, 50.

(11) These measurements from Cunningham, p.159.

(12) Cunningham, 152., Nath, *Monuments*, 81.

(13) Narain, 4.

(14) Ghazna was a town in the region that is now Afghanistan.

(15) J.E. Schwatzberg (ed.), *A Historical Atlas of South Asia* (Oxford University Press, 1992) p. 196, fn. 2, and p. 37. The location of Terain is disputed by historians, but it was probably near the town of Bhatinda in the Punjab.

(16) *Tabaqat-i-Akbari*, p. 69, fn. 3. Qutb al-Din Bakhityar was an important figure in the foundation of the Chhisti sect in India. He chose to live outside the city even though the Sultan had invited him to the court.

(17) H.H. Lamb suggests that the climate changes in the high latitudes contributed to the expansion of the Mongol empire. Up to about 1200 the warming trend may have increased the available pasture in Central Asia with a subsequent increase in population. Cooling in the region in the first quarter of the thirteenth century may have precipitated the Mongol expansion. *Climate, History and the Modern World* p. 175.

(18) *Tarikh-I Firoz Shah* of Ziya al-Din Barni (Elliot and Dowson) Vol 14, p. 7.

(19) P. Jackson, "Delhi; the problems of a vast military encampment" in R. Frykenberg, ed., *Delhi Through the Ages*, (New Delhi, 1986), 19.

(20) Jackson, 18.

(21) K. S. Lal, *Growth of Muslim Population in Medieval India*, (Delhi, 1973), 110.

(22) The suffix -"pur" denotes city or fort. V. K. Chari and K. B. Harder, "Terminal elements of place-names in the north eastern sector of Indian railways", *Names* 14(1966), 44.

(23) R. Mitra, "Note on the Palam inscription", *Journal of the Asiatic Society of Bengal*, 43(1874): 104-110.

(24) Barani, 48-49.

(25) M. Athar Ali, "Capital of the Sultans: Delhi during the thirteenth and fourteenth century" in Frykenberg, 36.

(26) Jackson, 20.

(27) Barani, 81.

(28) Barani, 110.

(29) Barani, 98.

(30) This pattern of village settlement still exists. In 1981, 369 villages were included in metropolitan Delhi; 111 were classified as urban and the rest were rural. Rachna Narendra "The Hauz Khas Village", *Architecture + Design* Jul-Aug 1990: 61.

(31) Barani, 157.

(32) This plan of Tughluqabad is reminiscent of fortress cities in western Asia. For example, an aerial view of Bam in Iran, shows a similar plan of a hill top citadel surrounded by a walled town. H. Gaube, *Iranian Cities*

(New York University Press, 1975) p. 105.

(33) H. Waddinton, "Adilabad: a part of the "fourth" Delhi," *Ancient India* 1946 (1) 60-76.

(34) *Delhi: Architectural Remains of the Sultanate Period* vol.3

(35) Tughluqabad has not yet been overrun by modern urban expansion which means that the small structures, such as the wells, survive. Many of the remains of the earlier cities have disappeared under modern Delhi so we have no details of the streetscapes or local water supplies.

(36) K. A. Nizami, "Cishtiyya", *Encyclopedia of Islam* vol. 2, 51-56.

(37) A.M. Husain, *Tughluq Dynasty* (New Delhi, 1976), 145.

(38) M. S. Mate, "Daulatabad: Road to Islamic Archeology in India," *World Archeology* 14(3) 1983: 335-341.

(39) *Tabaqat-i-Akbari* of Khawaja Nizamuddin Ahmad, translated by B. De 1911 (Calcutta, 1973), 218-219.

(40) Barani, 163.

(41) A. M. Husain *Rise and Fall of Muhammad bin Tughluq* (Delhi, 1972), 244. Husain identifies Nadayana with the modern village of Naraina which is located west of the southern ridge. He does not give his reasons for this identification.

(42) A. M. Husain, 246.

(43) Y. D. Sharma, *Delhi and its Neighbourhood* (New Delhi; 1990) p.25.

(44) H.A.R. Gibb, *The Travels of Ibn Battuta A.D. 1325-1354* (Cambridge University Press, 1971) vol.3 p.621.

(45) *Zafar-nama* Sharafu-d din Yazid, Elliot and Dowson, Vol. 13 p. 118.

(46) Satpula has an overall length of 79.5 m, including the sluice-gates in the centre and a square bastion at each end. The sluice is 54.5 m long, and consists of eleven, arched water channels 14.6 m long, 3.2 m high and 2.2 to 2.9 m wide. The seven central gates are the largest and gave the structure its name (sat=seven). The gates were probably heavy boards that fitted into grooves in the water channels, and were raised and lowered by means of ropes and pulleys. The gates were part of the wall defence, as well as water regulators. Satpula is much larger than the sluice at Tughluqabad which is only 6.8 m long and 6.3 m wide, and has three arched water channels. This was sufficiently large to create a large flood lake in the summer. The measurements are from *Delhi:*

Architectural Remains of the Sultanate Period vol. 3, pp. 62-64 (Satpula) and p. 53 (Tughluqabad).

(47) Shams al-Din 'Afif, *Tarikh-i Firuz Shah-i*, Elliot and Dowson, vol.15, 54.

(48) 'Afif, 96.

(49) 'Afif, 38.

(50) 'Afif, 107.

(51) *Futuh-at-i Firoz Shah* Sultan Firoz, Elliot and Dowson, Vol. 15 p. 129.

The problem of disruption of water supply by accumulation of silt in tanks and subsequent encroachment by cultivators has continued into the present. U. Shankari, "Major problems in minor irrigation: social change and tank irrigation in Chitor district of Andhra Pradesh",

Contributions to Indian Sociology n.s. 25(1) 1991: p. 105.

(52) Narendra 63. It is difficult to know how large the agricultural area was because *bigha* is a measure of land use and not a standard measure of area. See W.C. Neole, "Land is to rule," in R. E. Frykenberg, ed., *Land Control and Social Structure in Indian History* (University of Wisconsin Press, 1969), 5.

(53) Mehrdad Shokoohy and Natalie H. Shokoohy, *Hisar-i Firuza* (London, 1988), 6.

(54) Translation in Shokoohy and Shokoohy, 6-8. This translation was taken from the published Persian text and contains more detail than the *Tarikh-i Firuz Shahi* of Elliot and Dowson (1953), 33-36.

(55) 'Afif, 86.

(56) 'Afif, 39.

(57) al-'Umari, 36. al-'Umari died in 1348 three years before Firuz Shah came to power, however the general pattern of the city would not have changed much in a few years.

(58) These numbers are from the translation by Elliot and Dowson, p.86-87. In the translation of 'Afif in M. A. Ansari *Geographical Glimpses of Medieval India* (Delhi, 1989) vol. 2, p. 10, the number of new gardens is given as 1022, and the number established by 'Ala al-Din is given as 53.

(59) *Ta'rikh-i Firuz Shahi* of 'Afif, M. A. Ansari translation, 10. The Elliot and Dowson version puts the state revenue at 80,000 tankas, 87.

(60) 'Afif (Elliot and Dowson), 95.

(61) Sharma, 26; Welch and Crane, 152.

(62) G.R.G. Hambly, "The twilight of Tughuqid Delhi", in R. E.

Frykenberg, 51-52; *Zafar-nama* of Sharafu-d din Yazī (trans Elliot and Dowson, vol. 13, 118. Timur (1336-1405) became ruler of the Mongol empire in 1368 when he ascended the throne in Samarkand. He saw himself as the successor of Genghis Khan and the renewer of the Mongol empire. In the next twenty years he conducted ferocious campaigns throughout central and western Asia.

(63) *Mulfuzat-i Timuri* (The Autobiography of Timur), H.M. Elliot and J. Dowson, *History of India* (Calcutta, 1963), 55.

(64) Timur, 58.

(65) Timur, 60.

(66) Timur, 61.

(67) J. Burton-Page, "Dilhi" *Encyclopedia of Islam* (E. J. Brill, 1965) vol. 2 p. 258, and map p. 261.

(68) *Tarik-i Mubarak-Shahi* of Yahya bin Ahmad (Elliot and Dowson) vol. 6, 153. The site was close to Khidrabad, Burton-Page, 258.

(69) Burton-Page, 258.

(70) *Tarik-i Mubarak Shahi*, 160.

(71) This is discussed in more detail by Carla M. Sinopoli in "Monumentality and mobility in Mughal capitals" *Asian Perspectives* 33(2) 1994: 293-308.

Chapter 3: Architecture of Stepwells

Several methods were used to obtain and store water in the semi-arid climate of western and northern India. During the Delhi Sultanate numerous large scale hydraulic projects were undertaken by the sultans. Dams, large reservoirs and canals were constructed through royal patronage, to provide the urban population with water. There were additional sources of water. The primary community water supply was the simple shaft well.¹ There were also a variety of other structures that can be included in the classification of “well monuments”² such as stepwells, retreat wells, stepped tanks and deep tanks or cisterns. The architecture of stepwells and a retreat well constructed in Sultanate Delhi will be discussed in this chapter. A stepped tank, or *kunda*, is a deep pond or reservoir with laterally descending staircases or spirals of steps that lead down to the water level.³ Examples of stepped tanks include the Modhera and Kapadvanj reservoirs in Gujarat (fig. 64).⁴ In the upper town and palace quarter of Tughluqabad are two examples of deep tanks (fig. 59, 60).

Stepwells are indigenous Indian water structures found throughout western and northern India, but the greatest concentration is in Gujarat and Rajasthan. The distribution is more a product of climate than of cultural or religious factors. Stepwells are a unique response to the problems of water access and storage in areas where there is a long and hot dry period, and where there is a considerable seasonal variation in ground water level. The oldest extant example of a stepwell is located at Junagadh, on the Kathiawar Peninsula of Gujarat, near some Buddhist

caves. The dating is controversial but it may have been excavated as early as the sixth century.⁵ Three stepwells at the village of Dhank, north of Junagadh, date from the early seventh century.⁶ The most recent example was completed in this century, at the Wankaner palace, also in the Kathiawar Peninsula.⁷

Stepwells are distinctive constructions in that most of the structure is below ground level, creating a large, underground building. A stepwell can be described as a well shaft with an attached flight of steps. The stairs descending from the entrance, usually at ground level, form a reservoir. The steps are submerged to different depths as the water level in the tank changes. The stepwell may be plain or highly ornamented. The Urdu and Hindi word *baoli** is generally applied to stepwells in northern India and in Rajasthan. In western India, the Gujarati word *vav* is more commonly used.

There is no precise definition of the term *baoli* and it is frequently applied to a variety of different below-ground water structures. In this study *baoli* will be used more specifically for structures consisting of a well shaft with an associated, stepped tank.

Wells are designed to take advantage of sources of ground water. Inscriptions on a few wells and *baolis* specify that at least in some cases the wells were located at the site of natural springs, but otherwise none of the Sultanate texts record how the sources of ground water were determined. In Chapter 53 of the Sanskrit treatise *Brhatsamhita*, Varahamihira details various traditional methods of determining subsoil

*A variety of transliterations are used: *bauli*, *bauri*, or *bowri*.

water courses.⁸ Careful observations of variations in characteristics of plant growth were used to determine presence of underground water. The art of *dakargala*, that is, looking for water (*daka*) using a wooden stick (*argala*), was also noted. There is no reason to assume that the traditional methods would have been abandoned during the Sultanate.

Stepwells are either cut from natural rock or, more commonly, excavated and reinforced with a lining of stone or brick. There are no historical records of the construction methods used. A possible procedure, based on traditional well digging techniques, is suggested by Kirit Mankodi in *The Queen's Stepwell at Patan*.⁹ The well is excavated in stages. The first level would be excavated to a depth of 2 or 3 metres, and then the side walls of the tank would be built. The walls are supported on a course of horizontal stone slabs. After the wall of the first level was completed the next stage down would be excavated. At the next level the width of the tank is reduced, so that the soil bears the weight of the wall of the previous level. The wall of the lower section would then be built up to the base of the supporting slabs of the previous level. Each successively deeper level would be constructed in the same way. The stepwells become narrower and successive levels become shallower towards the bottom of the reservoir, because, as the depth increases, thicker walls are necessary to carry the weight of the upper walls and to counteract the pressure exerted by the weight of soil. At the bottom of the well, closer to the water table, the ground water makes the soil increasingly soft and unstable so that a substantial base is required to support the walls. Some of the problems of digging the wells in the unstable soil were recorded by Babar (r.1526-1530), the first Mughal

ruler of India, in his biography: "I ordered a large chambered-well to be made...a large well with a flight of steps, which in Hindustan is called a *wain*...they were busy digging it in the true rains (*ain bishkal*); it fell in several times and buried the hired workers".¹⁰

The simplest ground plan consists of a straight flight of steps, within a rectangular tank, descending from the entrance to the well shaft (fig. 65). Variations on this basic plan include cruciform and L-shaped structures, wells with lateral staircases, wells with more than one entrance, and wells with circumambulatory passages or helical staircases.¹¹

Many of the stepwells in Gujarat and Rajasthan are very complex structures, descending as much as 15 to 20 metres below ground, with highly ornamented, multi-storeyed colonnades (fig. 72). The rows of columns and lintels on each level provide cool shade within the well, and also create a supporting framework to reinforce the side walls of the tank. Internal colonnades and galleries are usually found in the larger and deeper stepwells.

The stepwells are ingeniously designed structures. The tank provides storage for a large volume of water. Even though the water level changes with the seasons the stairs always provide access to the water in the tank. Water in the *baoli* could be obtained either by walking down the stairs to fill water pots from the water in the tank, or water could be drawn from the well shaft. There are several ways of drawing water from wells. Small volumes of water could be drawn using a simple pulley and bucket, or a counter-balance device. A simple pulley can be seen on the east side of the *baoli* at Nizamuddin in the eighteenth century print by

Thomas and William Daniells (fig. 12). A counter balance device is shown in fig. 68. Larger volumes of water could be drawn using animal power. One device consists of a large leather sack attached to a long rope that would be pulled by an oxen, which would walk down an inclined ramp to bring the water container to the top of the well where the water would be emptied into a water channel or cistern.¹² Geared wheels with “chains of pots”, sometimes referred to as “Persian wheels”, that were operated by hand or animal power were also used on some wells (fig.67). It is not now possible to determine which type of device was used on the Delhi *baolis* during the Sultanate.

The stepwell design also takes advantage of the cooling effects of water. The deep narrow structure of the *baolis* would help to keep the water cool by shading it from prolonged exposure to direct sun. Evaporation would moisten the walls and floors increasing the passive cooling of the shaded galleries at the lower levels. The temperature of the lower level galleries would be kept relatively constant by the moisture and the insulating effect of the surrounding soil.

Eighteen Sultanate *baolis* have been identified in Delhi.¹³ (These are listed and briefly described in Appendix I.) Although there are variations, most of these *baolis* are of the simplest type, having a rectangular tank with a single straight flight of steps. This does not mean that they are all alike, for each is a distinctive structure. A complete architectural study of all the monuments is impossible because several are in very poor condition, and details of the ground plans and any decorative treatment have been lost. Some have almost entirely disappeared; for instance, the *baoli* at Qadam Sharif, in north Delhi, is now marked only by a few

stones from the wall at the top of the well shaft. Four stepwells will be described in detail in this chapter. These were selected because they are in relatively good condition and because they represent examples from different periods of the Delhi Sultanate.

1. **Gandak ki Baoli**

This *baoli* is located in Mehrauli district about 600 meters west of the Quwwat al-Islam complex. Gandak ki Baoli is not dated but is usually assigned to the period of Altamsh (1211-1236).¹⁴ The construction techniques and the way stones are worked are similar to other early Sultanate structures such as Altamsh's extension of the Quwwat al-Islam complex, the 1231 tomb of Prince Nasir al-Din Muhamud, and the c.1235 tomb of Sultan Altamsh. A no longer extant fragment of Arabic epigraphy in the upper level gallery strengthens the probability of Muslim patronage,¹⁵ although the patron is not known.

The tank is a narrow rectangle with the circular well shaft, outside the tank, on the south end (fig. 4). The overall external length, including the well shaft, is 41 meters and the width is about 12.5 meters.¹⁶ The well shaft is about 12 to 15 m deep,¹⁷ and at the top there is a platform that provided a place to stand while drawing water directly from the well. On the west and south, the opening at the top of the well shaft forms three sides of a hexagon. The angles are formed by stone beams that are supported on stones that project from the wall of the well shaft. In the centre of each projecting stone is a circular, vertical hole into which a wooden upright could be placed to carry the water raising mechanism. The surface of the platform slants away from the well opening, and directs water into a channel that runs along the top of the west wall and

into a small cistern at the northwest end of the tank.¹⁸

The entrance to the tank is at the north end. On each side of the north end of the tank there is a short, narrow staircase at right angles to the main steps. There are nine steps on the east side and eleven on the west. The two short staircases lead to a landing 5.5 meters by 2.5 meters at the top of the main staircase. The main staircase has at least seventy-six steps (fig.5).¹⁹ The tank is about 32 meters long and approximately 20 meters deep. The width of the tank decreases in five successive levels. Each tank level is defined by a horizontal division in the well shaft end of the tank (fig. 6). At each level a narrow walkway about 0.8 meters wide runs along both sides of the length of the tank providing access to the openings into the well shaft at the south end (fig. 7).

At the south end of the first level walkway, five steps lead up from the walkway to a platform, approximately 2 meters wide, in front of the well shaft. On the second level there is a gallery supported by a row of carved, square pillars, two engaged and four free standing. The pillars consist of a square base, a square shaft in two vertical sections separated by a square block, and a cruciform capital (fig.8). The ornamentation of the pillars is quite simple. On the base there are two incised horizontal lines over two low relief, semi-circular scallops. The bottom of the shaft is square in section. For about one third of its length, above, it is chamfered to make an octagonal section. The remainder of the column is square in section with two notches on the corners giving the appearance of three separate blocks. The top of the shaft is incised in relief with a foliate scroll. The block separating the two sections of the shaft is decorated with a band of diamonds. The capitals, though carved from a

single block, are shaped in the form of crossed corbelled braces with rounded ends. What appears as a cushion block between the capital and the lintel is part of the capital stone. The ceiling of the gallery is lantern deck construction. The opening into the well shaft is trabeate construction with the same style of pillar supporting the lintel. Each of the three lower levels has the same construction, but the pillars have only one vertical segment instead of two. On the lower levels the wall between the tank and well shaft is much thicker than on the two upper levels, thus creating a narrow passageway between the tank and the well.

The walls of the tank are square cut rubble stone in regular courses. There is no decoration on the tank walls except for a small, arched, red sandstone niche on the third level east wall. Near the south end of the east wall there is a line of displaced stones suggesting exterior pressure on the wall (fig. 7). The top of the wall on both sides of the tank and at the well shaft shows evidence of having been repaired with irregular courses of uncut rubble.

2. **Baoli at Nizamuddin**

The *baoli* is located within the enclosure of the *dargah* (Sufi centre) of Nizam al-Din Auliya. It is directly south of the north gate of the *dargah* and about 40 meters north of the tomb of Nizam al-Din Auliya.²⁰ The *baoli* was constructed circa 1320-1325, during the same period that the fortress city of Tughluqabad was built.²¹

This is a rectangular stepwell with the steps on the north end. There is no evidence of a separate well shaft. It is not possible to say if there ever was a separate well or if the shaft is contained within the tank.

Limitations of space within the precinct of the *dargah* may have prevented construction of a separate well shaft. The tank is 37.4 meters by 16.2 meters.²² The depth of the tank is not known.

The *baoli* itself is quite plain, and it is the surrounding buildings that provide the architectural interest. The entrance is through a gateway at the north end (fig. 9). From the gate seventeen steps, approximately one third the width of the tank, descend to the main staircase. The main steps are the full width of the tank. Within the tank, in the centre of the twelfth step, there is a small platform. Details of the tank's construction below the water line are not clear. The tank does not appear to be divided into different levels. On the east and west walls there are four arched recesses of which only the tops are visible above the water level. On the south side there were three arched niches, the centre one larger than the other two (fig.10).²³ At present there is a break in the centre of the south wall that extends to the top of the tank. The tank is constructed of square cut stone in regular courses. The top of the tank wall is marked by a projecting stone lip.

Several buildings enclose the *baoli*. On the east side a passageway leads from the *dargah* entrance to the tomb and mosque south of the *baoli* (fig. 10). For most of the length of the tank the passage is open, but towards the south end it is enclosed by a covered arcade. Along the top of the arcade a line of several stones projects over the tank. Each stone is pierced by a vertical hole, and these brackets supported a pulley for drawing buckets from the tank. An eighteenth century print by the Daniells shows this system in use (fig. 12).²⁴ There is no indication in the print of whether this was a hand operated or an animal powered

device. An arcade of five arches covers the extension of the passageway along the south wall of the tank. On the southwest side of the *baoli* is a small pavilion called Bai-Kodaladai's tomb.²⁵ A brick wall now separates this pavilion from the *baoli*, but the rounded, corbelled brackets that supported the open platform with the stone railing, seen in the Daniells' print, are still evident (fig. 11). A mosque called Chini-ka-burj, which may date from the Lodi period, occupies the northwest wall of the tank.²⁶ In the late eighteenth century this was a square building with a dome and an arcade of six arches opening on to the *baoli*. At present, only two of the arcade arches remain, and they have been filled in. A modern building²⁷ now occupies the space that once held the arcade. Two square tombs flank the narrow section of the staircase at the north end of the tank.

3. **Ugrasen-ki-Baoli**

This stepwell is located about 900 meters southeast of Connaught place and just east of the intersection of Kasturba Gandhi and Atul Grove roads. It is now surrounded by modern buildings, and nothing remains of its Sultanate context. The structure is not dated, but it is possibly a late Tughluq *baoli*.²⁸

This is one of the largest Sultanate stepwells in Delhi. It is 60 meters long by 15 meters wide.²⁹ The depth of the *baoli* is unknown and water level remains fairly consistently at ground level.³⁰ The well shaft is at the north end. The shaft is very broad, almost the full width of the tank. A small mosque is attached to the south end of the tank.

On approaching the *baoli* one is faced with a wall about four meters

high with deep recessed niches regularly spaced along the wall (fig. 37). The arched entrance is on the west side, up six steps from ground level. The gate opens on to a narrow landing six steps from the top of the tank staircase. Water level is quite high in this *baoli* and only two levels are visible, but there may be more levels below the water (fig. 41). The upper level, part of which is above ground, is visually divided into two sections by a double row of arched niches. In the upper row the niches are very shallow, and the vertical spaces between them contain three shallow rectangular recesses (fig. 42). The niches in the lower row are much deeper. Between each of these niches is a single arched recess, about one third the height of the niche, aligned with the rectangular recesses in the upper row. Only the top of the second level is visible, but it appears to continue the pattern of niches on both sides of the tank.³¹

Ugrasen *baoli* is unusual among the Delhi stepwells in that the tank is in two sections. At the north end, a small section between the well shaft and the main tank has been enclosed creating a square secondary tank. This area is covered by a roof, and arched openings connect it to both the main tank and the well shaft. The purpose of this secondary tank is unclear. The walkways inside are very narrow and would not have provided a comfortable resting place. It is possible that the enclosed area was an attempt to provide a shaded place to keep the water cool.

The north wall of the main tank is a large, arched alcove with a curved ceiling, creating the appearance of a shallow *iwan* (fig. 43). It is divided horizontally into two stages corresponding with the divisions in the tank walls. In the upper section there is a small arched opening flanked by two blind arches. Below, an arched passage opens onto the

second section of the tank. On either side, rectangular doors open to stairways which lead up, within the walls, to the roof of the secondary tank. The door on the east wall also connects with the first level walkway. Repairs to the northwest corner of the tank have closed the access to the walkway on that side (fig. 44). The floor of the iwan is supported on large rounded corbelled brackets. Similar brackets above the alcove suggest that there may have been another platform at the top of the tank. There is a small platform, at that level, in the northwest corner of the tank. The photograph in *Delhi: Architectural Remains of the Sultanate Period*, taken before 1970, shows the top of the wall at this level on the north side and for most of the west side (fig. 40). Subsequent restoration work has increased the height of the wall (fig. 41).

The doors on the north end also give access to a pair of small alcoves on the east and west sides of the small tank. The ceiling of this tank is a shallow dome that supports a flat roof. A small arched passage on the north side leads to the well shaft. The width of the well shaft nearly equals that of the tank and the shaft is open for the entire span. There is no water-drawing platform as at Gandak-ki *baoli*, but the roof of the small tank may have served this purpose. The *baoli* has had extensive repairs, particularly to the west wall.³²

At the south end of the *baoli* the steps open onto a large courtyard. On the west side is a small mosque with an arcade of three arches supported on square red sandstone pillars “carved with *chaitya*-motif” (fig.45).³³ Originally the mosque had a stucco finish although most of it is now in poor condition. There are three shallow, arched niches in the qibla wall. Each consists of a small arch within a rectangular frame,

inside a larger arch. In the spandrels of the larger arches are carved stucco medallions (fig. 46). Over the arcade is a sharply angled ceiling under a “whale back” roof.³⁴ The building is in generally poor condition.

4. **Rajon-ki Baoli**

Rajon-ki Baoli is located in the Mehrauli district about 200 meters east of Gandak-ki Baoli. This site includes the stepwell and an attached mosque and tomb. Rajon-ki is possibly the latest Sultanate stepwell in Delhi. An inscription in the *chhatri* of the tomb credits Daulat Khan, a noble in the court of Sikander Lodi, with the construction in 1506. However, it is not clear if the date refers to the construction of the tomb or of the whole complex.

This *baoli* is a broad rectangle with the circular well at the south end (fig. 23). The mosque, on the west side, is on a raised platform, with the tomb on the platform between the tank and the mosque (fig. 21, 22). At the north end the steps extend beyond the east and west walls and open onto a broad, stone-paved area to the north of the *baoli* (fig. 27). Total exterior length, including the well shaft is about 39 meters. The east and west walls are about 33 meters long. Overall width of the tank, not including the mosque platform is about 24 meters.

There are three vertical levels, and the first level is above ground (fig. 24, 27). On each side of the upper level is an arcade of eleven arches. The two arches at the north end are blind, and the other nine open onto a long gallery. On the east side the gallery extends the full length of the wall, but the west side gallery is the length of the nine open arches. The arches are supported on piers composed of four square pillars. There are

five arches on the south wall. Three blind arches in the centre are flanked by two very narrow doorways that lead to stairs that give access to the flat roof. The two outer arches open on to rooms that are continuations of the east and west galleries. There is no opening to the well shaft on this level. On all three sides there is a broad walkway in front of the arcade. Above the arcade is a row of stone eave brackets (fig. 31). These rounded, corbelled brackets are decorated with scroll patterns in relief. At the top of the walls is a crenellated parapet decorated with arch shaped merlons.

On the second level narrow walkways run the length of the tank. The south end of the west wall has a gallery about 7.5 meters long fronted by an arcade of three arches. On the east wall is a single arched opening leading to a small room. The extent of the gallery is limited by the presence of native rock in this wall of the tank (fig.24). The rest of the wall, on both sides, is decorated with small arched niches aligned with the arches of the first level arcade. There is a row of stone brackets, in the same style as on the upper level, over the openings on both sides.

On the south wall is an arcade of five arches aligned with the arches on the first level. The arches are supported by square pillars of the same style as those at Gandak-ki *baoli*. Behind the arcade is a room the width of the tank and about two meters deep. In the centre of the back wall is an opening to the well shaft. The opening is rectangular but is given an arched appearance through the use of two carved stone blocks. At the west end of the room an arched doorway leads to stairs that go up to the first level. A second staircase to the upper level is located half way between the well shaft opening and the east end. This asymmetry in the

plan may have been necessary because of the rock intrusion on the east wall of the tank. The central section of the room has a domed ceiling the diameter of the width of the centre arch. The ceiling, on either side of the dome, is vaulted, and the west side gallery also has vaulted ceilings.

On the third level at the south end of the tank are three deep, arched recesses alternating with small niches. There appears to be no opening to the well shaft at this level. The side walls also have a pattern of alternating arches and small niches. This level is partly obscured by accumulated soil in the tank. According to the *Delhi Monuments List* in 1875,³⁵ there were originally four stories visible, and the drawing of the *baoli* in Sayyid Ahmad Khan, *Athar al-Sanadid*, also shows four levels (fig. 26).

The well shaft is circular except at the top level where it is octagonal. At each corner of the octagon, at the transition from the round shaft to the octagonal upper works, is a pierced, carved stone support for the water raising mechanism (fig. 29). The exterior of the well shaft, on the south side, has an arcade of five arches supported on plain, square pillars: the arches vary in width (fig.28). The arcade opens on to a two meter wide gallery that gives access to the well shaft.

Adjoining the *baoli*, on the west side, is a mosque and tomb situated on a raised platform. A low wall, a continuation of the crenellated parapet along the roof of the *baoli*, separates the platform from the *baoli* roof. The mosque is a flat roofed building, the width of the platform, with three large arches on the east side. Towards the north end of the platform, between the mosque and the *baoli*, is a small tomb, a domed *chhatri* supported on twelve square pillars over a grave marker. A

decorated gateway at the southeast corner of the platform opens on steps down to ground level. There are small arched rooms or recesses in the walls of the platform at ground level.

The *baoli* complex is rough-cut rubble construction with a plaster finish, although the plaster is missing in many places. Much of the plaster is intact on the first level east and south walls, but little remains on the west wall. The arcades have a smooth plaster finish with a lotus bud relief at the top of each arch and large rosettes in the arch spandrels (fig. 31). On the south wall and on the nine open arches of the east wall the rosettes are an open lotus flower design. Sixteen radiating petals surround a central boss of a stylized stigma. This lotus flower design is repeated in the dome of the *chhatri*. The surface of the dome is decorated with sixteen petals outlined in relief and the top of the dome is the centre of the flower.

The rosettes on the two arches at the north end of the east wall are a different style (fig. 30). They have a quatrefoil design set against a pattern of interlaced lines. There are similar rosettes on the east face of the mosque. However, on these the interlace pattern in the centre has been replaced with the word "Allah". Each of the north end arches has an arched window into the room behind. These small arches are set into rectangular frames, and above the frame is a foliate relief. The spandrels of the small arches contain rosettes of a simple eight petalled flower.

Along the length of the wall above the eave brackets and just below the parapet is a narrow foliate frieze (fig. 31). The merlons of the parapet are decorated with a foliate pattern similar to the relief above the windows in the north end arches. Originally one of the simple eight

petalled rosettes was set on each of the merlons, although many are now missing. The crenallated parapet is repeated along the top of the interior and exterior walls of the *baoli*, around the mosque platform and around the roof of the mosque.

The rosettes on the exterior arcade of the well shaft are eight pointed stars with the simple flower shape in the centre. There are foliate reliefs at the top and bottom of the vertical panels between the arches. Over the arches is a repeat of the same frieze as seen on the interior walls (fig. 28).

Very little of the plaster finish is left on the second or third level. Three of the arches on the well shaft end of the second level have lotus flower rosettes. Most of the plaster is missing from the domed ceiling in the centre of the south end gallery. There is a fragmentary band of inscription in Arabic script around the base of the ceiling dome. On the pendentives is a row of six-petalled, flower shapes over an elongated, lotus bud form. There are traces of foliate relief on the ceiling vaults on both ends of the gallery (fig. 32). The ceilings in the east side gallery are plain, undecorated plaster.

Rajon-ki has the best preserved decorative details of the Sultanate *baolis*. It is probable that other *baolis* that now appear rather roughly finished originally had a decorative, plaster surface. Others, for instance Gandak-ki or Nizamuddin, that are ashlar construction may not have had a plaster finish.

Another type of well monument is the “retreat well”, which also referred to variously as, *bhramani*,³⁶ *sardab*³⁷ and *kupagar*.³⁸ There is one Sultanate retreat well in Delhi, and it is included here because it is

frequently labelled a *baoli*,³⁹ but there are significant differences between the two kinds of wells. Retreat wells differ from *baolis* in structure - they do not have stepped access to the water - and in function - they are designed to be cool underground living space.

5. **Circular Retreat Well at Firuz Shah Kotla**

This structure is located in the palace complex (Firuz Shah Kotla) of Firuzabad, in eastern Delhi. The well is northwest of the Jami Masjid and the Lat Pyramid. Although it is not dated, it was probably built during the construction of the citadel in the mid 1350s. It may be one of the earliest examples of a retreat well in India.⁴⁰

It is a circular structure on two levels with a circular well shaft, 8.9 metres in diameter, in the centre (fig. 51).⁴¹ Water level is at the top of the well shaft and the depth of the well is not known. Much of the interior of the building has collapsed, but enough remains to give some idea of the original structure (fig. 52).

The first level is above ground and is 27.1 metres in diameter (fig. 53). Doorways on the east and west side provide access to the interior through short L-shaped passages that open on to circular rooms six metres in diameter. These rooms had domed ceilings. In both rooms there appears to have been an opening onto the well shaft and doorways leading to the fan-shaped arcades on the north and south sides of the well. The floors of the north and south rooms have collapsed towards the centre, but they probably extended to the perimeter of the well shaft. On the rear wall of each fan shaped room are nine arched recesses 0.9 m deep and 1.9 m high and set about half a metre above the floor (fig. 52).

Low walls across the bottom of the niches appear to have been designed to retain a small pool of water in each niche, however most of these retaining walls have disappeared.⁴² Much of the roof over these rooms is missing, but a few remaining pillar bases suggest that the rooms were pillared halls. There is enough left of the outside edge of the roof to indicate that the roof support was arcuate construction.

The second level has the same arrangement of rooms, but on a smaller scale. Access to the lower level is by two narrow curved staircases; one at the east end of the south gallery and one at the west end of the north gallery. The stairs open onto ring shaped rooms about five metres in diameter. The centre of the ring is a massive pillar, almost two metres in diameter, that supports the floor of the circular room above. Each room has an arched opening to the well shaft.

The second level arcades are about 2.5 metres deep with seven arched niches on the back wall. The niches are smaller than the ones on the upper level, but most of these niches still have the water retaining walls. These rooms were probably also pillared galleries; however, none of the roof supports is intact.

The exterior wall of the well is divided into four sections (fig. 51). There are extensions of the wall, about one metre deep and 14 metres long, on the east, west, north and south. On each nine metre section of wall, between the extensions, are six arched niches set in the upper half of the wall. The extensions on the east and west contain the entrances. On the north side there are steps to the roof. The roof is flat except for raised sections over the domes of the circular rooms. Much of the roof has collapsed, but it presumably extended to the perimeter of the well

shaft which would have been left open. A few remaining stone uprights suggest that there was a stone railing along the edge of the roof. There is now no evidence of the chhatris over the circular rooms shown in the conjectural reconstruction (fig. 54).⁴³

The well shaft is ashlar construction,⁴⁴ while the upper works are rubble. A few remnants of the plaster finish that covered the rubble can still be found. A series of pipes and channels distributed water throughout the rooms, to provide a cool and pleasant retreat.⁴⁵ The niches on the outside walls of the galleries were designed to hold water which would have moderated the temperature within the building. The system has been largely destroyed by deterioration and reconstruction of the building. The present poor condition of the building belies what must have been an attractive and interesting structure.

The ground plans of the Sultanate *baolis* exhibited little variation in three centuries. The unique character of each structure was achieved through decoration, addition of other buildings and elaboration of the galleries. The well monument that introduces an innovative plan is the retreat well at Firuz Shah Kotla. The most obvious architectural distinction between this structure and the *baolis*, in addition to the circular form, is the absence of stepped access to the well shaft.

Unlike the *baolis*, which are indigenous well monuments, the retreat well appears to be a foreign introduction or innovation. The origin of the retreat wells may be in the roofed underground water cisterns⁴⁶ and ice houses⁴⁷ found in Khurasan and Turkestan. This supposition is supported by the fact that one retreat well, in Gujarat, was built by a Khurasani mason.⁴⁸ Retreat wells are uncommon in Indian architecture,

and most examples from Gujarat date from the end of the fifteenth century.⁴⁹ The Bhamaria retreat well, at Mehmudabad in Gujarat, is a single storeyed building with vaulted rooms (fig. 70). A much more elaborate structure was built during the reign of Akbar (r. 1556-1605) at the fort in Agra.⁵⁰ This is a six-storeyed, underground structure, built of red sandstone (fig. 71).

The two levels of rooms in the Delhi retreat well would have made the underground space a welcome reprieve from the heat and dust of the city. The well may have been more just a comfortable resting place. The massive pillars in the rooms of the second level, which appear to be heavier than necessary to carry the floor above, may have been supports for some other system of drawing water from the well shaft. A very similar, but much later (c.1570s), structure was a part of the urban water supply of the Mughal city of Fatehpur Sikri (fig. 55).⁵¹ The Mughal well had galleries on four levels below ground. On the second level are two large octagonal rooms, on opposite sides of the well shaft. These rooms probably contained large wheels, supported on massive stone beams, that were part of the mechanism to bring water up from the well. Evidence for the use of a “Persian wheel” in this structure is shown in a miniature from an *Akbarnama* depicting the construction of Fatehpur Sikri (fig. 68).⁵² The similarity between these two structures suggests that they had similar functions, although it is not possible to say if the Mughal well was derived from the Tughluq example. However, extensive water lifting systems are not a feature of all retreat wells.

Two wells of the Sultanate period but not located in Delhi appear to combine elements of the *baolis* and the retreat wells. Both have an

octagonal tank surrounded by circumambulatory passages. In addition, each has a straight staircase leading from the entrance down to the water level. The Ra Khengar *vav*, in Gujarat, is trabeate construction and was probably built between 1230 and 1240.⁵³ The second well, of arcuate construction, was built about 1412 in south India, in the village of Malpannagudi, near Hampi in Karnataka Province (fig. 56). The origin of these interesting variations is unknown. They do indicate that the architecture of stepwells is not rigidly defined, and that innovations and experiments were introduced by patrons and builders in all types of structures.

Chapter 3: Notes

(1) There are problems with extrapolating from modern studies but descriptions of modern village communities indicate that the well is an important part of village life and that residential patterns are in part determined by the location of the well. See, for example, S.K. Chandoke, "The habitation patterns of Jat village," *Ekistics* 45 (1978): 229-235.

(2) Jutta Jain-Neubauer, *The Stepwells of Gujarat: in Art-Historical Perspective* (Delhi: Abhinav, 1981) uses the term well-monument as a general classification for various well structures, 1. Her study surveys 60 Gujarati stepwells, with detailed discussion of 34.

(3) Jain-Neubauer, 2.

(4) Klaus Herdeg, *Formal Structure in Indian Architecture* (New York: Rizzoli, 1990), 9-13.

(5) Jain-Neubauer, 19.

(6) Jain-Neubauer, 20.

(7) Jain-Neubauer, 24. There may be earlier examples, or other recent ones, from other places in India. Information is limited by lack of published reports on wells outside of Gujarat.

(8) A.M. Shastri, *India as Seen in the Brhatsamhita of Varahamihira*, (Delhi, 1969), Appendix IV, "Darakgala or the art of exploring underground water-springs", 500-503. Some of Varahamihira's information is derived from earlier works, Shastri, 443.

(9) Kirit Mankodi, *The Queen's Stepwell at Patan* (Bombay, 1991), 13-21.

(10) *Tuzuk-i-Babari* translated in M. A. Ansari, *Geographical Glimpses of*

Medieval India Vol. 1 (Delhi, 1989), 118-119.

(11) Jain-Neubauer, 25-28.

(12) T. Schioler, *Roman and Islamic Water-lifting Wheels*, (Copenhagen, 1973), 85.

(13) T. Yamamoto, M. Ara, and T. Tsukinowa, *Delhi: Architectural Remains of the Sultanate Period*. (Tokyo, 1970) Vol. I (A general List of the Monuments); Vol. III (Waterworks).

(14) Y.D. Sharma, *Delhi and its Neighbourhood*: New Delhi: ASI (1980), 61.

(15) M. Ara in *Delhi* vol.III, 35 mentions that fragments of inscriptions were seen in 1959, but when he returned in 1961 the inscriptions had disappeared. He was not able to translate the fragments.

(16) These measurements are from *Delhi* vol.III, 34-37.

(17) Depth of the wells can only be estimated because the depth of the water prevented me from making accurate measurements, or because of the depth of silting at the bottom of the wells.

(18) The condition of the top of the wall on the west side suggests that this may be a later addition.

(19) *Delhi* vol.III, 35.

(20) *Delhi* vol.I. (w.19); Ara, *Dargahs in Medieval India* (Tokyo: University of Tokyo Press, 1977) plan on 314.

(21) Sharma, 166; M. Husain, *Tughluq Dynasty* (New Delhi: S. Chand and Co., 1976), 628n.

(22) These measurements are from Burton-Page *Encyclopedia of Islam* vol.I, 1024.

(23) These are visible in Ara's photograph. When I saw the baoli the water level was above the arches.

(24) "A Baolee near the Old City of Delhi" *Oriental Scenery* III, 18. 1 Dec. 1802. The Daniells visited the *dargah* on 16 February 1789. Mildred Archer, *Early Views of India: The Picturesque Journeys of Thomas and William Daniell 1789-1794*. 73.

(25) Sharma, 117.

(26) Sharma, 117.

(27) The building was constructed between 1955 and 1960. In M. Ara *Dargahs*, a photograph taken in 1955 shows the remains of the arcade but a photograph taken in 1960 shows the new building, figure 9.

(28) *Stepwells*, xiii, assigns the baoli to the Tughluq period. Sharma, 100, puts it in the late Tughluq or Lodi period. *Delhi* vol. I assigns it to the third period, ie. Sayyid or Lodi period.

(29) These dimensions are given by Sharma, 99. It is not clear if this includes the well shaft. K.V.S. Rajan, *Islam Builds in India* (Delhi: Agam Kala Prakazhan, 1983), 155 gives the length as 192 feet (58.5 m).

(30) From my own observation, and from all the photographs that I have seen, the water level shows very little variation.

(31) Usual water level seems to be part way up the lower section of the first level. Sharma, 99, says that the lower row of niches usually remain partly under water. Plate 133c of *Delhi* shows the water almost to the top

of the lower row of niches. The discolouration of the walls near the top of these arches appears to be a water line.

(32) *ASI Reports* 1926. *Delhi* plate 133c shows that the upper work of the west and north wall was replaced recently.

(33) Sharma, 100.

(34) Sharma, 99.

(35) Quoted in Ara, "The *baolis* of the Sultanate period in Delhi," *Memoirs of the Institute of Oriental Culture*, 102, fn 57.

(36) Jain-Neubauer, 27.

(37) Shariff, 36.

(38) R. Nath, "Account of a typical Mughal stepwell (*baoli*) and a well-house (*kupagar*)", *Vishveshvaranand Indological Journal* 9(1) 1971: 130-136.

(39) Sharma, 132.; Welch, "Hydraulic Architecture", 77.

(40) Shariff, 36.

(41) These measurements are from *Delhi* Vol. III.

(42) These walls are mentioned in *Delhi* vol. III (Waterworks), and so were still there before 1970, deterioration of the structure since then means that for the most part they are no longer extant.

(43) A. Welch, "Hydraulic architecture", 77, 80.

(44) Only three courses of stones were visible above water level at the top of the well shaft.

- (45) *Delhi* vol. III, 31-33; A. Welch, "Hydraulic Architecture", 80.
- (46) R. Holod, "Anbar (Water reservoir)", *Encyclopedia Iranica* vol. 1, 39.
- (47) Shariff, 36.
- (48) Shariff, 36.
- (49) The large Bhamariya retreat well at Mehmedabad, in Gujarat, was built at the end of the fifteenth century. It differs from the Firuzabad example in having an octagonal well shaft.
- (50) See, for example, R. Nath, "Account of a typical Mughal step-well (*baoli*) and a well-house (*kupagar*)", *Vishveshvaranand Indological Journal* 9(1971): 130-136.
- (51) R. Nath, *History of Mughal Architecture* Vol. II (New Delhi, 1985), 173-177.
- (52) The location of the wheel outside the "Elephant Gate" in the painting corresponds with the actual location of the well at Fatehpur Sikri.
- (53) Jain-Neubauer, 66.

Chapter 4: Architectural Context

The Sultanate *baolis* cannot be separated from the architectural history of the period. Most of the published work on Sultanate architecture discusses building types and ground plans. Because the stepwells are a distinct category of buildings it is difficult to relate the structural features to the general surveys of Sultanate architecture. It is in the architectural and decorative details that the *baolis* can be compared to other contemporary buildings. Unfortunately, there has not yet been published a comprehensive survey of architectural details of the period. A thorough study of the architectural features such as pillars, brackets, eaves, *chhatris*, parapets, and merlons is needed. The types of surface decoration such as stone carving, stucco and tile, and the designs and motifs also need to be studied. A complete study of these features is beyond the scope of this thesis, but a brief survey of Sultanate architecture will set the context for a discussion of the architecture of stepwells.

Survey

From the outset, Sultanate architecture reflected an integration of Hindu and Muslim architectural elements. The first building constructed for a Muslim patron in Delhi was the Quwwat-ul-Islam mosque at Lal Kot. Construction of the mosque was started immediately after the capture of Delhi, as recorded in an inscription on the inner lintel of the east gateway to the mosque: "This fort was conquered and this Jami Masjid was built in the year 587 (1191-92 A.D.) by...Aibek...the materials

of 27 [Jain and Hindu] temples...were used in the construction of the mosque.”¹ This building marked the introduction at Delhi of a foreign architectural form, in this instance the hypostyle mosque, that was, however, built using existing techniques and materials. The temples, constructed of precisely cut and unmortared stone pillars, lintels and ceilings, would have been easily disassembled. Many of the re-used elements were decorated with figural sculptures that were not suitable for a Muslim holy site. The figures were chiselled off, plastered over or the stones placed with the figures inside the walls, so that in some instances, stones have Hindu figures on one side and Arabic script on the reverse.² Some recycled materials, not deemed inappropriate, may have been used without alteration. The mosque, presumably built by local Hindu masons who used their traditional building techniques, is trabeate construction. The salvaged elements are most evident in the prayer hall and the colonnades of the mosque. The elaborately carved pillars taken from the temples, some set one on top of the other to achieve height in the new structure, support the lantern deck ceiling and flat roof of the perimeter colonnade. In front of the prayer hall is a screen of five corbelled ogee arches. Variations in the colour of the building stone give the structure additional visual richness.

On the east face the entire surface of the qibla screen is embellished with elaborately carved stone in which imported and indigenous design elements are combined. Texturing the exterior of buildings with geometric and arabesque patterns in brick and carved terracotta or stucco was common practice in Islamic architecture of Afghanistan and eastern Iran at that time. The carved stone in this

structure mimics those terracotta and stucco surfaces. Each arch of the screen is framed with two bands of calligraphy in Arabic script. Monumental calligraphy was well established as an important decorative device in Islamic architecture by the end of the twelfth century, and served symbolic and didactic as well as decorative functions. The decoration of the qibla screen also includes bands of stylized lotus (*padma*) and curling vine, similar to those on some Hindu temples.³ The lotus had a long tradition as a symbolic and decorative emblem in Indian art before the Sultanate. The iconography of the lotus is extremely complex. Initially the lotus represented water which is the source and support of all things, and it has come to symbolize many things including creation, perfection, purity, the sun, and a source of wealth. It can be argued that the presence of the lotus and vine motif on the qibla screen is a local adaptation of an arabesque design, and that the local craftsmen used the lotus as a suitably sacred symbol on a religious building.

Very few buildings remain from the urban expansion of Delhi in the thirteenth century. However, from the evidence of extant buildings it appears that trabeate construction was the standard building method for most of the first century of the Sultanate. The extension of the Quwwat-ul-Islam Mosque (c.1230) commissioned by Altamsh, and the Sultan's own mausoleum (1235), were built using post and lintel techniques.

The true arch was added to Sultanate architecture at the end of the thirteenth century. This can perhaps be linked to the influx of Muslims from Islamic countries to the west following the expansion of the Mongol empire during the thirteenth century. The refugees who fled to Delhi

included a number of princes from Khurasan, Turkistan, and Iran, who came with their households and retinues. Among these may have been craftsman and builders who were accustomed to using the true arch.

The Alai Darwaza (c.1311-16), the south gate of the extension of the Quwwat-ul-Islam undertaken by Ala al-Din Khalji, is the earliest intact example of the next phase in the progression of Sultanate architecture. It is a square building on a raised base with a low dome supported on arched squinches. The entrances and windows on each side are double voussoir arches. Two-tiered, attached pillars, very similar in style to those in the mosque colonnade, support the arches and fringes of lotus buds decorate the arch intrados.⁴ The battlemented parapet that originally finished the outer walls was removed during repairs in 1828.⁵ J.A. Page suggests that in the original design of the facade the entrances were emphasized by raising the decorative framing above the rest of the wall.⁶ This seems plausible because the central arch of the earlier qibla screen is emphasized in this manner. The plinth is faced with carved red sandstone consisting of horizontal bands of simple geometric and floral designs with a molding of applied tricuspated dentals in the centre. In Page's conjectural reconstruction the parapet was decorated with a similar band of tricuspated dentals.⁷ The east, south and west facades are finished in red sandstone and white marble embellished with low relief bands of calligraphy, geometric and arabesque designs which give a strong vertical emphasis to the walls. The decorative scheme of the qibla screen is reiterated in the use of lotus bud and tendril scrolls in the arabesque patterns. The decorative combination of red stone and white marble was to become a frequently used design feature in Indo-Islamic

architecture.

In the Tughluq period, the practice of texturing the entire exterior surfaces of buildings with relief carving apparently declined. In the upper city of Tughluqabad there are ruins with remnants of carved stucco facings, but among extant buildings smooth finishes are more typical. The earliest example of Tughluq architecture is the 1320 tomb of a sufi saint, Rukn-i 'Alam, in Multan. It was commissioned by Ghiyath al-Din Tughluq while he was still governor of Multan. It is a two-storeyed octagonal building surmounted by a broad low dome. The first storey has battered walls with dome-topped, tapered turrets at the corners; the second storey has perpendicular walls. The tomb is a brick building. The first storey has a plain facing of pale sand coloured brick relieved by a few horizontal bands of inlaid blue tiles and figured bricks. The doorways are emphasized with figured framing. The frieze at the top of the first storey wall is a dentate molding very similar in design to the plinth molding on the Alai Darwaza. Light and dark blue tiles are used extensively to decorate the second storey and the base of the white dome.

Ghiyath al-Din Tughluq's mausoleum (c.1325) is located on the south side of Tughluqabad, and is enclosed in a irregular pentagonal fortress. Like the Alai Darwaza, it is a square building faced with red sandstone and white marble. The attached pillars supporting the recessed arches of the entrances on the south, east, and north sides, and the lotus bud fringes in the arch intradoes are very similar to those of the Alai Darwaza. The battered walls and the octagonal base of the white hemispherical dome are reminiscent of the tomb of Rukn-i 'Alam. The crenellated parapet at the top of the walls repeats the pattern of the three

lobed molding found on the earlier structures. Although it is faced in red and white stone the decorative scheme is more like that of the Multani tomb than of the Alai Darwaza. The facing stone has a smooth, unpatterned finish and the decorative elements are on the upper third of the building above a wide horizontal band of white marble.

The Tughluq period is characterized by many innovations in building design. The large number of extant buildings including fortresses, waterworks, mosques, madrasas, and tombs records the many experiments and innovations developed by the patrons and builders. Although there was considerable experimentation in ground plans, some features were characteristic of the period. Buildings are generally rubble construction with plaster facings. Commonly used architectural details include low domes, parapets decorated with crenellations, either freestanding or as an applied frieze, massive rectangular, plain stone pillars, recessed arched openings and the inclusion of lintels within arched doorways.

Tughluq architecture is frequently characterized by historians as restrained,⁸ and although the buildings now appear rather sombre and plain, there is evidence that painted decoration was used. Painted murals have a long tradition in Indian architectural decoration.⁹ Painting buildings with colourful wall murals was, and still is, a common practice in Rajasthan and other parts of western India.¹⁰ Ibn Battuta mentions painted pillars in the sultan's palace at Delhi.¹¹ An Arabic inscription from a tomb in Bidar (c.1436) names the painter who carried out the painting in the tomb.¹² Another much later epigraph (1635) in a mosque in Bidar cites a religious decision "...that according to Hanafi law,

painting in a mosque...is permissible, if done with the sole intention of pleasing Allah.”¹³ Although these inscriptions are from a later period, they do suggest that decorative painting was not uncommon. Evidence from Sultanate manuscript painting also supports the conclusion that interiors and exteriors of buildings were painted and decorated. In the Mughal city of Fatehpur Sikri remnants of wall painting can still be seen on some buildings. The decorative use of contrasting colour, introduced on the Alai Darwaza, would have been easily reproduced on a painted surface. Even if the buildings were not painted, the plaster or stucco finish would have been much brighter when new than it is now. Amir Khusrau in his description of buildings in Delhi mentions that “the stones were so brilliantly polished that they looked like mirror.”¹⁴ This certainly does not describe a dull and sombre architecture.

Since most of the exterior ornamentation has disappeared, it is difficult to know how similar the decoration on different buildings might have been. The crenellated moldings on the tops of walls is one common decorative device that has survived. It occurs on a variety of buildings, such as the Begampur (c.1343), Kirki (c.1352-54) and Kalan (c.1387) mosques and on numerous tombs. It did not occur on all buildings; ruins at Tughluqabad have both plain and crenellated walls. The motif continued to be used in the late Sultanate, and is found on many tombs of the Sayyid and Lodi periods. Even a cursory study shows considerable variation in the details of the crenellations, and a comprehensive stylistic analysis needs to be done.

The architectural record of Delhi in the fifteenth century, under Sayyid and Lodi rulers, is found primarily in the numerous mausolea

and a few small mosques, since very few other structures survive from this period. Two distinct tomb types were developed; octagonal tombs were favoured for the rulers while square structures were preferred for the tombs of noblemen. Small mosques, with three or five domed bays in front of the qibla, replaced the large congregational mosques of the earlier periods. The architecture of this period developed its own distinct characteristics. Ashlar stone construction became more common, and battered walls were used less frequently. The building facades were textured by emphasising structural elements, such as arches, which were used as decorative elements. Domes became higher and were often crowned with a lotus motif. The facades of the square tombs were divided into two or three ornamental storeys articulated with rows of blind arches. Blue tiles, first used in some Tughluq monuments (for example the Begampur mosque), appear frequently as a decorative embellishment.¹⁵ Rosettes, in a great variety of designs, decorate the arch spandrels of most buildings. Interior surfaces were frequently embellished with carved and painted stucco.

Initially, Sultanate buildings manifested an integration of indigenous Hindu and imported Muslim architectural elements. While it is possible to trace the origin of some of the elements, after the first generation the architecture evolved as new style and the integrated elements developed in new patterns.

Architecture and Style of the Sultanate Stepwells

The earliest Sultanate *baoli*, Gandak-ki, is post and lintel construction (fig. 10). The columns supporting the corbelled brackets and large stone beams over the passages between the tank and the well shaft

are of the same pattern as some of those found in the colonnade in the Quwwat-ul-Islam mosque.¹⁶ Those on the upper level gallery, as in the mosque colonnade, are doubled, one on top of the other, and support a lantern deck ceiling. While the structure is basically unadorned, the few decorative elements are consistent throughout. The same style columns, for instance, are used on all levels, and the rounded brackets supporting the walkways are all alike.

Arcuate construction was widespread in Sultanate architecture from the beginning of the fourteenth century. This trend is reflected in the *baolis* which, from that period onwards, were all built using arches. The *baoli* at Nizamuddin (c. 1320) has shallow arched niches as part of the decoration of the tank walls. Another stepwell located southwest of Tughluqabad (VII)*, and possibly built in the early Tughluq period, is very similar to Gandak-ki *baoli* except that the galleries at the well shaft end of the tank are arched rather than post and lintel (fig. 18, 19).¹⁷ Several of the *baolis* of the early period were ashlar construction and relatively plain, and arches and arched niches were used as decorative, as well as structural features. The few remnants of the plaster finish on some of the *baolis* appear to be smooth and unadorned, although the walls may have been painted. Some structural elements, for instance, the rounded brackets supporting the walkways, were consistently used in all the structures.

During the Sultanate, there was a trend towards greater elaboration of the stepwells. The frieze of imitation crenellations seen on many other Sultanate buildings was frequently used to decorate the top

* The Roman numeral in brackets refers to the list of *baolis* in Appendix 1.

of the walls of the *baolis*. This embellishment can be seen on the stepwell south east of Hauz Rani (IV) (fig. 15), which Ara places in the early Tughluq period, the *baoli* at Sultanpur (VIII) (fig. 20), southwest of the Qutb complex on the road to Gurgaon, the ruined Basti Baoli (X) c.1488 (fig. 34, 35)¹⁸ in south Delhi west of the dargah of Nizamuddin, and on Rajon-ki Baoli (IX). At Rajon-ki and Basti this decorative treatment was continued on the other structures of the complex. The small domed pavilion at the top of the steps of the *baoli* at Sultanpur also has a crenellated band around the base of the dome.

About 1500 m west of Haus Khaz, in the modern colony of Ramakrishnapuram, is a site containing five tombs, that probably date from the Lodi period,¹⁹ and a stepwell. The small *baoli* (XIII) has been recently restored and little remains of its original construction except for two small, domed, square pavilions which house the entrances to narrow secondary staircases on either side of the well shaft (fig. 47, 48). The proportions of the pavilions reflect those of the tombs at the site, and the use of relatively narrow arches is repeated on the tombs and the *baoli*. Although the other structures at the site are decorated with crenellated friezes, the *baoli* is quite plain. Only a small portion of the *baoli*'s original plaster finish is extant, and decorative details have been lost, but there is no evidence of a decorative frieze.

Some stepwells were made more elaborate by attaching other structures to the *baoli*. At Nizamuddin the addition of secondary structures occurred over an extended period. For instance, the small mosque, Chini-ka-Burj, adjoining the tank was added during the Lodi period, more than a century after the initial construction. And the

process of change has continued to the present, with modern additions and alterations to the site. Ugrasen-ki *baoli* also has an attached mosque which has more decorative features than the *baoli*. The square pillars supporting the arches in front of the qibla are ornamented with carved reliefs on the base and top (fig. 45). Stucco medallions in the spandrels and foliate shapes above their points embellish the arches. On some of the medallions a tricusped molding encircles the centre figure (fig. 46). Fragments of smooth plaster remain in the apex of the large arch at the north end of the tank, and on the domed ceiling of the covered tank. There are no other decorative details in the tank. The site is given coherence by the repetition of the arches in the mosque and the tank.

The best preserved decorative programme is at Rajon-ki Baoli. The *baoli* and adjoining mosque and tomb have an integrated decorative scheme. One of the unifying features is the repetition of the lotus motif. As we have seen, the lotus was one of the decorative elements incorporated in the earliest Sultanate buildings, and it evidently remained an important motif. One of the reasons for its persistence, in addition to its broad cultural significance and its historical presence, may be that it is an adaptable form that can be represented in several different ways. The narrow frieze just below the parapet appears to be based on a lotus bud form. Lotus buds decorate the apex of each arch on the east and south galleries (fig. 30, 31). The radial symmetry of the lotus flower makes it particularly useful for circular medallions and domes, and it is used in both forms in the decoration of Rajon-ki. The lotus, with its real and symbolic associations with water, seems to be especially appropriate for decorating a hydraulic structure.

The decorative crenellated frieze on the parapet also helps to unify the whole complex. The parapet of the tomb pavilion, although of the same form, is embellished by the use of blue tiles. Tiles were introduced into Sultanate architecture during the Tughluq period,²⁰ but most extant examples are on Sayyid and Lodi buildings. In general, tiles appear to have been used as decorative elements rather than as covering for whole buildings.

The square pillars that support the galleries on the south end of the Rajon-ki tank are the same pattern as those used at Gandak-ki. It is not possible to say if this is the result of using recycled materials or if it represents the persistence of an architectural element. The re-use of decorated materials of significance can set the pattern for subsequent buildings: recycled decorative elements will be a model for later structures constructed of new materials. It is a kind of mimesis and provides cultural continuity despite a change in faith, patronage, or ruling class.

Although only a few fragments remain of the carved plaster decoration on the ceiling of the second level gallery (fig. 32), they suggest that the vaults were richly decorated. The motif is a scroll work of vines, leaves, and flowers radiating from a circular centre design. A similar carved plaster motif can be found on the ceiling of the tomb (c.1528) of Jalal Khan (d.1535) located a few hundred metres south of Rajon-ki (fig. 33). The example in the tomb is painted in brilliant colours, mostly reds and blues, but it is impossible to tell if the ceiling of the gallery at Rajon-ki once carried similar pigments. The apex of the dome over the grave marker is decorated with a carved plaster design formed by concentric

bands of the bud and leaf motif found in the frieze below the parapet of the external walls.

The integration of the structural and decorative elements into a cohesive scheme for the entire site was evidently a traditional pattern. Bhadresvar, on the east coast of Kachh (western Gujarat) is one of the oldest extant Muslim sites in India. The site includes a mosque, a shrine and a stepwell constructed about 1175.²¹ Although the walls of the *vav* are plain, the style of the columns and the decorative treatment of the column bases and cap stones is repeated in the other structures at the site.

Although the Sultanate *baolis* of Delhi have a distinctive function and form, it is evident their construction and decoration were influenced by the same trends exhibited in other structures of the period. This relationship between the stepwells and regional architecture can be seen in other parts of western and northern India. The elaborate arcading that is characteristic of many stepwells in Gujarat and Rajasthan is also characteristic of other buildings of the region. For instance, an interior view (fig. 66) of a *haveli*, or city mansion, in the desert city of Jaisalmer, in western Rajasthan, shows a series of horizontal arcades and multi-storeyed courtyards. A similar division of space into horizontal arcades can be seen in the large stepwells such as Dada Harir, in Ahmadabad (fig. 57, 58, 72) and the Mata Bhavani stepwell at Admadabad (fig. 73). This design allows for circulation of air through a series of shaded spaces providing much needed relief in areas where summer temperatures often go above 40 C.

Variations in decorative details of stepwells are influenced by both

regional styles and religion. *Baolis* built for Hindu patrons are frequently embellished with figural carvings (fig. 74), which obviously would not be found on the wells built for Muslim patrons. However, other elements of decoration may be found on both Hindu and Muslim stepwells.

If the *baolis* were simply utilitarian water storage facilities there would be no need to make them so elaborate. Not only can they not be separated from the rest of the architectural context in which they were built, but they also must be studied in their social context. The social role that the stepwells fulfil will be discussed in the next chapter.

Chapter 4: Notes

(1) Quoted in J.A. Page, *An Historical Memoir on the Qutb: Delhi Memoirs of the Archeological Survey of India No.22* (Calcutta, 1926), 29.

(2) J. A. Page, plate IX.

(3) C. Tadgell, *The History of Architecture in India*, (London, 1990), 157.

(4) These are frequently referred to as spear points, however as they are very similar in shape to the lotus buds in the scrolls and the whole decorative scheme is coherent it seems more likely that they are derived from the organic form.

(5) Carr Stephen, *Archeology and Monumental Remains of Delhi*, (originally published 1867; reprinted Allahabad, 1967), 57.

(6) Page, 14-15, Plate VII.

(7) Page, Plate VII.

(8) S. S. Blair and J. A. Bloom, *The Art and Architecture of Islam 1250-1800* (New Haven, 1994), 154.

(9) J. Chakrabarti in, *Techniques in Indian Mural Painting*, (Calcutta, 1980), discusses some of the history as well as techniques used in traditional mural painting.

(10) See, for example: F. Wacziarg and A. Nath, *Rajasthan: The Painted Walls of Shekhavati*, (London, 1982)

(11) H.A.R. Gibb, *The Travels of Ibn Battuta* (Cambridge, 1971), 660.

(12) Z.A. Desai, *A Topographical List of Arabic, Persian and Urdu Inscriptions of South India* (New Delhi, 1989), 15.

(13) Desai, 28.

(14) R. Nath, *India as Seen by Amir Khwarau*, (Jaipur, 1981), 119.

(15) It is difficult to say if this is related to increased use or better preservation.

(16) The pillars in the original mosque built by Aibek are elaborately carved, those in the extension of the mosque built by Altamsh are plainer.

(17) The structure is not dated. M. Ara in volume III of *Delhi* suggests that it is in the mid-period of the Tughluq dynasty. Its location near Tughluqabad suggests that it was constructed at a time when the fortress was occupied, and so served people living near or travelling to the city.

(18) R. Nath, *Monuments of Delhi* (New Delhi, 1979) 44. The tomb was constructed by a member of the court of Sikander Lodi in 1488.

(19) Y. D. Sharma, *Delhi and its Neighbourhood* (Delhi, 1990) 88.

(20) Sharma, 24.

(21) Mehrdad Shokoohy, Bhadresvar: *The Oldest Islamic Monuments in India* (Leiden, 1988), 38.

Chapter 5: Social Context

Architecture does not exist in isolation; it has a place within the broader context of social, economic and political history. One way to understand how buildings are linked to the cultural context is to look at the question of patronage. Who commissioned the construction of the buildings? Who were the builders? What social and economic class did they belong to? Why did they build them? How were the buildings used after completion?

In arid northwest India the water supply is critical, and wells, tanks, and reservoirs have been a vital supplement to rain water for most of India's history. Provision of water is a precious gift, and endowing waterworks had considerable social significance. Control of water resources and construction of hydraulic projects were traditionally important for both the Hindu and Muslim populations. The regulations and laws that governed water use helped to determine the attitudes towards patronage of hydraulic projects.

For Hindus, water has a significant role in ritual and daily life. Water laws were formulated early in Indian history. The ancient Code of Manu, the earliest of the extant law books,¹ includes several references to water in its laws and duties. The regulations include the concept of public or common ownership of water. Severe punishments were sanctioned for those who disrupted the public water supplies. For instance, included in the duties of a king (Chapter IX, article 279) is the punishment for "Him who breaks (the dam of) a tank he shall slay (by drowning him) in water or by (some other) simple (mode of) capital punishment; or the offender may repair the (damage), but shall be made

to pay the highest amercement.”² Not all punishments were as harsh and the laws allowed, in some cases, for the imposition of fines and an obligation to repair the damage: “...he who shall take away the water of a tank, made in ancient times, or shall cut off the supply of water, must be made to pay the first (or lowest) amercement.”(Chapter IX, article 281)³ The laws governing *Sraddhas* (rites to benefit the dead) enjoin: “Let him not entertain at a *Sraddha* ...he who diverts water-courses, and he who delights in obstructing them...” (Chapter III, article 163).⁴ In disputes between two villages concerning boundaries, the king shall require that “tanks, wells, cisterns, and fountains should be built where [the] boundaries meet....”(Chapter VII, article 248).⁵ Water works were among the charitable acts and social duties enjoined on the Brahmin. In Chapter IV, article 226 states that a *Snataka* (Brahmana who has completed his studentship) should “...without tiring, always offer sacrifices and perform works of charity [such as constructing a reservoir or well or building a fountain] with faith....”⁶ These charitable works were for the benefit of the patron; Article 229 of the same chapter reads, “He who gives water obtains satisfaction.”⁷ There are frequent references to water and irrigation in the ancient literature of India.⁸ Vishnu Gupta Kautilya, in *Arthashastra*, the earliest extant treatise on statecraft, describes many aspects of irrigation and regulations concerning water. According to this account the state maintained a record of all the village reservoirs;⁹ for each new village, the ruler “should build dikes for water either perennial or from other sources. He should assist with resources and communications those who build reservoirs or construct works of communal comfort and public parks.”¹⁰ In *Sukranith*, Sukra stipulates

that the king has a duty to construct hydraulic facilities, for domestic and agricultural purposes, for the welfare of his subjects.¹¹

It is in southern India that the patterns of Hindu hydraulic patronage are best preserved. The technology of tank irrigation developed there over several centuries. Historical evidence, particularly from copper plate and other inscriptions dating from as early as the eighth century, indicate that waterwork construction was sponsored by “kings, chiefs, dominant farmer castes, merchants and priests for purposes of revenue enhancement, tax concession, and religious merit.”¹² Many Hindu temples were responsible for the development of waterworks in the medieval period.¹³ The temples had a central role in the agrarian society, and endowments were used by the temple members to develop irrigation projects. Improvement of crop yield through irrigation provided a reliable investment for the temples. Water tanks were also built as part of the temple precincts. In Sri Lanka, irrigation projects were traditionally known as “king’s work”.¹⁴ Throughout Sinhalese history great kings were more respected for their abilities as hydraulic engineers than for military conquests. Most of the upkeep and minor repairs to irrigation facilities was carried out at the village level by the local population. New construction or major repairs were done by specialized caste groups on contract to the villagers.¹⁵

For Muslims, free access to water was a right, and the gift of water was a religious charity and a legal obligation.¹⁶ This principle is expressed in several *hadiths*:

To the man who refuses his surplus water, Allah will say: ‘Today, I refuse thee my favour, just as thou refused the surplus of something that thou hadst not made thyself.’¹⁷

No one can refuse surplus water without sinning against Allah and against man.¹⁸

There are three persons whom Allah will ignore on the day of resurrection. He will not grant them any indulgence and will inflict on them painful punishment; these three persons are: 1) the man who, having water in excess of his needs, refuses it to a traveller...¹⁹

Animals, too, were protected from thirst, and could not be denied water:

He who digs a well in the desert when there is pasture around this well and when there is no other water nearby cannot prevent the animals from slaking their thirst at this well.²⁰

Anyone who gives water to a living creature will be rewarded.²¹

A complex water legal system evolved in Islamic society to protect this precious commodity. Interpretation of the water laws varies somewhat between the different schools of Islamic law, but all are based on the fundamental principle of the right of thirst, that is the right of anyone to take water to quench their thirst or to water their animals. The laws govern questions of the ownership of water sources and the right to take water based on the nature of the water facility.²² Natural sources such as rivers can be used by all, but no individual can divert the water so as to cause a shortage for others. Ownership of a well belongs to the well-digger who has first right to the water. Wells designated as communal property are free to all. Access to wells on private property may be restricted, but the owner can not deny water to anyone suffering thirst. He can, however, refuse water for irrigation. Water from natural springs, like river water, is public property. Springs that are improved or enlarged through digging become the property of the person carrying out

the development, but the right of thirst still applies. Water rights may be individual or collective, and an individual's share is determined by the amount donated to the construction of the well, reservoir or canal. Ownership can be transferred through sale, gift, or inheritance. Water rights established through *waqf*, a religious or charitable endowment to the community, can not be transferred.

In the deserts of the Middle East, water supply and irrigated agriculture are inextricably linked to the growth and evolution of human society. From ancient times the construction, maintenance and administration of complex irrigation facilities were priority activities. Royal patronage of irrigation is recorded in the Old Babylonian "Lu-igisa archive" (1898-1877 B.C.).²³

The Muslims inherited hydraulic systems from their predecessors in many parts of the empire, and from the earliest expansion of the empire, they frequently used and refurbished existing hydraulic installations.²⁴ Construction of new waterworks was undertaken by all levels of society. Wells were dug by individuals, families, village communities, and by nomadic tribes. Landowners, merchants and the ruling elite undertook the construction of dams and irrigation canals. In some parts of Iran, the construction of *qanats* (underground water channels) was carried out almost entirely by private individuals with little or no government finance.²⁵ Profit and piety motivated the patrons of the *qanats*. New cities established by the Muslims had to be supplied with water and irrigation systems. For instance, the town of Basra in Iraq was founded in 638 as a military encampment.²⁶ Within two decades it had started to expand into a permanent settlement, and two canals which brought

water from the Shatt al-'Arab were completed in 665. Basra became an important agricultural, commercial and intellectual centre and an extended network of canals around the city supported agriculture which in turn supported the city. The Abbasid ruler al-Mu'tasim (833-42) established an irrigation system and planted groves of trees before building his palace (c.836) at Samarra, on the east bank of the Tigris.²⁷

Knowledge and understanding of water technology was crucial because the nature of the water supply determined the size and prosperity of the community. In the ninth century a writer, Ibn Qutaiba (d.889), described the skills required by a perfect secretary:

The Persians always used to say, 'He who is not knowledgeable about diverting water into channels, digging out water courses for irrigation streams and blocking up disused well shafts...about the construction of bridges and aqueducts, irrigation machines and water wheels...- such a person must be considered only partly qualified as a secretary.'²⁸

The necessity of this expertise is apparent when we consider that in the tenth century the director of the irrigation system in the region of Marw on the river Murghab in Khurasan supervised several thousand paid workers who were responsible for maintenance of the system and allocation of water.²⁹ In Iran, under the Seljuks, treatises on government recognized that economic stability depended on successful agriculture, and maintenance of irrigation works was incumbent on the ruler.³⁰

Royal Patronage of Waterworks in Sultanate Delhi.

Major hydraulic projects were undertaken by the Delhi Sultans. Dams were erected by Ghiyath al-Din Tughluq and Muhammad Tughluq

to contain rain water at Tughluqabad and Jahanpanah, in south Delhi, for irrigation and domestic use. Firuz Shah incorporated a dam into the elaborate water system at Wazirabad, which also included a canal and bridge, designed to improve the agricultural production of the land of north Delhi. He commissioned another dam, near the village Mahihpalpur, a few kilometers west of the Quwwat-ul Islam mosque.³¹ Another significant component of royal patronage of waterworks was the excavation of canals. Canals were primarily constructed to improve irrigation. Excavation of new canals and repair of old ones in northwest India was recorded at the end of the thirteenth century, in the reign of 'Ala al-Din Khalji.³² Firuz Shah Tughluq pursued an ambitious program of canal building in the region around Delhi and for the new city of Hisar-i Firuza that he built northwest of Delhi. The canals improved the water supply, and large tracts of waste land were brought under cultivation.³³ A ten percent tax on the increased agricultural production added considerable revenue to the Sultan's treasury.³⁴ Some smaller canals were built by provincial governors, nobles and wealthy landowners.³⁵ Royal patronage was also directed towards the construction of urban reservoirs such as the Hauz-i Shamsi, built by Altamsh in 1230, and the Hauz Khas, built by 'Ala al-Din Khalji at the end of thirteenth century. Maintenance, repairs, and additions to these reservoirs were carried out by succeeding rulers.

Royal patronage of hydraulic projects is better documented than is patronage by lesser individuals. Contemporary documents, such as the *Tarikh-i Firuz Shahi* of 'Afif, or Firuz Shah's own *Futuh-at-i Firuz Shahi*, that record the construction of canals,

dams, and reservoirs,³⁶ were primarily concerned with recording the deeds of the rulers and, generally, we can only infer information about the lives of the populace. There is little direct evidence about the patronage of the Sultanate *baolis* in Delhi. They are not mentioned in the contemporary histories and there are few extant epigraphical records. For the most part, determining the patterns of patronage and use of the Delhi stepwells depends on an extrapolation from information about *baolis* elsewhere in India, from the few epigraphs, and from association with other buildings.

Epigraphs on *baolis* and wells can provide valuable information on patronage, although the details may be incomplete. Many inscriptions simply give a date of construction, the type of structure, and the name of the builder, and frequently the epigraphs are fragmentary. A common difficulty in interpreting the epigraphical evidence is that the inscription may be the only extant record of a person, and all that remains is a name. For example: an inscription, now in the Peshawar museum, attributes the construction, in 1090, of a well in the Punjab to one Abu Ja'far Muhammad, son of Abdul Jabbar, son of Muhammad, native of Jurjan.³⁷ There is no further information on who Abu Ja'far Muhammad was, nor any description of the well. More inscriptions have survived from the late than from the early Sultanate. Wells and *baolis* were built in the early Sultanate, but there are more remaining structures and epigraphs from the later period.

The type of waterwork referred to in an epigraph, or in an historical account, may be difficult to determine. Since many epigraphs are on loose tablets in museums it can be impossible to accurately describe the

structures they came from. Frequently there is no description of the structure, and terminology is sometimes used loosely. For instance: the inscription on the large stepwell in Ahmadabad, known as Dada Harir *vav*, refers to the structure simply as a well, not as a stepwell.³⁸

Inscriptions on wells built by Muslim patrons during the Sultanate are usually in Persian, and will be assumed to be so unless otherwise stated.

Aristocratic Patrons

The construction of stepwells in the Sultanate was supported by diverse patrons. Numerous stepwells were endowed by the nobility, many of whom had positions in the government. In 1324 a stepwell was constructed in the district of Aurangabad by a nobleman, who is identified only as Muhammad.³⁹ A fief-holder who was the son of the chief superintendent of the royal stables excavated a tank during the Tughluq dynasty.⁴⁰ An epigraph, from Gulbarga, dated 1367, located on the wall of a stepwell situated in the tomb precinct of a saint, records the construction of the *baoli* by Abu Muhammad Tabrizi, who is designated the Chief of Turks.⁴¹ Another inscription from Gulbarga, located over the main entrance of the Badi mosque, states that Rajab Jalal, the prefect of the Audience Hall (*shahna-i-Bar*), built the mosque and a stepwell in 1373.⁴² The inscription on the Navalakhi stepwell at Baroda assigns the design and completion of the building to Zafar Khan, son of the governor of Gujarat, in 1405.⁴³ A pavilion, a stepwell and a garden were established at Fatehabad, near Chanderi in 1497 by Malik Ladan, the king's minister.⁴⁴

Women Patrons

Noblemen were not the only patrons. Several stepwells were commissioned by noble women. The custom of women endowing stepwells pre-dates the Islamic conquest. In northern Gujarat, near the town of Patan, is a large stepwell known as the Ranki Vav. It was commissioned (c.1063) by Udayamati, the widow of king Bhimadeva who ruled northern Gujarat in the middle of the eleventh century.⁴⁵ An inscription from Vasantgarh in Rajasthan records the renovation of a stepwell in 1042 by Lahini, the widowed sister of King Purnala of the Paramara dynasty of Candravati.⁴⁶

In 1331, a lady named Kad Banu, identified as the wife of Iran Shah and daughter of Sayyid Shams al-Din Tasin al-Alawi Tabataba, commissioned the construction of a well or water-tank, which was financed from the proceeds of her personal property.⁴⁷ A well was built in 1435 at Nagaur, in Rajasthan, by a widow named Hatim Khatun.⁴⁸ A bilingual epigraph, in Persian and Sanskrit, now in the State Museum, Hyderabad records the construction of a stepwell in 1444, by a lady known as Makhduma-i-Jahan Bibi Shahnaz. The inscription further states that she was the mother of Khan-i-Mu'azzam Mahmud Khan, who was in charge of Mahur, although it is not clear what Mahur refers to. The inscription also records the lineage of the king, Ahmad II (r.1436-1458) of the Bahmani dynasty. The Sanskrit inscription mentions the victory of Ahmad Shah over Deva Rai of Vijayanagara.⁴⁹

In the late fifteenth century a large and elaborate stepwell, now known as Dada Harir *vav*, was commissioned by a woman, Bai Sri Harir, who was the general superintendent of the king's harem.⁵⁰ The stepwell, situated to the northeast of Ahmadabad, in Gujarat, was completed in

1499.⁵¹ Dada Harir, like the previous example, has two inscriptions: one in Sanskrit and one in Arabic. In 1499 another stepwell was also commissioned by a woman. Rudabai *vav*, was constructed on the outskirts of Adalaj, a village 18 km north of Ahmadabad, by Rudadevi, the wife of king Virasimha, the ruler of the area where the stepwell is located.⁵² It is apparent from these examples that the women, both Hindu and Muslim, who endowed these projects were highly placed and wealthy members of the nobility.

Other Patrons

A variety of other people also commissioned stepwells. A *baoli* built on the site of a natural spring located within the precinct of a tomb at a Sufi dargah, near Gulbarga, is ascribed to Khudawand Khan, a descendant of the Prophet.⁵³ At the town of Tarapur, near Mandu, a merchant laid out a garden and excavated a well in 1482.⁵⁴ The patron of Mal Baori, a stepwell built outside one of the gates to the city of Bijapur, is identified only as a resident of the city.⁵⁵ There is a record, from the Mughal period, of a mosque, a well and a tank that were built by Kalol Bai, who is identified as a singer.

Some wells were built by more than one person. Two men established a mosque, a garden and a stepwell at Chanderi in 1462. One was the son of a government official and the other was identified as a learned man, mentioned in the epigraph as the second Imam Abu Hanifa.⁵⁶ A stepwell built in 1505 in Baroda was commissioned by two brothers.⁵⁷

Masons

The epigraphs seldom identify the workers who actually built the wells. The inscription on the Dada Harir *vav* states: “At the building of the well, the overseer [was] His Majesty’s servant Malik Sri Bihamad”. Several other individuals are also named but their functions in the construction of the well are not clear.⁵⁸ The Rudabai stepwell at Adalaj was built by “the best of masons...Marana, son of Bhima, Srimali by caste...”⁵⁹ An inscription from a *baoli* near the fort at Raichur in Karnataka records the construction of the stepwell by one Aba Haji Baqi, and identifies the mason as Ahmad, son of Muhammad.⁶⁰ He was probably the foreman of the work. The supervisor of the construction of the stepwell of the two brothers in Baroda is identified as Nuh, son of Musa Barodari (i.e. of Baroda), indicating that he was a local craftsman.

Patrons of Delhi *baolis*

Information on the patronage of the Sultanate *baolis* in Delhi is limited. The patrons of only a few stepwells are identified or can be surmised. The Nizamuddin *baoli* (c.1321) is attributed to Nizam al-Din Auliya. It was built during the initial construction of the dargah, and the whole complex was under the general patronage of Nizam al-Din. However, we do not know if the whole complex was financed by one person or by several people. The later additions of secondary structures to the *baoli* means that, in its present form, there have been several patrons.

In 1488, Basti Khan, “a man of importance in the reign of Sikander Lodi”⁶¹ (r.1489-1517), built a mosque, a tomb and a *baoli* about 2 km southwest of the dargah of Nizam al-Din.⁶² The *baoli* is now in ruins.

A second stepwell of the Lodi period, Rajon-ki Baoli, also has a named patron. The construction, in 1506, is attributed to Daulat Khan, a nobleman of Sikander Lodi's reign. The inscription on the chhatri in the courtyard of the attached mosque reads: "In the reign of...Sikander Shah...[this pavilion was] built by the slave, who hopes for the mercy of the Protector, Khan Daulath, son of Khwajah Muhammad".⁶³ The inscription apparently refers to the chhatri, and not necessarily to the *baoli*. K.V.S. Rajan, in *Islam Builds in India*, suggests that the mosque is an addition to an earlier *baoli*, although no evidence is given for this argument.⁶⁴ The decorative scheme of the complex is coherent throughout, suggesting that, in its present form, it had a single patron.

Not all the Sultanate waterworks of Delhi were built by Muslim patrons. Three Sanskrit inscriptions record the construction of wells by Hindus at villages in the Delhi area. The inscriptions are on detached tablets, and the wells are not described. One was a *baoli* excavated in 1276 by a wealthy landowner at Palam, west of Delhi.⁶⁵ The other two wells were established during the reign of Muhammad bin Tughluq (1325-1351). One was commissioned by a Brahmin at the village of Naraina, west of Delhi, in 1327.⁶⁶ The next year, the third well was excavated at Sarban, south of Delhi, by two brothers.⁶⁷ The three inscriptions are similar.* The first verses invoke the blessings of one or more of the gods; these are followed by a brief history of Delhi and a lineage of the founder.

* The complete wording of the inscriptions is given in Appendix 2.

Social Function

The primary function of stepwells is to supply water. Traditionally the water was used “in households and for personal needs like washing clothes and bathing, [and] also for watering animals and irrigation of fields.”⁶⁸ The stepwells located near settlements also served as cool and pleasant retreats from the heat of the day for both local villagers and for travellers. Stepwells located outside settlements on major roads were comfortable stopping place, supplying shelter and water for travellers and their animals.⁶⁹

The epigraphs clearly indicate that the water was intended for public use, for instance the Dada Harir well was “for the use of the eighty-four lakhs of the various living beings, [viz] men, beasts, birds, trees, etc. who may have come from the four quarters, and are tormented with thirst.”⁷⁰ An epigraph from Champaner (Gujarat) records the donation, by a noble in 1500, of a mosque and stepwell and includes a hadith:

And the Prophet - may God's blessings and peace be upon him - has said: he who excavates a well, from which the thirsty among the genii, mankind and birds cannot quench their thirst, God will render him thirsty on the Day of Resurrection.⁷¹

This inscription reiterates the right of free access to water. The *baoli* of Mukhduma-i-Jahan Shahnaz was designated for public use, as was the well of the two brothers of Baroda. The inscription on the well of Hatim Katun specifies that it was for the use of Muslims. Residents of the tomb precinct and visitors to the saint's tomb benefited from the stepwell established by Abu Muhammad Tabrizi in 1367.

Providing relief to travellers was an important function of the *baolis*.

The Palam *baoli* was excavated, “with a view to remove the exhaustion of tired travellers”⁷² and the Naraina well was also built for wayfarers. Two stepwells located near the city gates of Bijapur, the Mal Baori and the Biwi Bandi-ki Baoli, were built for the use of travellers to and residents of the city.⁷³ A serai, with a *baoli* and a garden, was established by Qazi Ibn Mihran, a government official, at Chanderi in 1485⁷⁴ and the association of the stepwell with a serai suggests that it was intended for travellers. Travellers could also find relief at Dada Harir *vav* “at a place where four roads meet, crowded with good men, who come from the four quarters”.⁷⁵ Because water is an essential wells, whether simple shaft wells or stepwells, were important places for social gathering; people had to come to the well for water and would meet other members of the community, or travellers there. The cool and shaded retreats of the stepwells would be good place to rest and exchange news.

References to the quality of the water of the *baolis* were often included in the inscriptions. “Men, even when overpowered by many evils, are made to smile”.⁷⁶ after drinking the water of the Palam *baoli*. The epigraph on the Naraina well asks: “Is this the water of the celestial river - cool, sweet and wholesome?...Thus exclaims the crowd of wayfarers when they proceed home, after drinking the sweet clear water of this well.”⁷⁷ Two inscriptions on the Battisi Baoli (c.1485) at Chanderi extol the excellence of the water. The first declares “The sugar of Egypt and the sugarcandy of China are not so sweet [as its water]. How can sugarcane come up to its sweetness even though it is sweet?...[This *baoli*] is Zamzam⁷⁸...all around is the sweet-smelling garden... Perhaps Paradise has appeared in the world”.⁷⁹ The second inscription also praises the purity of the water: “At times, the heart of the stream of

Kauthar⁸⁰ turns to water due to jealousy of its pure water; at other times, Zamzam is immersed in perspiration upon its forehead on account of envy...He who has desire to be favored with a glimpse of the Paradise, let him come and rest here for a while, because Paradise is like this.”⁸¹

Endowing a stepwell was a charitable act. The patron, Nasir, of a *baoli* in Bidar “possesses innumerable virtues and [his] charity is [ever] increasing.”⁸² The two patrons of a *baoli* at Chanderi are said to have commissioned many such works of public utility.⁸³ Bai Sri Harir “built this well [Dada Harir *vau*] at great expense, in order to benefit the world.”⁸⁴

Stepwells would have been expensive to build, and wealthier patrons could afford to build larger and more elaborate structures. Construction of a *baoli* could take several years, the Battisi *baoli* at Chanderi took three years to complete,⁸⁵ and the work would have to be planned because excavation and construction could not be carried out during the rainy season. Once the well was finished maintenance would have been an additional expense; the wells needed to be kept clean, accumulations of silt and debris had to be removed and repairs had to be done.

There is no question that the wells were important public facilities and that their construction fulfilled a real need. But there were more benefits than just provision of water. These acts of charity, while benefiting the general public, were also meant to reward the builder. Wells were intended to be a public record of the patron’s charitable nature and sense of social responsibility. There was social merit obtained through public recognition of the patron’s charity. This function is stated succinctly in the Dada Harir inscription: by building “forts, pure

groves, pools of water by the hundreds, and feeding houses step by step, the wealthy earn merit.”⁸⁶ There are specific statements of the ultimate benefit that the patron anticipated through establishing the well:

On the Palam well:

May this be to the welfare of the noble Udhdhara Thakkura for the enjoyment of all the sweets and pleasures of this world in the company of his wives and sons and friends and dependents...for the fulfillment of his good in heaven and for his emancipation⁸⁷

On the Naraina well:

Sridhara caused a well to be made for the gratification of his forefathers...may good happen of this⁸⁸

On the Sarban well:

Khetala and Paitala, with the view of their deceased ancestors attaining to imperishable Heaven and for the continuation of their race, caused this well to be made... may this well and its author with his family exist for a long time.⁸⁹

A patron received public recognition by building a stepwell, but, whether for Hindus or Muslims, religious merit was far more important than social approbation. The inscription on the *baoli* of Nasir in Bidar concludes with the entreaty “May God accept this charitable institution and may its builder ever last!”⁹⁰ Bai Sri Harir built the stepwell “in order to please God”. This function of the stepwells preceded the Delhi Sultanate. In 1045, a number of Brahmin residents of Bhundipacha village “caused a stepped well to be constructed to acquire worldly fame as well as spiritual satisfaction.”⁹¹ The association of waterworks with merit has a long history in India; an inscription recording the repair of a dam in Gujarat, in the years 456-457, states that the king undertook the

repairs to benefit “the cows and the Brahmanas for a thousand years and to increase his religious merit and fame, without oppressing the inhabitants of the town and country by taxes, forced labour...[he spent] a vast amount of money from his own treasury....”⁹² Through charitable donations the patrons sought spiritual benefit for themselves or for others. Acquisition of merit may not be always be explicitly stated but there are enough references to pious motivations that we can assume it was a factor in the construction of most stepwells.

In some instances, the stepwells were commissioned as commemorative monuments, and so served both as worldly memorial and as spiritual benefit. In ancient India the practice of digging wells in memory of dead relatives was widespread. An inscription dated 532, recorded that Daksa, an official of the court of Mandasaur, excavated a well to honour his dead uncle.⁹³ The renovation of a stepwell by Lahini, in 1042, was carried out following the death of her husband. The Ranki *vav* at Patan was commissioned after the death of the king.⁹⁴ The Rudabai stepwell at Adalaj was built by the queen “in order that her (deceased) husband might attain to the world which is the abode of the gods.”⁹⁵ The commemorative function of stepwells built for Muslim patrons is not usually explicitly stated. A well, built by a Shi’a patron,⁹⁶ at Bidar dated 1673 has the following inscription: “By the grace of God this well dug and called Husain Ba’in in memory of Hadrat Husain, the martyr...Drink a mouthful of water in memory of Husain”.⁹⁷ This well was intended as a pious memorial. The reference is particularly poignant because the *Husainiyyah* dramas about the martyrdom of Husain include specific references to the shortage of water and the thirst of

Husain and his small group of followers at Karbala.

While it is not possible to name individual patrons for all the Sultanate *baolis*, we can place them in a cultural context. From the preceding discussion it is clear that stepwells were more than simply sources of water, although this was always the primary function.

Most of the *baolis* in Delhi are associated with other buildings, usually tombs or mosques. Stepwells located within a tomb or mosque precinct were probably built concurrently with the other buildings. But it is possible that different structures at the same site were endowed by different patrons. In some instances, such as the dargah of Nizam al-Din, there have been additions to the site over a long period. The stepwells, associated with tombs and mosques, provided water for the residents of the sites and for visitors. The number of *baolis* associated with religious sites in the Delhi area may be a reflection of the density of the urban population and the number of tombs and mosques in the area. It is not clear if the association of stepwells with Muslim holy sites is related to the fact that many Hindu stepwells incorporated shrines within the well. The construction of a *baoli* within a tomb precinct may have served a commemorative function.

Not all the Delhi *baolis* were associated with shrines. The location of Gandhak-ki *baoli*, outside the city walls of Lal Kot, suggests that it may have been built for travellers to the city or for residents of a suburban village. Two *baolis*, one to the west and the other to the northwest of Tughluqabad, may have been constructed for people travelling between Tughluqabad and the other urban areas of Delhi. The stepwell south of Hauz Rani, outside the south wall of Jahanpanah, may have also been

for people coming to the city. The wells did not have single purposes, and those located within tomb precincts would also have served the local population and travellers.

Not all the well monuments were for public use. The large tanks in the palace and upper town of Tughluqabad would not have been accessible to the general population but only to the residents of the citadel. The circular retreat well at Firuz Shah Kotla was probably restricted to members of the royal court. Its location within the palace precinct and its innovative form suggest that it was built under the personal patronage of Sultan Firuz Shah, well known for his interest in architecture and for many innovative commissions. In general, the retreat wells are situated in more restricted or private locations than are the *baolis*. The Bhamaria retreat well, at Mehmudabad in Gujarat,⁹⁸ was probably located in a pleasure garden and may not have been readily accessible to the general public.⁹⁹ The Mughal retreat well in Agra Fort is located next to one of the royal residences, suggesting that it was intended for private use. The location of these structures, as much as the design, sets them apart from the *baolis*.

Stepwells were part of the architectural development of the Sultanate from the earliest period. The Muslims, coming from arid lands, would have been quick to appreciate the value of the indigenous waterworks of their new territories.¹⁰⁰ This is in contrast to many later Europeans who viewed the *baolis* as curiosities or unsanitary holes.¹⁰¹ Patronage of stepwells was not restricted solely to Muslims or solely to Hindus but regularly included patrons from both communities, as well as from the Jains; it is important to note too, that inscriptions often offer

very precise information about sectarian adherence within particular faiths: thus the 1673 stepwell inscription in Bidar is careful to indicate that the well was built by a Shi'a patron as an act of piety to commemorate the martyred Husain, and the inscription of the Rudabai stepwell at Adalaj takes pains to indicate the caste of the mason. Despite the apparent differences, and sometimes violent conflicts, between the ruling Muslims and the indigenous Hindu population, there was extensive cultural synthesis during the Delhi Sultanate. Stepwells are an excellent example of this synthesis; not only were they built by members of both communities, but the occurrence on some wells of inscriptions in two languages suggests that they were also used by a wide spectrum of society. Stepwells were readily adopted as part of Sultanate architecture and provide a unique architectural link between the two cultures.

Chapter 5: Notes

- (1) The *Laws of Manu* were composed sometime between the first century B.C. and the second or third century A.D.. They were based on an earlier *Manava Dharma Sutra*, a didactic collection of sayings that laid out the principles of moral conduct.
- (2) F. Max Muller, *The Laws of Manu: The Sacred Books of the East XXV*, translated by G. Buhler, (Oxford, 1886 (reprinted 1969)), 392.
- (3) Muller, 392.
- (4) Muller, 106.
- (5) Muller, 298.
- (6) Muller, 164. Also D. A. Caponera, "Water laws in hydraulic civilizations," in G.L. Ulman (ed), *Society and History* (The Hague, 1978), 99.
- (7) Muller, 165.
- (8) C.T.M. Kotraiah, "Irrigation in Ancient India", *New Trends in Indian Art and Archeology* Vol.II: 371-381.
- (9) Kotraiah, 373.
- (10) William H. McNeill and Jean W. Sedlar, (eds) *Classical India* (New York, 1969), 26.
- (11) Kotraiah, 374.
- (12) Uma Shankari, "Major problems in minor irrigation: Social change and tank irrigation in Chitoor district of Andhra Pradesh", *Contributions to Indian Sociology* n.s. 25(1): 1991, 96.

- (13) Burton Stein, "The economic function of a medieval South Indian temple," *Journal of Asian Studies* 19(1960) 176.
- (14) E. R. Leach, "Hydraulic Society in Ceylon", *Past and Present* 15(1959), 14.
- (15) Leach, 6.
- (16) D.A. Caponera, *Water Laws in Moslem Countries* (Rome, 1954), 15.
- (17) Quoted in Caponera, 15.
- (18) Caponera, 16.
- (19) Caponera, 16.
- (20) Caponera, 16.
- (21) Caponera, 16.
- (22) The regulations are covered in more detail in M.J.L. Young, "Water in classical Islamic law," in *Encyclopedia of Islam* (Leiden, 1965), Vol. 5, 860; D. Caponera, *Water Laws in Moslem Countries*.
- (23) S. D. Walters, *Water for Larsa: An Old Babylonian Archive Dealing With Irrigation*, (New Haven, 1970)
- (24) R. Hillenbrand, "Islamic art at the crossroads: east versus west" in A. Daneshvari (ed), *Essays in Islamic Art and Architecture in Honour of Katherine Otto-Dorn* (1981), 68.
- (25) A.K.S. Lambton, "The qanats of Qum", in P. Beaumont, M. Bonine, and K. McLachlan (eds), *Qanat, Kariz, and Khattara: Traditional water systems in the Middle east and North Africa* (Cambridge, 1989), 167.
- (26) D. R. Hill, "Information on engineering in the works of Muslim

geographers”, *History of Technology*, 9(1984), 136.

(27) E. B. Moynihan, *Paradise as a Garden in Persia and Mughal India* (New York, 1979), 40.

(28) Quoted in C.E. Bosworth, “A pioneer Arabic encyclopedia of the sciences: al Khwarizmi’s Keys of the Sciences, *Isis*, 54 part 1 (1963), 98-99.

(29) Hill, “Information”, 134.

(30) A.K.S. Lambton, *Continuity and Change in Medieval Persia*, (New York, 1988), 159.

(31) Shams-i Siraj ‘Afif, *Tarikh-i Firuz Shah-i* (translated in H. M. Elliot and J. Dowson, *The History of India as told by its Own Historians*, Calcutta, 1953) p.96. ‘Afif names six dams, including Wazirabad and Mahihpalpur, and refers to several others that are not named.

(32) I.H. Siddiqui, “Water works and irrigation system in India during pre-Mughal Times”, *Islamic Culture* 1984, 12-13.

(33) Waste land generally refers to areas that were not previously under cultivation.

(34) According to ‘Afif, 36-37, Firuz Shah convened an assembly of “judges, lawyers, and doctors” to seek approval for the tax. The council unanimously authorized the tax.

(35) Siddiqui, 12-15.

(36) The information in the histories is limited. Most of it is just a list of what was built, without information of what the structures looked like, or even where they were located.

(37) V.S. Bendrey, *A Study of Muslim Inscriptions* (Bombay, 1944), no.94

(38) Jutta Jain-Neubauer, *The Stepwells of Gujarat* (Humanities Press, 1981), p. 78. The problem of determining the type of structure is compounded when inscriptions are only available in translation.

(39) *Indian Archeology* 1964-65, 68.

(40) *Indian Archeology* 1962-63, 61.

(41) Z. A. Desai, *A Topographical List of Arabic, Persian and Urdu Inscriptions of South India*, (New Delhi, 1989), 55, inscription no. 559.

(42) Desai, 55, inscription no. 561.

(43) Jain-Neubauer, 80.

(44) *Indian Archeology* 1962-3, 57.

(45) Kirit Mankodi, *The Queen's Stepwell at Patan* (Bombay, 1991) says that construction began in 1063 following the death of the king, 5. Previous estimates placed it about twenty years earlier. J. Jain-Neubauer, *Stepwells of Gujarat*, 33-34.

(46) Mankodi, 234.

(47) *Indian Archeology* 1956-7, 42.

(48) *Indian Archeology* 1965-66, 73.

(49) Desai, 16, inscription no. 163.

(50) Jain-Neubauer, 78. Her name suggests that she may have been a Hindu, but there is no record that clarifies this.

(51) The dating is controversial. The date recorded in the Sanskrit

inscription corresponds to 1499, while the date in the Arabic inscription corresponds to 1490. Jain-Neubauer, 41. It is possible that there was an error in one of the dates, or that the dates refer to different parts of the construction. 1499 is usually accepted as the date of completion.

(52) Jain-Neubauer, 58 and 79.

(53) Desai, 139, inscription no. 1419. The inscription is dated 1425-6.

(54) *Indian Archeology* 1972-2, 63.

(55) Desai, 25 inscription no. 266. This well was built in 1583, so it is later than the Delhi Sultanate period.

(56) *Indian Archeology* 1962-3, 56.

(57) *Indian Archeology* 1962-3, 56.

(58) Jain-Neubauer, 78.

(59) Jain-Neubauer, 79.

(60) Desai, 132 inscription no. 1354. The well was built in 1501.

(61) Carr Stephen, *Archeology and Monumental Remains of Delhi* 1876 (Allahabad, 1967), 164.

(62) R. Nath, *Monuments of Delhi* (New Delhi, 1979), 44.

(63) Quoted by Carr Stephen, 169-170. The date in this source is given as 922 A.H. (1516), however, 1506 is accepted as the date in most other references.

(64) K. V. Rajan, *Islam Builds in India* (Delhi, 1983), 159. One fact that might support the suggestion is that the *baoli* walls and the mosque are not parallel. The qibla wall is set at a 20 degree angle to the side walls of

the *baoli*. This may have been a response to the intrusion of native rock in the *baoli* excavation. Such intrusions are obvious in the east wall of the tank and may have dictated the position of the *baoli* tank.

(65) R. Mitra, "Note on the Palam *baoli* inscription", *Journal of the Asiatic Society of Bengal* 43(1874) pt.1, 104-10.

(66) A.M. Husain, *The Rise and Fall of Muhammad bin Tughluq* (Delhi, 1972), 244-246.

(67) Husain, 246-247.

(68) Jain-Neubauer, 4.

(69) Jain-Neubauer, 4

(70) Jain-Neubauer, 78.

(71) W.E. Begley, *Monumental Calligraphy from India* (Villa Park, Illinois, 1985), 68.

(72) Mitra, 107-108.

(73) Desai, 25, inscription nos. 264, 266.

(74) *Indian Archeology* 1963-4, 56.

(75) Jain-Neubauer, 78.

(76) Mitra, 110.

(77) Husain, 246.

(78) Zamzam is a sacred well located near the Ka'ba in Mecca.

(79) Quoted in Nath, *Chanderi*, 51.

(80) Kauthar is a river in paradise.

- (81) Nath, *Chanderi*, 51.
- (82) G.Yazdani, *Bidar: Its History and Monuments* (London, 1947), 147.
The date of the inscription is 1446.
- (83) *Indian Archeology* 1961-2, 88.
- (84) Jain-Neubauer, 78.
- (85) *Indian Archeology*, 1961-62, 88.
- (86) Jain-Neubauer, 78.
- (87) Mitra, 108.
- (88) Husain, 245.
- (89) Husain, 247.
- (90) Yazdani, 147.
- (91) Brijendra Nath Sharma, *Social and Cultural History of Northern India c.1000-1200 A.D.*, (Delhi, 1972), 136. The precise location of the village is not indicated.
- (92) *Epigraphica Indica*, vol.VIII, 49. Quoted in Kotraiah, *Irrigation*, 377.
- (93) Mankodi, 234.
- (94) Mankodi, 235.
- (95) Jain-Neubauer, 79.
- (96) Bidar was a centre of Shi'ism in the 17th century.
- (97) Yazdani, 197.
- (98) Jain-Neubauer, 67-68. This well dates from the late 15th or early 16th century

(99) J.A.S. Burgess, *Muhammadan Architecture of Baroch, Cambay, Dholka, Champanir and Mahmabad in Gujarat* (Delhi, 1971), 46-47

(100) Afghanistan, the homeland of the Ghurids, has a rugged terrain and a harsh climate. Mountain ranges traverse the centre of the country, and arid and semi-arid steppelands surround the mountains in the north, west and southwest. Only about 22% of the land is arable, and most of that requires irrigation to support agriculture. Several major river systems have their source in the mountains, but the steep mountain valleys are not suitable for agriculture. Many smaller rivers and streams are seasonal, and dry up in the summer months. Except in the most eastern mountain ranges, which receive an annual average of about 400 mm precipitation from the monsoon, rainfall is low. Average annual precipitation at Ghazni (the capital of the Ghaznavid and Ghurid empires) is 215 mm, approximately one third the average rainfall at Delhi.

(101) In many travellers' diaries *baolis* are noted as 'jumping wells' where men would jump into the water to collect coins. Jain-Neubauer, p. 3 notes that in the nineteenth century the English authorities ordered the closure of numerous wells considered to be health hazards.

Conclusion

It is clear that the hydraulic architecture of Sultanate Delhi is of both cultural and architectural significance. The need to obtain and store water transcends faith, wealth and social position.

The heavy rains of the four months of the summer monsoon are the primary source of water for most communities in north and west India. Periodic droughts and famines have been a major problem throughout India's history, and several major droughts were recorded during the Delhi Sultanate. The water supply demands of the large urban population of the imperial capital led the Delhi Sultanate rulers to commission the construction of large dams and reservoirs within the Delhi triangle. These imperial commissions were an integral part of the growth of the city: they supplied water for the urban population, contributed to imperial prosperity and fulfilled charitable and religious duty. The sultans were not the only builders of waterworks. Men and women of the aristocracy, wealthy landowners and others were motivated by charity and social responsibility, and the need to acquire religious merit to commission the construction of stepwells.

It is perhaps difficult from a modern view, and since many of the wells have fallen into decay, to understand how important the *baolis* were. The distinctive structure of the *baolis* is a response to the arid climate of western and northern India. In the climatic extremes of the monsoon the stepwell is eminently practical, providing both fresh water and a water cooled retreat from heat and dust. The deep, narrow tank

protects the water from prolonged exposure to the direct sun and thereby reduces the rate of evaporation. The staircase in the tank allows easy access to the water as the depth of water changes with the different seasons. The shaded galleries in the tank or between the tank and the well shaft remain at a relatively constant temperature and humidity.

These unique underground structures were developed in western India as early as the 7th century A.D.. Although they had their origin in utilitarian need and practical design the *baolis* are elaborated with decorative details and architectural elements that are consistent with other representatives of regional architecture. When the Ghurids captured Delhi in 1192, and then established the city as the centre of a new empire, they laid the foundation for a cultural synthesis that is evident in the architecture of the period. Integration of indigenous and foreign elements can be seen in the adaptation of local building techniques and decoration on imported building types, such as mosques, and, on the other hand, the adoption of the indigenous stepwells by the Muslims. The continuity of design elements in buildings of all types constructed in Delhi during the Sultanate indicates that the *baolis* were part of the mainstream of architecture of the period.

The previously published studies of the Sultanate *baolis* by Matsuo Ara were primarily descriptive catalogues of the main architectural features of the stepwells. In this thesis I have enlarged on his initial research by considering the *baolis* in historical, urban, architectural and social context. As in many areas of research, each new study makes it obvious that further work is needed. Excavation of the *baolis* that have been filled in or partly destroyed would be very useful; this would give a

more complete picture of the variations in structure and detail of the Sultanate period stepwells.

The *baolis* are an important reminder that architecture is an interaction of utility and aesthetics. And that in the study of architectural history all of the components - the aesthetic, the social and the technological motivations - must be considered as a whole.

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Appendix 1: Catalogue of Delhi Sultanate Stepwells.

While the descriptions in this list are the author's own, to maintain continuity between studies the *baolis* are described here in the same order used by Matsuo Ara in "The *baolis* of the Sultanate period in Delhi: Historical studies on the monuments of the Delhi Sultanate period (V)," *The Memoirs of the Institute of Oriental Culture (Toyo Bunka)* 44(1967): 1-108 (in Japanese).

I. Gandak-ki Baoli. This *baoli* is located approximately 700 m southwest of the Qutb Minar. It is rectangular structure, of ashlar finish, with the stairs on the north end and the well shaft at the south end. The tank is divided into five levels. Built in the early 13th century, during the reign of Altamsh. (fig. 4, 5, 6).

II. *Baoli* in the *dargah* of Nizam al-Din Auliya. Located in Nizamuddin West, south of Lodi Road. It is rectangular structure with the stairs on the north end. It does not have a separate well shaft. The tank does not appear to be divided into different levels. The side walls of the tank are decorated with widely spaced arched niches. Accessory structures surround the tank on all sides. Built c.1320-1325, during the reign of Ghiyath al-Din Tughluq. (fig. 9, 10).

III. *Baoli* of Muradabad Pahari. Located about 1.5 km west of Vasant Vihar and about 1 km south of Rao Tularam Road. This is a rectangular stepwell with the stairs on the south end and the well shaft on the north end. The stairs have all but disappeared and the bottom of the tank is filled with rubble. Three or four levels of arched galleries separate the tank from the shaft. The tank walls are divided into four or five levels.

The walls have a distinct batter and are finished with rows of regularly spaced arched niches. The *baoli* is rubble construction faced with plaster. Other buildings in the vicinity include a small mosque. Probably built in the Tughluq period. (fig. 13, 14).

IV. *Baoli* south east of Hauz Rani. Located about 2.5 km east of Qutb Minar, south east of the village of Hauz Rani and south of the south wall of Jahanpanah. It is a rectangular structure with the stairs on the south end. It is in very poor condition and is mostly buried. Remains of an above ground section of the east wall indicate it was rubble construction with a plaster finish. This section of wall has regularly spaced arched niches and a crenellated frieze at the top of the wall. Probably built in the Tughluq period. (fig. 15).

V. *Baoli* south of Chor Minar. It is located about 400 m north of Begampur mosque, south of Panchsheel Marg. It is a rectangular *baoli* with the stairs at the east end and the well on the west end. It is in very poor condition, and the number of levels is unknown. The arched gallery separating the tank from the well shaft is supported on plain square stone piers. A row of rounded brackets supported the eaves over the gallery arches. Probably built during Tughluq rule.(fig. 16).

VI. *Baoli* northwest of Tughluqabad. It is located about 1 km north of the north west wall of Tughluqabad. It is rubble stone construction, on at least three levels. The side walls have regularly spaced shallow arched niches. The wall between the tank and the well shaft has mostly collapsed; there was an arched opening flanked by two small arched niches. The wall was finished in smooth plaster. The eaves over the tank were supported by rounded, corbelled brackets. Probably built during the

Tughluq period. (fig. 17).

VII. *Baoli* west of Tughluqabad. It is located 2 km west of Tughluqabad and south of Mehrauli Badarpur Road. It is a rectangular *baoli* built of rough cut ashlar stone, that was covered with a plaster finish. The well shaft end is divided into four levels, with arched galleries separating the tank and well shaft. Square stone piers support the arches, and rows of rounded brackets support the eaves and gallery floors. Probably late Tughluq period. (fig. 18, 19).

VIII. *Baoli* south of Sultanpur. This *baoli* is located south east of the Mehrauli Gurgaon road. It is a rectangular structure with the well at the west end. On the east end there is a small, domed, octagonal pavilion on a broad paved platform at the top of the tank stairway. The tank is filled with dirt and only the top of the walls are visible; the depth of the tank is unknown. The walls are ashlar construction faced with a thin coating of plaster. On both sides of the top of the walls is a decorative crenellated frieze; there is a similar frieze on the base of the pavilion dome. Possibly 15th century. (fig. 20).

IX. Rajon-ki Baoli. Located in Mehrauli village about 150 m south of Gandak-ki Baoli. Rajon-ki is a large rectangular *baoli*, with three levels now visible, although there may have originally been a fourth level. The well shaft is at the south end and the steps at the north end open onto a broad paved platform. It is ashlar construction with a plaster facing. The extant plaster facing is decorated with carved or molded designs. Arched galleries separate the tank and the well shaft. The first level is above ground and consists of narrow rooms with arched openings to the tank. On the second level there are rooms on both sides of the south end of the

tank. A mosque and tomb located on a high platform adjoin the tank on the west side. Date of construction was 1506. (fig. 21-32).

X. Basti Baoli. This stepwell is located about 2 km south west of the dargah of Nizam al-Din, on the north side of Defense Colony. Almost nothing remains of this *baoli*. Descriptions from the 19th century indicate that it was a rectangular structure with the long axis running east to west.¹ There were several levels and rooms with arched openings on the side walls of the tank. The building was faced with plaster and had a decorative crenellated frieze at the top of the walls. The *baoli*, with an associated mosque and tomb, was located within a walled enclosure. The complex was built c.1488. (fig. 34, 35).

XI. *Baoli* at Mubarakpur Kotla. The *baoli* is located just northeast of the tomb of the Sayyid ruler Mubarak Shah (d.1434). It is a rubble built structure with several levels. The well shaft is located at the south end. The side walls are plain; arched openings lead from the tank to the well shaft. It was probably built about the same time as Mubarak Shah's tomb. (fig. 36).

XII. Ugrasen-ki Baoli. The *baoli* is located about 600 m southeast of Connaught place and just east of the intersection of Kasturba Gandhi and Atul Grove roads. It is large stepwell, with the well shaft at the north end. A section of the north end, between the well shaft and the main tank, is enclosed and covered with a roof creating a secondary tank. At the south end, at the top of the stairs is a raised platform with a small mosque. The *baoli* was extensively repaired in the 1920s. (fig. 38, 39) Further repairs were made after the survey by M. Ara in the 1960s. (fig. 40, 41) It is a rubble built structure, with at least two levels. The side

walls are decorated with rows of regularly spaced, shallow, arched niches. It was possibly built in the late Tughluq or in the Sayyid period. (fig. 37-46).

XIII. *Baoli* south of Wazirapur ka Gumbad. It is located about 1500 m west of Hauz Khas in Ramakrishnapuram colony. It is in a walled enclosure with several tombs. It is a small, rubble built *baoli* with two levels visible. The well shaft, on the south end, is flanked by two domed square pavilions. The side walls have regularly spaced arched niches. In the centre of the south wall is a large arched opening that leads from the tank to the well. Two small arches on the sides of the south end give access to narrow secondary stairways. The *baoli* has been extensively repaired. It was probably built in the late Sayyid or Lodi period. (fig. 47, 48).

XIV. *Baoli* at Adhchini. It is located about halfway between Hauz Khas and the Qutb complex and close to Aurobindo Marg. It is a small, almost square structure of rubble masonry, in very poor condition. The tank walls are plain. The well is in an enclosure with a shrine. It was possibly built in the 15th century. (fig. 49).

XV. *Baoli* north of the Qutb complex. This stepwell is located northeast of the Qutb area. Rubble built and faced with cut stone, the well is in very poor condition. It had at least three levels and the side walls had regularly spaced arched niches. It possibly dates from the 15th century. (fig. 50).

XVI. *Baoli* at Qila Rai Pithora. It is located in the southern section of the area of Qila Rai Pithora about 1 km south east of the Qutb Minar. It was

a large cruciform stepwell. It is in very ruinous condition, and it is difficult to determine any of the details. From its location it was possibly built in the early Sultanate.

XVII. *Baoli* at Qadam Shariff. This well was located within the shrine complex of Qadam Shariff in north Delhi, about 600 m northwest of the New Delhi Railway station. All that remains of the *baoli* is part of the top of the wall surrounding the well shaft. It may have been built in the Tughluq period.

XVIII. *Baoli* southwest of Mehrauli. This *baoli* is approximately 300 m southwest of Mehrauli village. Almost nothing remains of this structure. Date of construction is unknown.

Related Structures

XIX. Retreat well at Firuz Shah Kotla. This is a large circular building on two levels with a circular well shaft in the middle. The structure is rubble stone construction and both levels are badly damaged. Access to the interior is through narrow doorways on the east and west sides. On each side the entrances open onto a circular room with a domed ceiling. Narrow stairways lead down to the second level. The circular rooms of the upper level are supported on massive pillars creating ring shaped rooms on the lower level. On the north and south sides fan shaped rooms open onto the well shaft. There are regularly spaced, recessed, arched niches on the interior and exterior walls. This structure was presumably built during the construction of the palace citadel in the early 1350s.(fig. 51-54).

XX. Tank in the upper town of Tughluqabad. This is a large square tank

located within the city near the south wall of the fortress. Some of the cut stone facing remains on the north wall, the rest of the walls have deteriorated. On the north side, three corbelled stone beams, that presumably supported a platform or a wheel for drawing water from the tank, remain intact. There is no evidence of stairs or of a well shaft. The tank presumably was built during the construction of the city.(fig. 59).

XXI. Tank in the citadel of Tughluqabad. This is a very large, very deep tank. The walls are intact on the south, west and north walls; the east wall has collapsed. The walls are vertical with no division into different levels. It is possible that the east wall had stairs for access to the water. At the northwest corner, corbelled stone beams extend over the edge of the tank. Although there is no evidence, it is possible that the tank was a quarry during the construction of Tughluqabad.(fig. 60).

Notes:

- (1) Carr Stephen, *Archeology and Monumental Remains of Delhi* (Allahabad, 1967 (1876), 164; R. Nath, *Monuments of Delhi* (New Delhi, 1979), 44.

Appendix 2: Inscriptions of Sultanate period wells.

1. **Inscription on the Palam Baoli**¹

Sri Salutation to Ganapati Om ! Salutation to Siva

May, He who creates, protects, and destroys this (universe) -- may, He who irradiates and also immerses in illusion (the mind of) men -- may that Hara, who fulfils the desires of his votaries, be the destroyer of the travails of this world to you all !

Issuing from whose head the heavenly stream (Ganges) laves the empire in sanctity and prosperity, and, by her ever-undulating waves, serves as a *chauri* by his side -- over whom the rays of the white-rayed (moon) form an orb, like a soothing umbrella -- may that Samkara of illimitable glory be to your welfare !

The land of Hariyanaka was first enjoyed by the Tomaras, and then by Chauhanas. It is now ruled by Saka kings.

First came Sahabadin, then king Khudabadin then, Samasadin then Pherujasahi became king.

After him Jalaladin, and then were born king Maujadin, the auspicious, and noble king Alavadin, and the lord of the earth Nasaradin.

He for whom the earth, from Gauda to Gajjana, from the country of Dravida to the entirety of *Setubandha*, all the contented provinces in the great kingdom of *Saurajya*, bore vernal floral charms, produced by rays fo the innumerable precious stones and corals which dropped on it from the crowns of the bowed-down heads of kings who come to and fro for his service --

He, whose legions daily traversed the earth to both eastward at the confluence of the Ganges (*Gangasagara*) and westward at the confluence of the Indus with the sea --

He, under whose reign courtesans, proudly set of with many coloured riaments, moved about without fear, filling the air with the tinkle of their bracelets, produced by the wanton undulations of their hands --

He, the bewildering dust raised by the hoofs of whose cavalry marching in front of his army, overthrew his enemies in front -- even he, the lord of the seven sea-girt land, *Sri Hammira Gayasadin*, the king and emperor, reigns supreme.

When his horses swept over a high way, the glory of the dust produced by the pounding of the earth caused by their hoops, enveloped the quarters and the sky, and the grandeur of the Sun with his eternal rays generally so set that kings could not say whether it was day or night.

When he issued forth on a military expedition, the Gaudas abdicated their glory; the Andhras, through fear, besought the shelter of caves; the Keralas forsook their pleasurs; the Karnatas hid themselves in defiles;

the Maharashtras gave up their places; the Gurjjaras resigned their vigour; and the Latas dwarfed themselves into Kiratas.

The earth being now supported by this sovereign *Sesha*, altogether forsaking his duty of supporting the weight of the globe, has betaken himself to the great bed of Vishnu, (the ocean), and Vishnu himself, taking Lakshmi on his breast, and relinquishing all thought of protection, sleeps in peace on the ocean of milk.

The metropolis of this lord of many hundreds of cities, the charming great city, called Delhi fourishes like a crescent-headed arrow on the side of his enemies. Like the bowels of the earth, it is the store house of innumerable jewels; like the sky, a source of delight; like the nether regions, the abode of many Titanic heroes (*Daityas*); like Maya herself, the most bewitching.

In the city of Delhi, renowned under the name of Yoginipura, was born Udhdhara, a house holder, wise, liberal-minded, given to meritorious acts, master of innumerable good qualities, devoid of ever blemish.

Where the Vitasta, the Bipasa, and the Satadru, join in front with the uprising, unbroken, and swelling waves of the factor Chandrabhaga, where stood the friendly Sindu, with its affluents;

Whose waters when drunk, render the sweetness of honey and of sugarcane, the hydromel of heavenly nectar, even the lusciousness of knowledge, insipid, --

Where the land is laved by the nectar of that Sindhu and is pure and pain-assuaging; where the town of Uchchapuri reviles and laughs at Amaravati which stands by the side of heavenly Ganges, --

Even there was the abode of his father Haripala, whose father was Yasoraja, the father of the last Dallahara, whose father was Kipu, thus for his genealogy by the father side.

The mother of Udhdhara was Chandi, daughter of Prithu, whose father was Harischandra; the father of the last was Utsahana, the son of Sahadeva, who was the son of Tola.

The father of Tola was Vyaghrahara, who was the son of Simha and grandson of Gaura.

In the work entitled '*Vansavati*', the two genealogies have been given in detail; here in this record the names have been taken to the extent desired to recall them to memory.

Like the threefold will, and energy (the *Saktis* of the deity), his wife, with Rajasri and Ratnadevi, was Jajala, the eldest.

Her son was named Hariraja (pure in body, speech and mind, renowned, the abode of the sixty-four accomplishments, apparently, like Vishnu, the sole protector of the universe),

who had two brothers, named, Sthiraraja and Jaitra, and a sister Virada.

The daughter of the second wife was the liberal-minded Dhanavati.

Her (the second wife's) two sons were Gunaraja and Bhupati. Of the youngest wife, Ratnadevi, the son was Haradevanatha, and a daughter.

She had also another son, Uttamaraja, and a daughter named Sadali thus, we have here the root, stem, branches, fruits, and flowers of this tree of desire.

Numerous and extensive were the alms-houses (*Dharmasalas*) established by this performer of sacrifices (*Udhhdhara*) in different places. He, the wise, with a view to remove the exhaustion of tired travellers, caused a well to be excavated.

To the east of the village of Palamba and west of Kusumbhapura. He made the well, like a lovely woman with rotund upheaving breasts, georgeous with undulating necless, the assuager of the thirst of many a lovesick swain, decorated with the seried riches of flower-tufted plants, be to your gratification.

Through its effects men, even when overpowered by many evils, are made to smile. Priding on this power of assuaging fatigue, it appeared to philosophers like *Vidya* herself (divine knowledge which overcomes the tribulations of the mind).

May this be to the welfare of the noble *Udhhdhara Thakkura* for the enjoyment of all the sweets and pleasures of this world in the company of his wives and sons and friends and dependants; -- of the person with well-governed mind; of the faithful, for the fulfilment of his good in heaven and for his emancipation; of him who is devoted to the two feet of the crescent crested (*Mahadeva*).

This eulogium is composed by *Pandit* Yogisvara of unbroken fame, to record the origin of this well of *Udhhdhara*, the receptable of all blessings. In this year of *Vidramanka*, *Samvat* 1333, on the 13th of the wane, in the month of *Sravana*, Wednesday.

2. Inscription on the well at Nadayana²

1. Hail! He (*Ganesa*) who is known as the destroyer of every hindrance for those who bow down before him; who, being worshipped, fulfils here the wish of his adorers; he, the lord of obstacles, bears one prominent tusk like a terrible crystal staff for the destruction of the enemies of the gods.

2. May (the goddess) *Chandika*, who destroys the foes of the Lord of the gods, and stands on the shoulder of the buffalo (demon); she who is invoked by *Hari* (*Vishnu*), *Isa* (*Siva*) and the lotus-born (*Brahma*) for complete success, the protectress of my house who quickly bestows rewards on man and upholds the universe; may she prove destructive to your sinfulness !

3. There is a great and holy Inad named *Hariyana* where *Krishna* with *Pritha's* sons (the *Pandavas*) walked (among men) for the suppression of

sin.

4. Therein lies this town of Dhilli covered with innumerable jewels, whence sin is expelled through the chanting of the Vedas by the knowers of the sacred lore and which appears lovely by the knowers of the sacred lore and which appears lovely by the tinkling of anklets of lovely damsels even as the heavenly river (the Ganges) by the voice of geese.

5. There was the renowned Nahamuda Shahi (Muhammad Shah), the crest-jewel of all rulers of the earth; the mighty Saka lord (or according to another reading, Sakendra -- institutor of anew era), whose foes were overthrown by the valour of his arm, through fear of whom, when going to the hunting-park, the earth trembles, the ocean dries up, all quarters (*viz.*, the whole world) takes at once to trembling (as well as mountains and (his) foes.

6. There was formerly a merchant who with his family made his abode in the village of Nadayana -- Govinda-deva, skilled in many pious works....

7. Unto him was born a virtuous son Ratna (pearl), even as a pearl is born from the ocean, who, law-abiding, took the faithful Ganganasri for wife.

8. By her were born to the good Ratna these four famous sons: Gangadhara, Madhava, Lakshmana and one called Damodara.

9. The youngest among them, Damodara, having married the beloved Virada, begot Dhira-Deva. Krishna and other sons (to the number of) nine.

10. Among them the wise and virtuous Dhira-deva accomplished in every art and well-versed in mercantile pursuits, in buying and selling, was liberal in giving cattle, land, gold and garments.

11. He, having married a fair and fortunate lady named Dhani, begot two sons, Risada and Sudeva.

12. By his wife, Rajasri by name, Risada obtained two goodly sons, namely, one called Dullabha-deva and another Srivara.

13. The wise Srivara, versed in the law and devoted to the worship of the lotus-like feet of Srivar (Vishnu, the lord of Sri), married two wives, Kallya and Gangadisri.

14. Srivara had three accomplished sons -- Prithvidhara by his elder faithful wife, and the other two, Sridhara and Solhana by name.

15. On the east side of Indraprastha there is a village well known by the name of Nadayana; to the north of this village Sridhara caused a well to be made for the gratification of his forefathers.

16. Is this the water of the celestial river (the Ganges) -- cool, sweet and wholesome? Or is it nectar here by the immortals. Thus exclaim the crowd of wayfarers when they proceed home, after drinking the sweet clear water of this well.

The work of Madana. In the year 1384 (the month of) Bhadra

(pada), the third day of the dark fortnight on Thursday. May good happen of this!

3. Inscription on the Well at Saravala³

Hail ! Worship be unto that Lord of *Ganas* through constant devotion for whose feet men obtain the fruit of all their desires.

May be, who is called Satyala, together with Amba (Ambavati), protect you, that god by whose grace the faithful shall be a vessel of bliss !

There is a country, called Hariyana, a very heaven on earth : there lies the city called Dhillika, built by the Tomaras, --

Wherein, subsequent to the Tomaras, the Chahamana kings, intent on protecting their subject, established a kingdom, in which all enemies of public order were struck down.

There upon the barbarian Sahabadin, having burnt down the forest of hostile tribes by the fire of his valour, seized that city by force.

Thence forward that city has been in the possession of the Turashkas to this day : at present prince Sri Mahammad Sahi rules over it.

Now, in that city there is a family of merchants dwelling in Agrotaka : in this family was born the *Sadhu* (virtuous) *Sri Sachadeva* by name.

His son was Lakshmidhara, the bee of the Lotus-pair of (Vishnu)

Lakshmidhara's feet, whose mind was ever bent on the propitiation of the gods, Brahmans, and who obtained fame by his kindness to all beings.

Lakshmidhara had two sons, who were strangers to the *Kaliyuga* (time of Strife and Sin); both of them oceans of greatness, and of goodly form.

The first of them was Maha (or Maha) by name, of subtile-mind; and his younger brother named Ghika, of highest renown.

Maha had a charming son named Melha, who was ever bent on propitiating the gods, Brahmans and Gurus.

Ghika married Sridhara's daughter, Vira (?) by name, devoted to her husband, by whom he had two sons.

The elder of them, Khetala by name, an ocean of goodness, and of boundless piety; and the younger, named Paitala, whose mind was devoted to the propitiation of all Gurus and Brahmans.

Now in the thought of those two *Sadhus* (virtuous men), named Khetala and Paitala, whose minds were occupied with deeds of renown, this fair piece of ground at the extremity of the village called Saravala, was dwelling.

Khetala and Paitala, with the view of their deceased ancestors attaining to imperishable *Svargs* (Heaven), and for the continuation of their race, caused this well to be made.

Written in the year countable by Veda (4), Vasu (8) Fire (3) and Moon (1),

from the time of Vikramarka, on Tuesday, the 5th of the bright half of *Phalguna*. (15)

In this village of Saravala, in the “*pratigana*” of Indraprastha may this well, and its author with his family, exist for a long time.

Samvat 1384, bright *Phalguna*'s. Tuesday.

4. The Inscription on Dada Harir Stepwell⁴

Obeisance to the Creator!

Obeisance to thee, the lord of the waters, who hast the form of all the waters! Obeisance to thee, O Varuna! Obeisance to [thee], the witness of charitable deeds!

Victorious is the mother of the three worlds, the supreme sakti, kundalini, by name whose feet are praised by gods and men [and] who ever (exists) in the form of wells.

I bow to Visvakarman, the giver of every desired [object], by whose grace all men are able to perform work.

Hail! Prosperity! In the Gujara country, in the glorious city of Ahmedabad, in the victorious reign of the Padshah, the thrice glorious Mahmud -- the general superintendent at the door of the Kings's harem, Bai Sri Harir by name, caused a well to be built in order to please God, in Harirpur, situated to the north-east of the glorious city, for the use fo the eighty-four lakhs of the various living beings, [viz] men, beasts, birds, trees, etc. who may have come from the four quarters, and are tormented with thirst, in *Samvat* 1556 [and] in the current saka year 1421 on the 13th [tithi] of the bright [fortnight] of Pausha on Monday.

If one looks at the mass of the deep nectarlike water [of this well], it seems as though the ocean of milk had taken up its abode in it.

As long as the moon and the sun [endure], may this [well] remain for the nourishment of insects, birds, plants and animals!

The amount of money expended on this [well] was 3,29,000 in all.

This well was built by the powerful, religious, chief councillor of King Mahmud, Harir by name, at a place where four roads meet, crowded with good men, who come from the four quarters. As long as the moon and the sun [endure], may [the water of] this sweet well be drunk by men! [By founding?] forts, pure groves, pools of water by hundreds, and feeding houses step by step, the wealthy earn merit.

[The lady] Bai Sri Harir by name built this well at great expense, in order to benefit the world.

At the building of the well, the overseer [was] His Majesty's servant Malik Sri Bihamad; also the gajadhara, the Vaisya sutra[dhara] Vira; also the servant, su[tradhara] Deva; Sri Girana; Mahan[t] Sayaa; also Mahan[t]

Vira.

5. The Inscription of Rudabai Stepwell, Adalaj⁵

Rudadevi, the Rani of King Virasimha, resembling Lakshmi, caused this well to be made by the best of masons.

Hail! Now in the Kali age, after fifty-five years added to fifteen hundred of the era of king Vikramarka have passed, the queen of the valorous king Virasimha, by name Ruda, the good daughter of the lord of Vena [probably Vina near Nadiad], caused to be made this well which is like the heavenly river [the Ganges].

It is said that for the construction of the well 5 lakhs of tankas were spent from the treasury by this queen Rudadevi.

In the good village of Adalaj, queen Ruda, beloved of Virasimha, made this well with hundreds of compartments.

Hail! When the year 1555 of the era of king Vikrama,...that is the year 1420 of the Saka era, was current, when the sun was in the northerly course, on Wednesday, the fifth of the bright fortnight of the month Magha [16 January 1499], in the Sisira season,...the moon being in Pisces, in the victorious reign of Badshah Mahmud, queen Rudaba, lawful wife of king Virasimha, son of Mahipa, of the Baghela clan, who ruled over the district of Dandahi, and was the jewel in the band of kings, caused to be made the well in Adalaj in order that her [deceased] husband might attain to the world which is the abode of the gods, Marana, son of Bhima, Srimali by case, made the well...May it be firm and durable as long as the sun and the moon [are in heavens].

6. The Inscription of Navalakhi Stepwell, Baroda⁶

In the name of God, the Most Merciful, the Most Compassionate. There is no God, but God and Muhammad is the apostle of God.

After offering praise to God Almighty and invoking blessings on His apostle [it may be stated] that during the administration of the greatest Khan, the majestic ruler, Ulugh-i-Qutlugh [the great prince], the auspicious [chief] of exalted rank (may his position remain high) Zafar Khan, the son of Wajihu'l-Mulk, the fief-holder [or Governor] of the territory of Gujarat, by the gracious help of the Malik of Maliks of the East, Malik Adam, son of Sulaiman, the fief-holder of Barodra (may God Almighty preserve his life), nasiru'd-Daula Wad-Din Amir Nhattu Thakur (may his rank remain for ever), designed and completed the building of

this well by the grace of God Almighty. This was [done] on the first of the revered month of Rajab in 807 H, [corresponding to Saturday, 3 January 1405].

Notes

(1.) Quoted in S. R. Phogat, ed., *Inscriptions of Haryana*, (Haryana, 1978), pp. 45-47.

(2.) Quoted in A. M. Husain, *The Rise and Fall of Muhammad Bin Tughluq*, (Delhi, 1972), pp. 244-246.

(3.) Quoted in S. R. Phogat, ed., *Inscriptions of Haryana*, (Haryana, 1978), pp. 42-43.

(4.) Quoted in J. Jain-Neubauer, *The Stepwells of Gujarat*, (Atlantic Highlands, N.J., 1981), p. 78.

(5.) Jain-Neubauer, 79.

(6.) Jain-Neubauer, 80.

Figures and Illustrations

All photographs by the author were taken on site,
in India, during November and December, 1990.

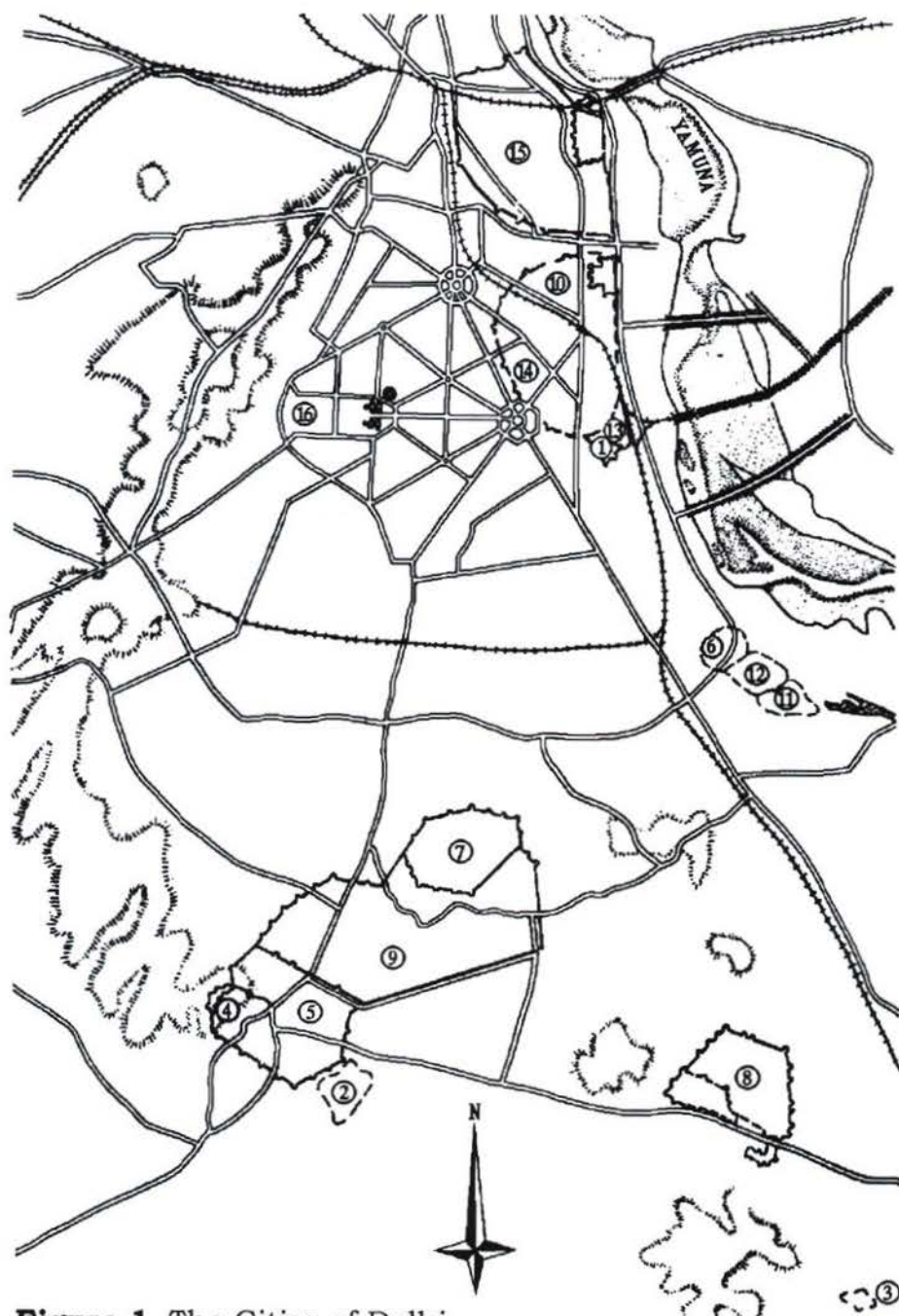


Figure 1 The Cities of Delhi

1. Yuhishtra's **INDRAPRASTHA** 1450 BC - 350 AD
2. Raja Dillu's **DILLI** C 100 BC
3. Surjpal's **SURAJKUND** C 1024 AD
4. Anangpal's **LAL KOT** C 1024 AD
5. Prithviraj Chauhan's **QILA RAI PITHORA** C 1170 AD
6. Kaiquabad's **KILOKRI** 1288 AD
7. Ala-ud-Din Khalji's **SIRI** 1302 AD
8. Tugluq Shah's **TUGHLUQABAD** 1320 AD

9. Muhammad Tugluq's **JAHANPANAHA** 1334 AD
10. Firuz Shah Tugluq's **FIRUZABAD** 1351 AD
11. Khir Khan's **KHIZRABAD** 1415 AD
12. Mubarak Shah's **MUBARAKABAD** 1433 AD
13. Humayan's **DINPANAHA** 1530 AD
14. Sher Shah Sur's **DILLI** 1542 AD
15. Shah Jahan's **SHAHJAHANABAD** 16448 AD
16. **NEW DELHI** 1911 AD

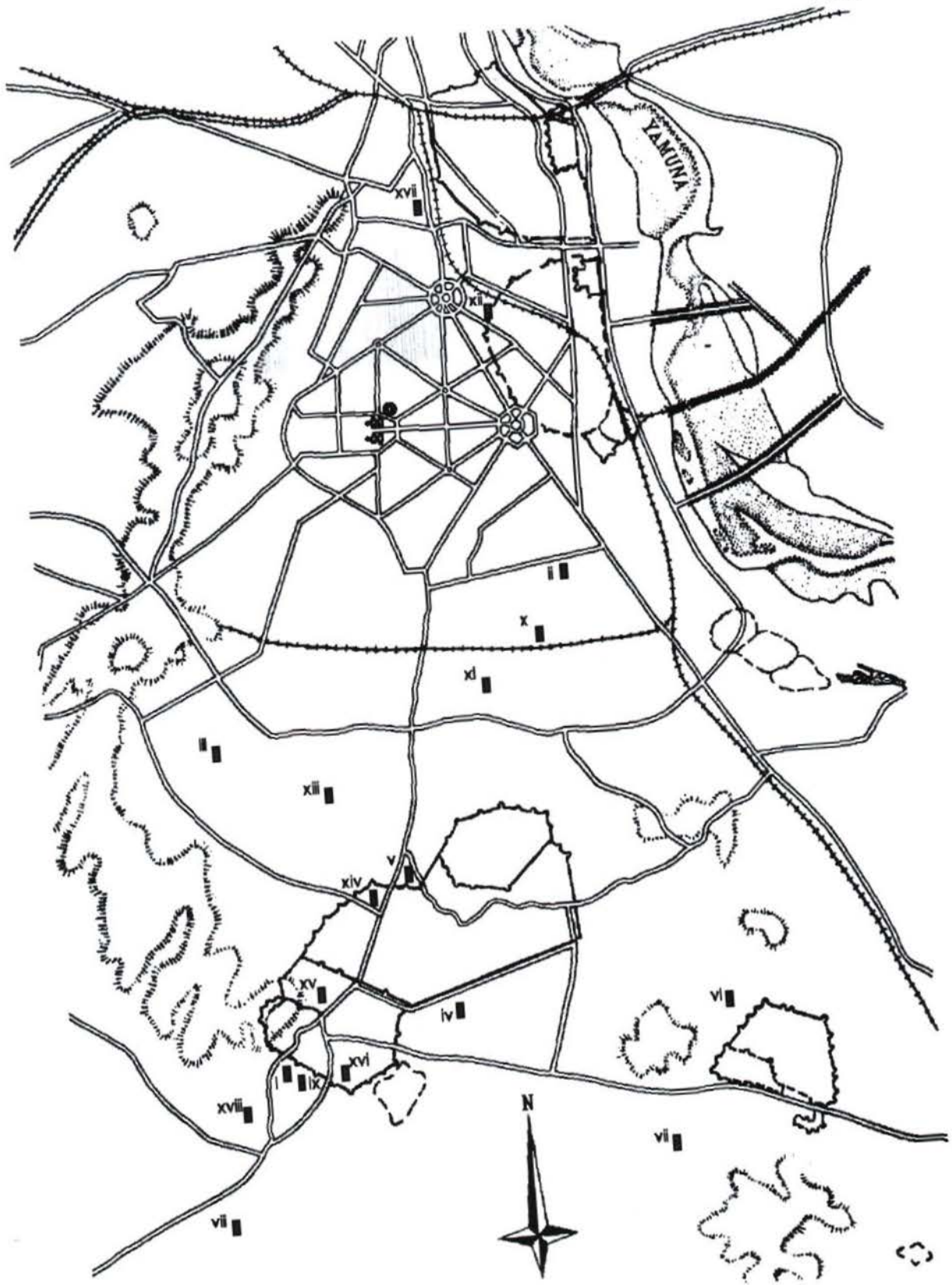


Figure 2 Sultanate Baolis in Delhi



Figure 3 Aerial view of Tughluqabad



Figure 4 Gandak -ki *Baoli*

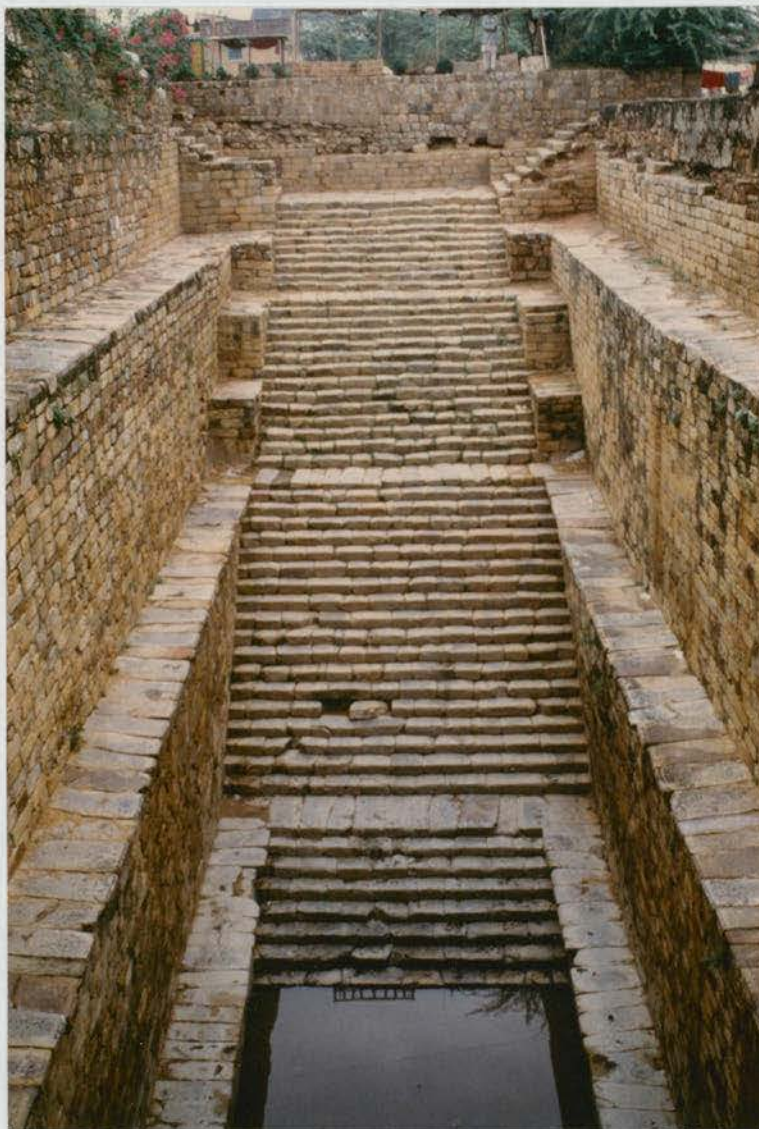


Figure 5 Gandak-ki *Baoli* - north end

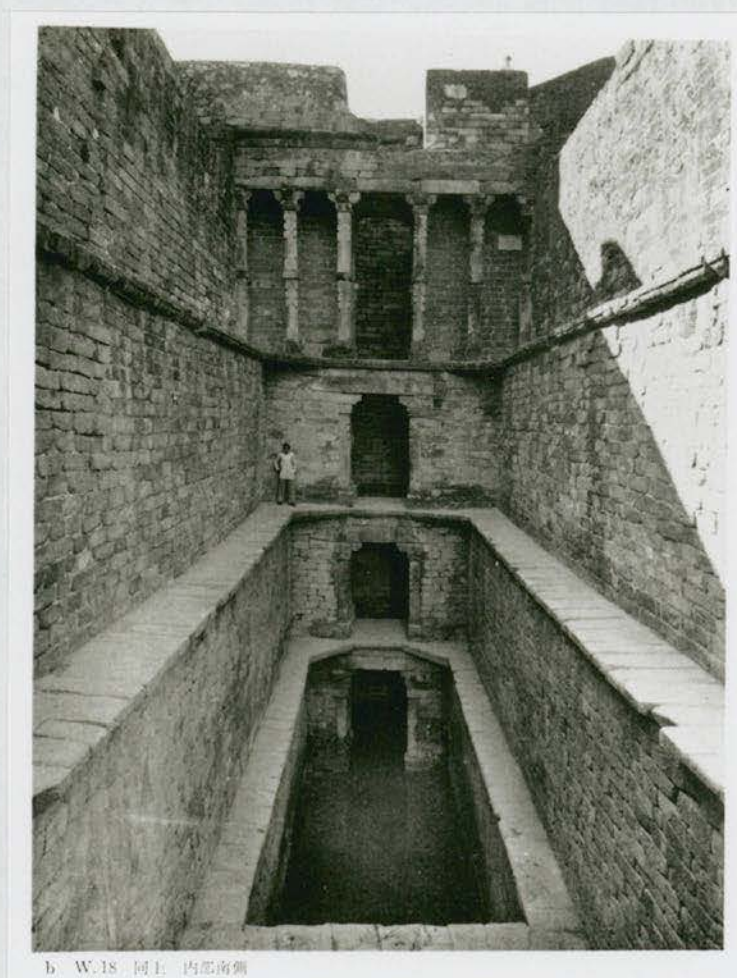


Figure 6 Gandak-ki *Baoli* - South end

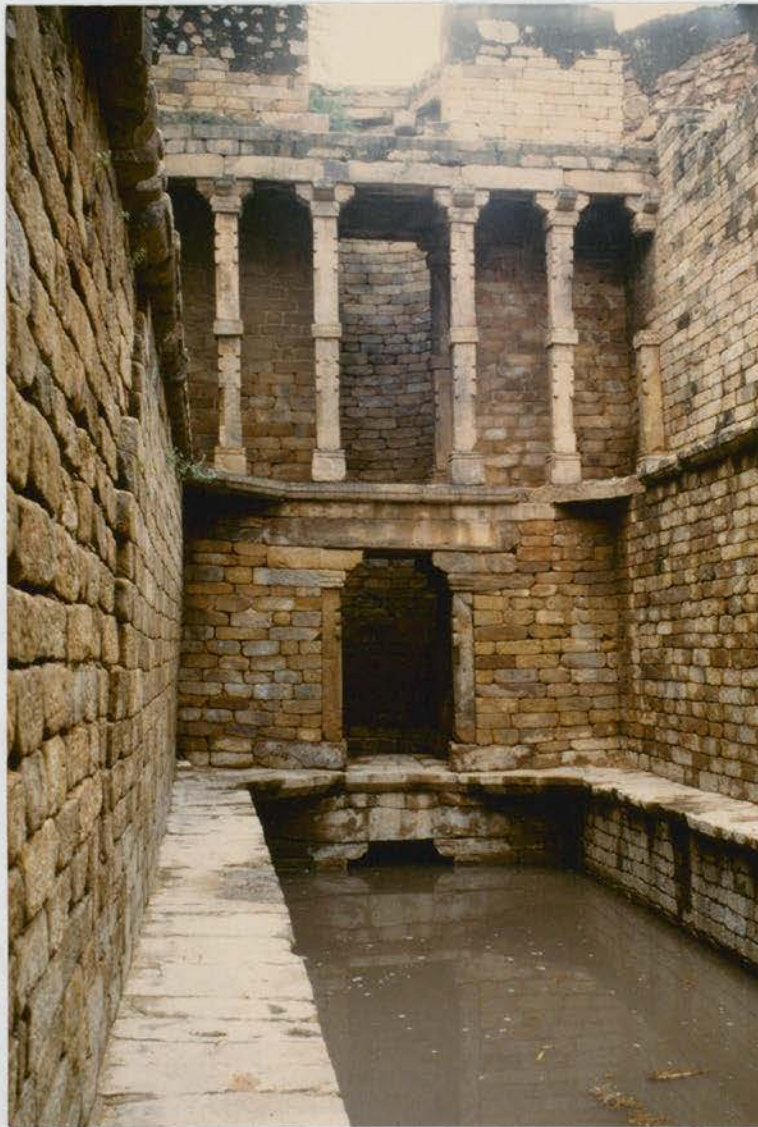
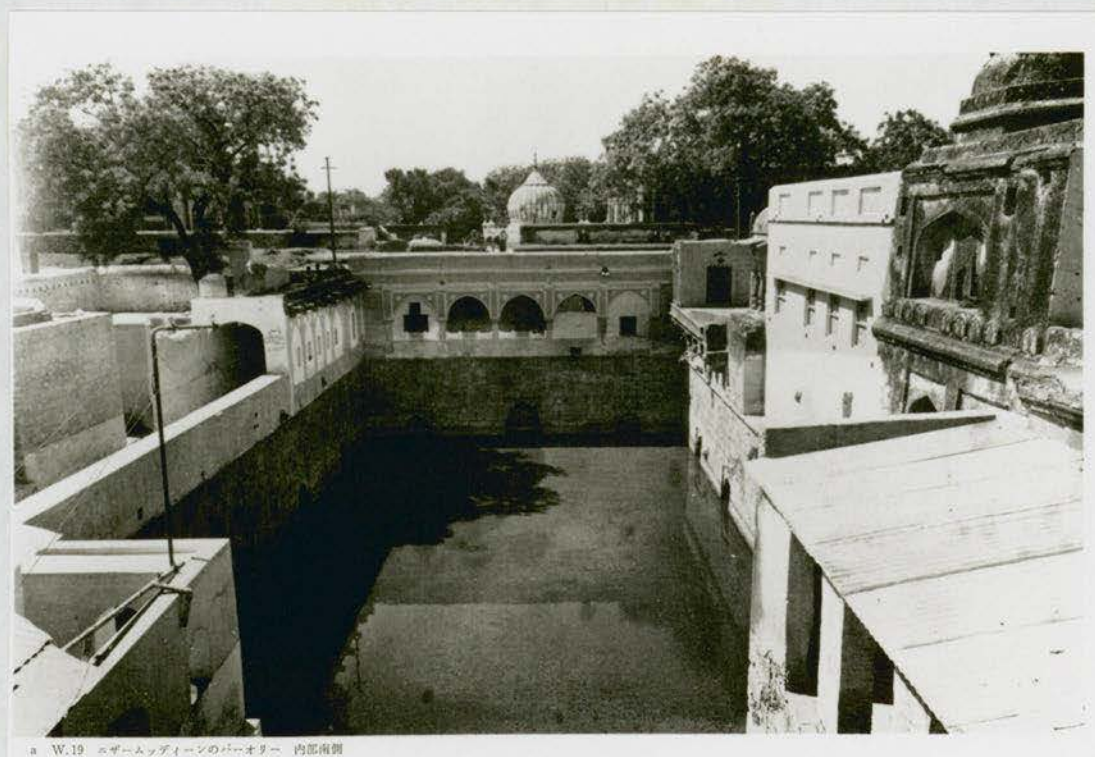


Figure 7 Gandak-ki *Baoli* - South end



b W.19 同上 内部北側と西側

Figure 9 *Baoli* at Nizamuddin - North end



a W.19 ニザムッディーンのパオリー 内部南側

Figure 10 *Baoli* at Nizamuddin - South end



Figure 11 *Baoli* at Nizamuddin - Southwest corner



Figure 12 "A Baolee near the old City of Delhi", Thomas and William Daniells, 1802



Figure 13 *Baoli* at Muradabad Pahari - North end



Figure 14 *Baoli* at Muradabad Pahari - South end



Figure 15 *Baoli* south-east of Hauz Rani

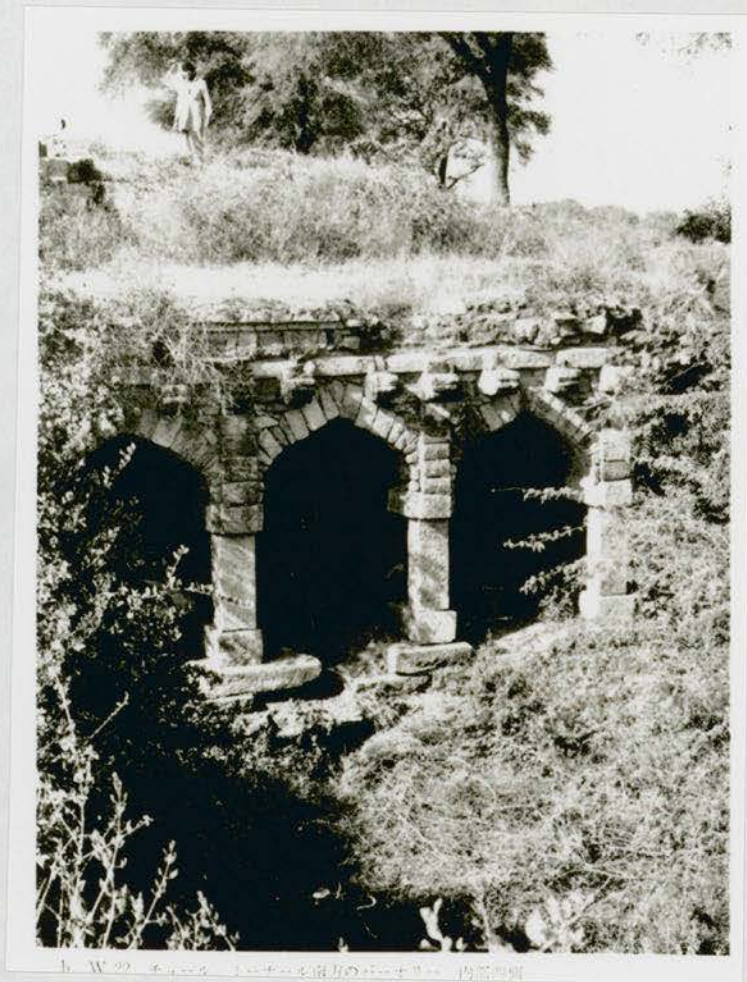
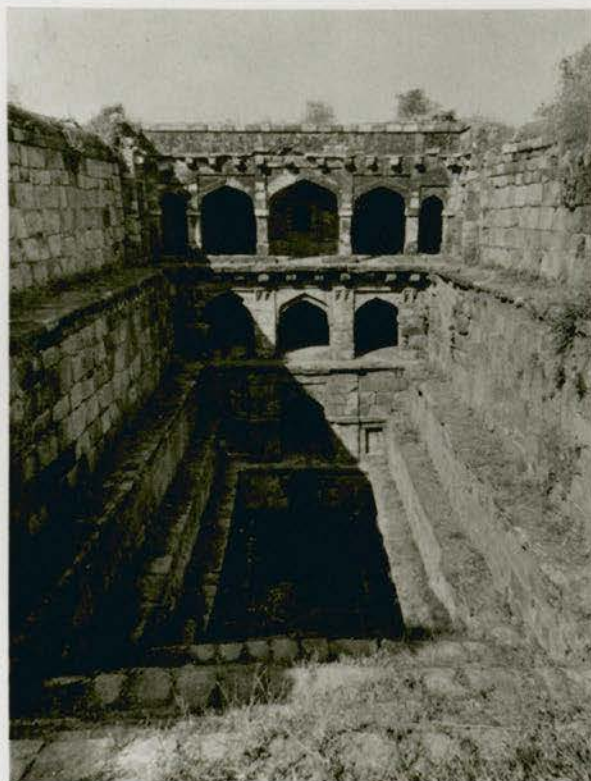


Figure 16 *Baoli* south of Chor Minar



Figure 17 *Baoli* northwest of Tughluqabad



a W.24 トッフルカバード西南のバオリー 内部西側

Figure 18 *Baoli west of Tugluqabad - well shaft end*

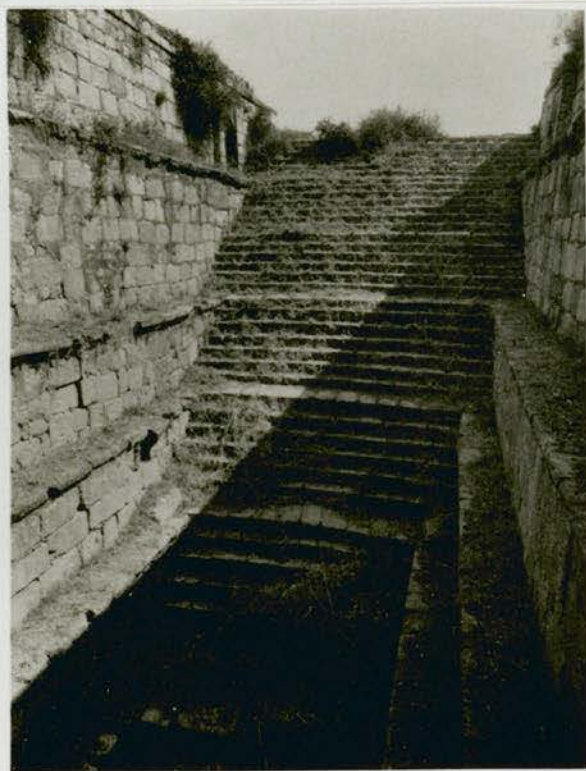


Figure 19 *Baoli west of Tugluqabad - stair end*



Figure 20 *Baoli* south of Sultanpur



a W.26 ラージョーン-キ-バイーン 同バーオリ-とモスクおよび墓建築 北より

Figure 21 Rajon-ki *Baoli* - view from the north



Figure 22 Rajon-ki *Baoli* - view from the south



Figure 23 Rajon-ki *Baoli* - view of tank



Figure 24 Rajon-ki *Baoli* - east side of tank

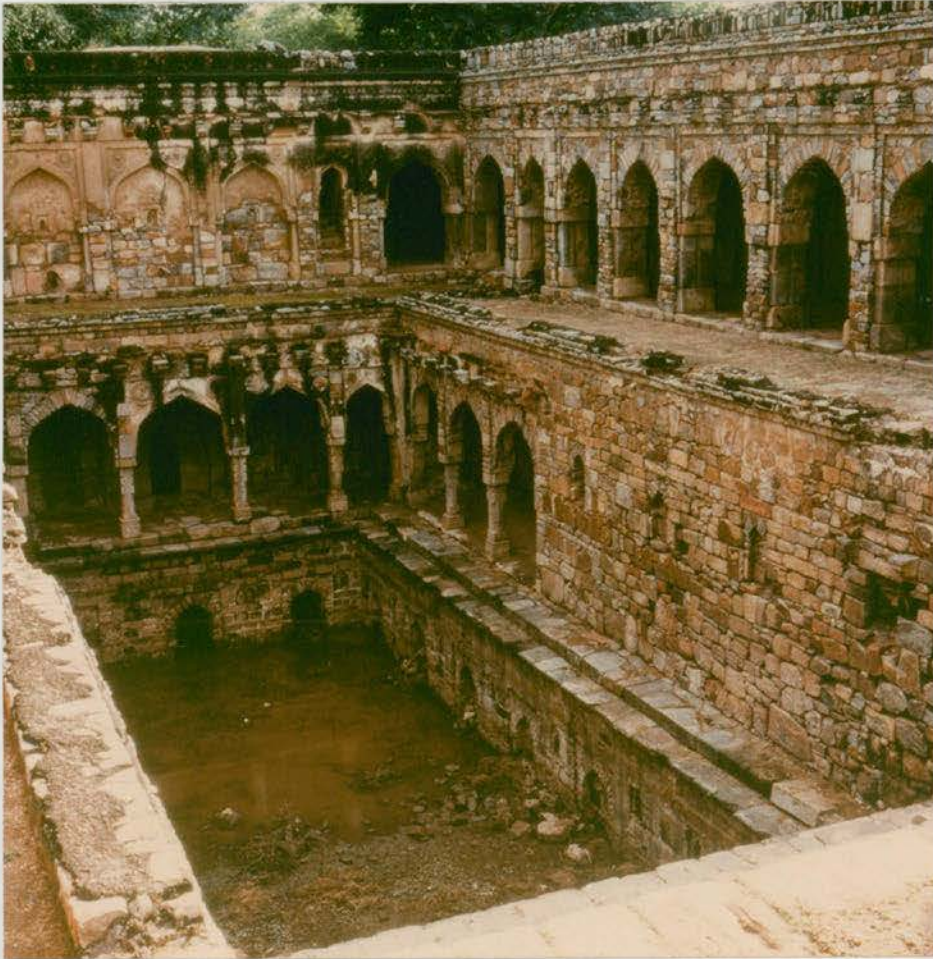
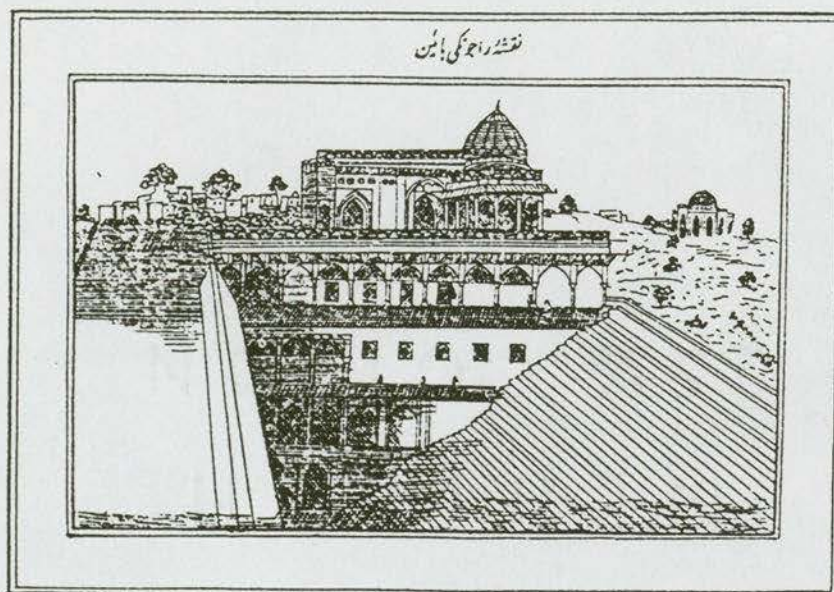


Figure 25 Rajon-ki *Baoli* - west side of tank



挿圖13 Saiyid Ahmad Khān の Āthār al-Ṣanādīd (初稿本, 1987年刊本所載の挿圖)

Figure 26 Rajon-ki Baoli. Syed Ahmed Khan, *Athareal Sanadid* 1846.



Figure 27 Rajon-ki Baoli - stairs



Figure 28 Rajon-ki *Baoli* - well shaft exterior



Figure 29 Rajon-ki *Baoli* - well shaft interior



Figure 30 Rajon-ki Baoli - east wall detail



Figure 31 Rajon-ki Baoli - east wall detail

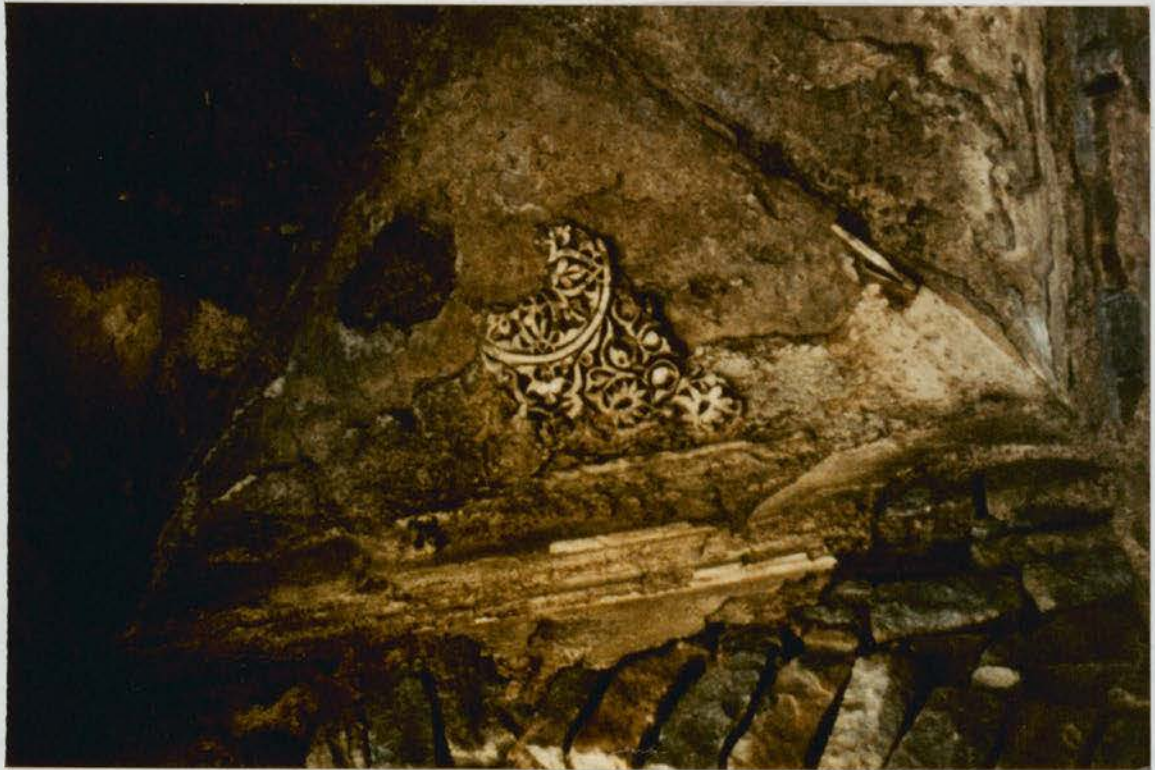


Figure 32 Rajon-ki *Baoli* - detail of second level ceiling



Figure 33 Tomb of Jahal Khan - detail of ceiling



Figure 34 Basti Baoli - Syed Ahmed Khan Atharal Sanadid 1846



Figure 35 Basti Baoli



Figure 36 *Baoli* at Mubarakpur Kotla

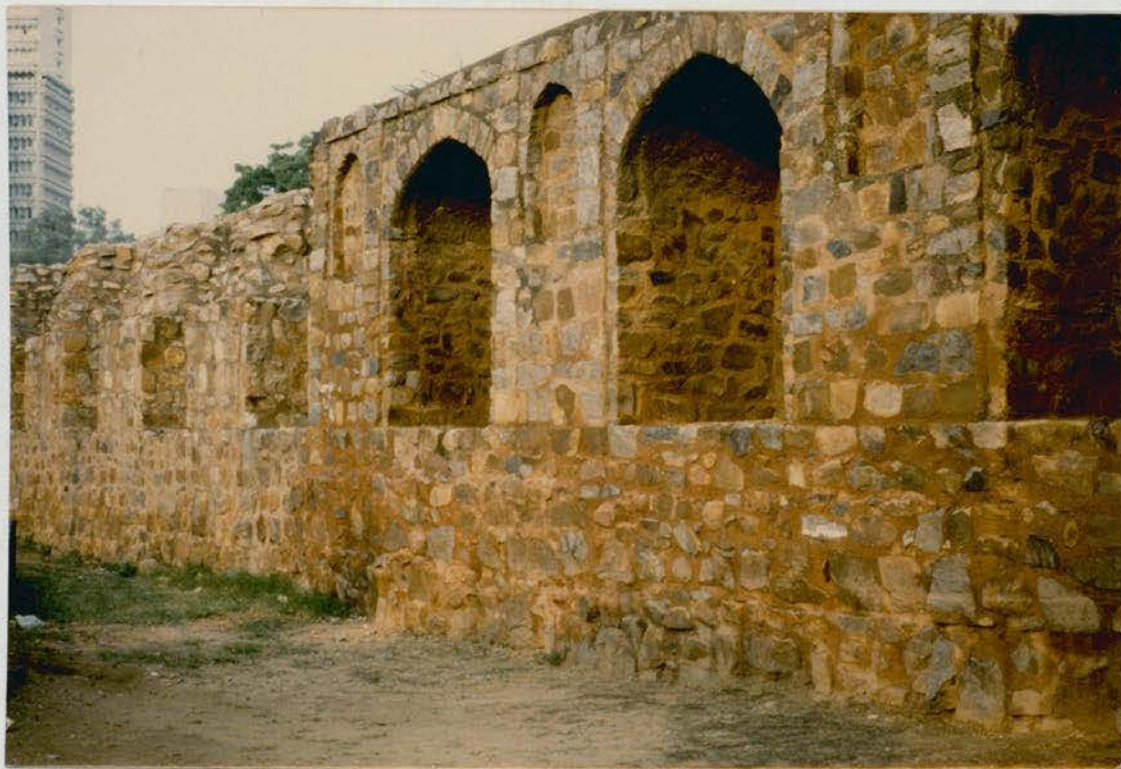


Figure 37 Ugrasen-ki *Baoli* - exterior of west wall

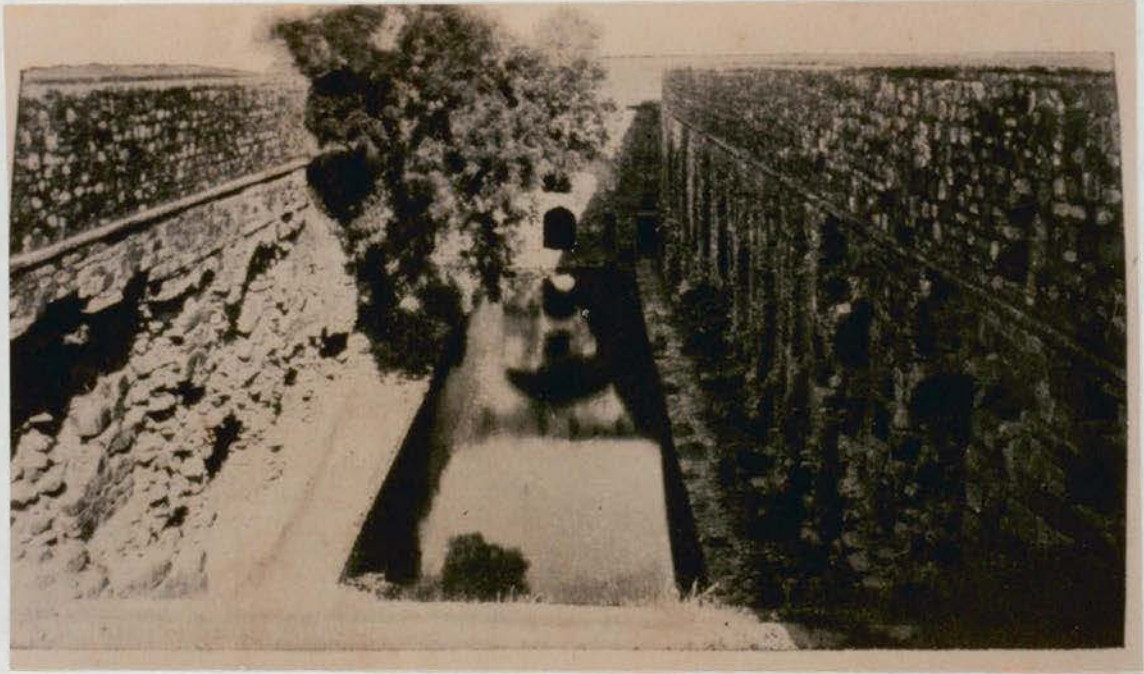


Figure 38 Ugrasen-ki *Baoli* - before conservation



Figure 39 Ugrasen-ki *Baoli* - c.1926 - after repairs



c W.29 ウグレン・サインのバオリー 内部北側

Figure 40 Ugrasen-ki *Baoli* - prior to 1970 - showing additional damage

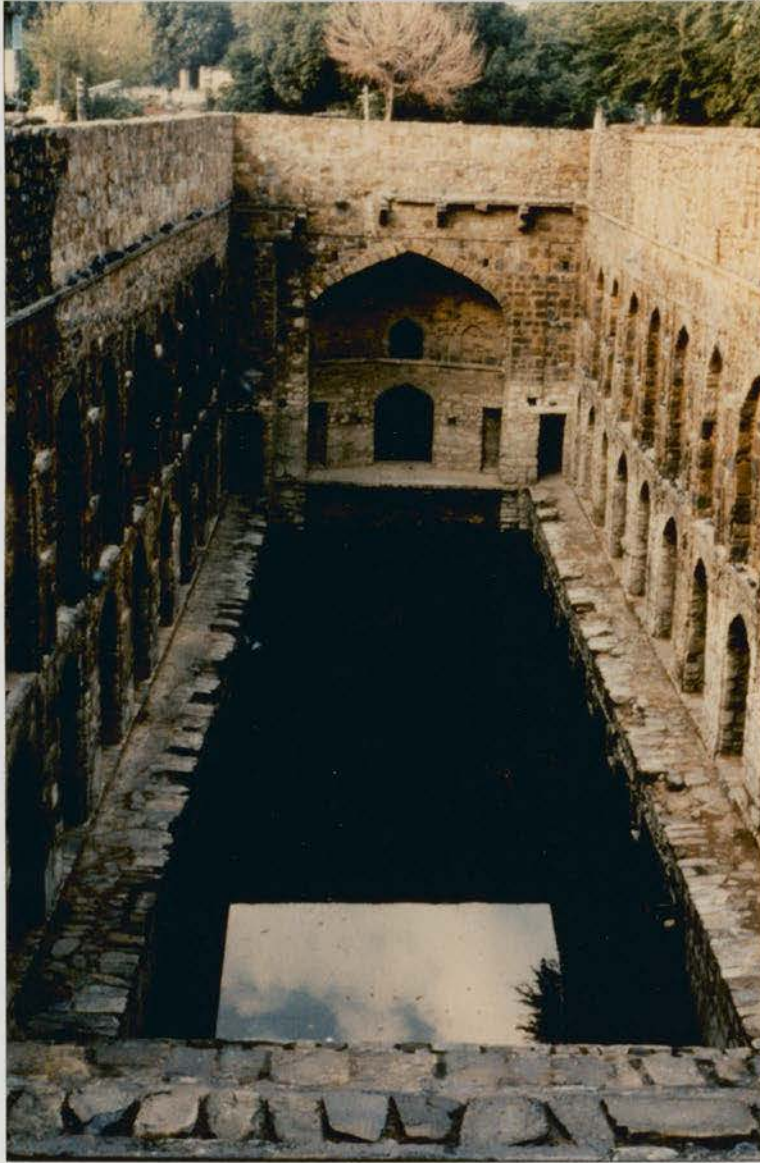


Figure 41 Ugrasen-ki *Baoli* - north end - recent repairs



Figure 42 Ugrasen-ki *Baoli* - south end - stairs



Figure 43 Ugrasen-ki *Baoli* - north end



Figure 44 Ugrasen-ki *Baoli* - north west corner



Figure 45 Ugrasen-ki *Baoli* - south end - mosque pillars

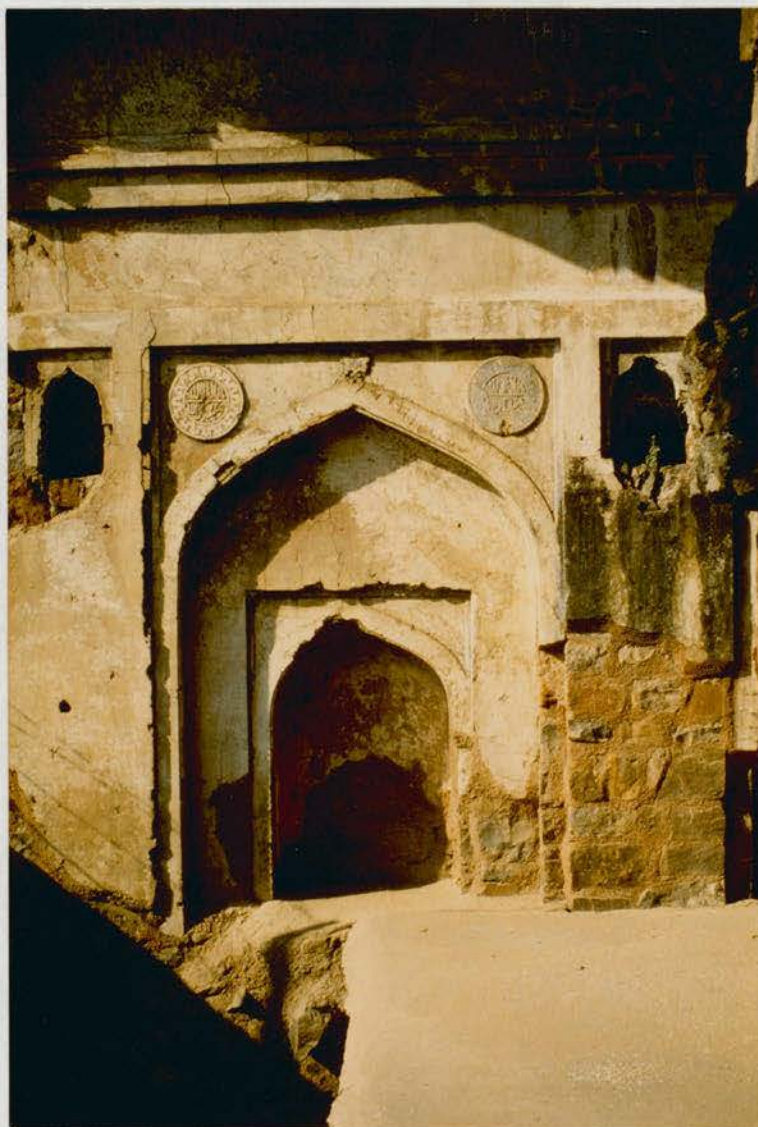


Figure 46 Ugrasen-ki *Baoli* - qibla wall



Figure 48 *Baoli south of Wazirapur ka gumbad - south - recent repairs*



Figure 49 *Baoli at Adchini*



Figure 50 *Baoli north of Qutb*

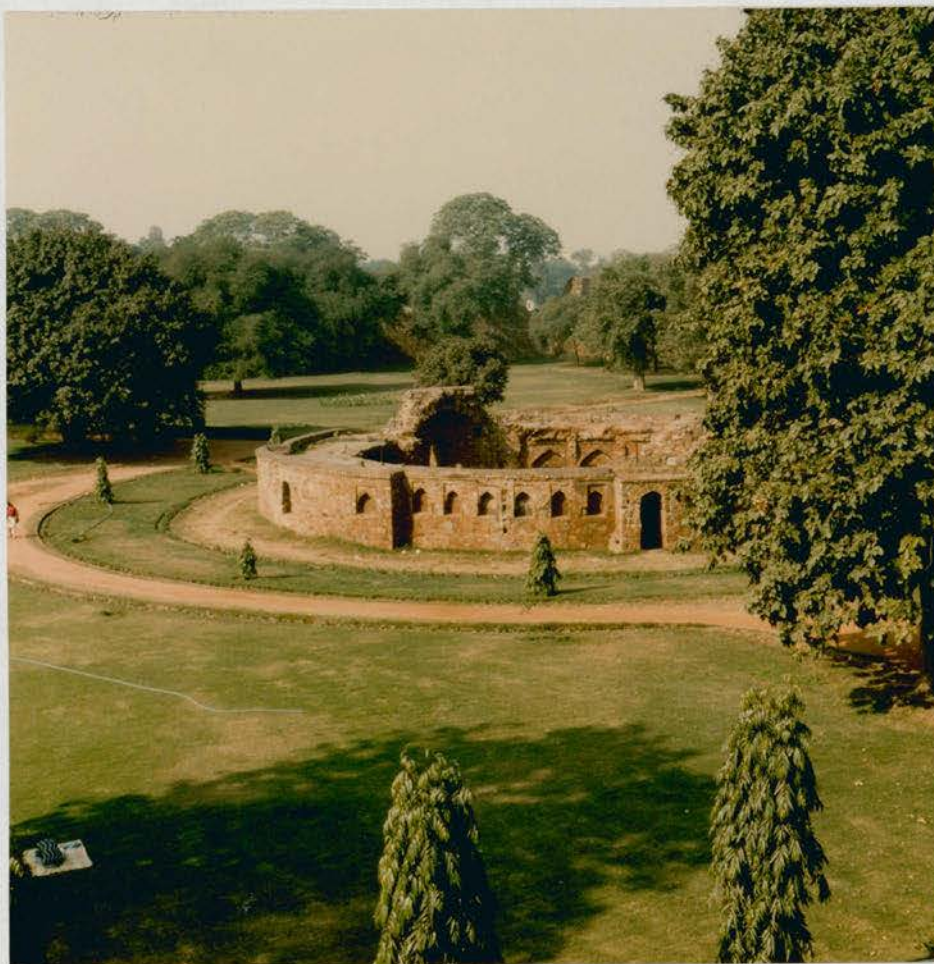


Figure 51 Retreat well at Firuz Shah Kotla



Figure 52 Retreat well at Firuz Shah Kotla - interior

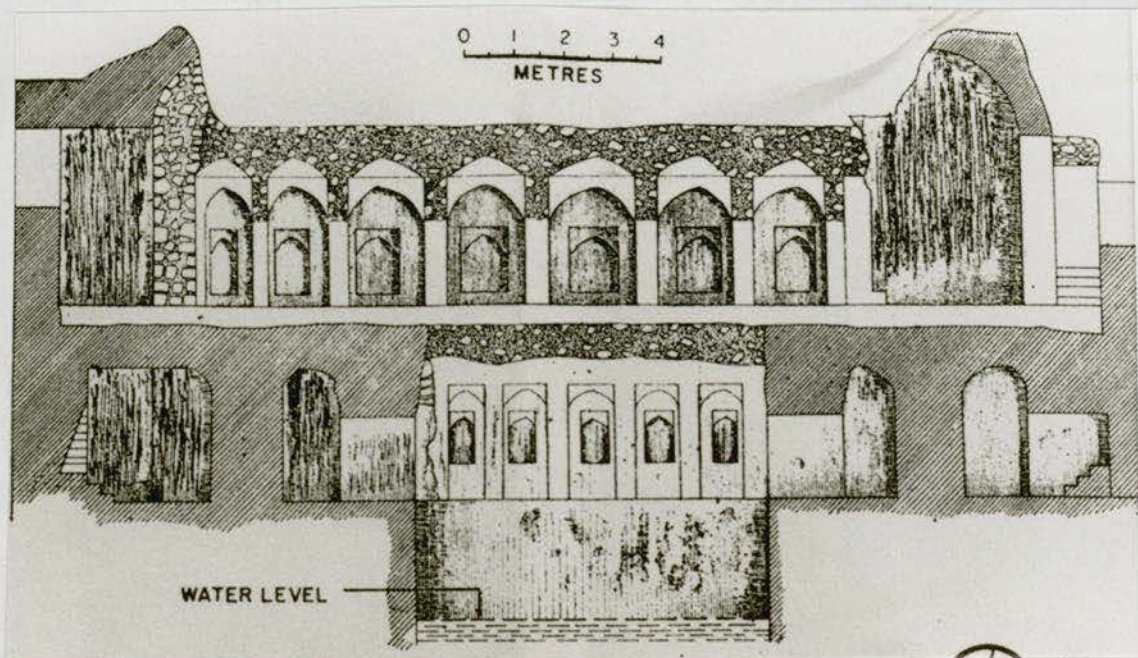


Figure 53 Retreat well at Firuz Shah Kotla - cross section

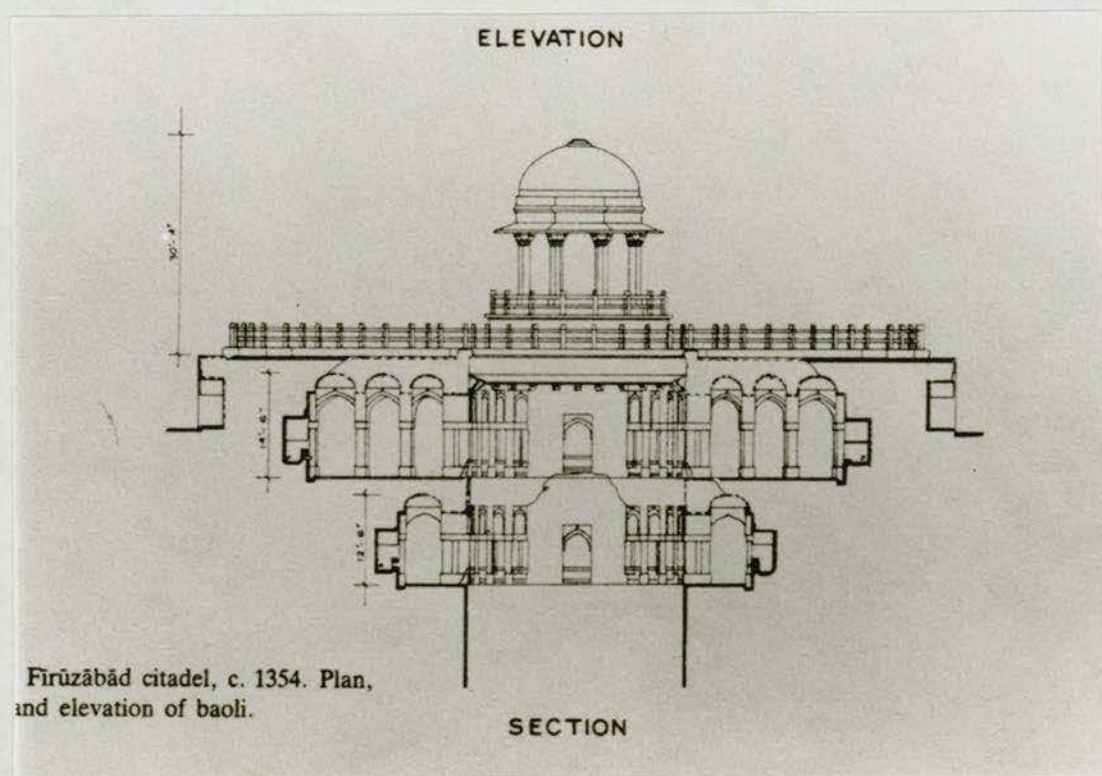


Figure 54 Retreat well at Firuz Shah Kotla - conjectural reconstruction



Figure 55 Large well at Fatehpur Sikri

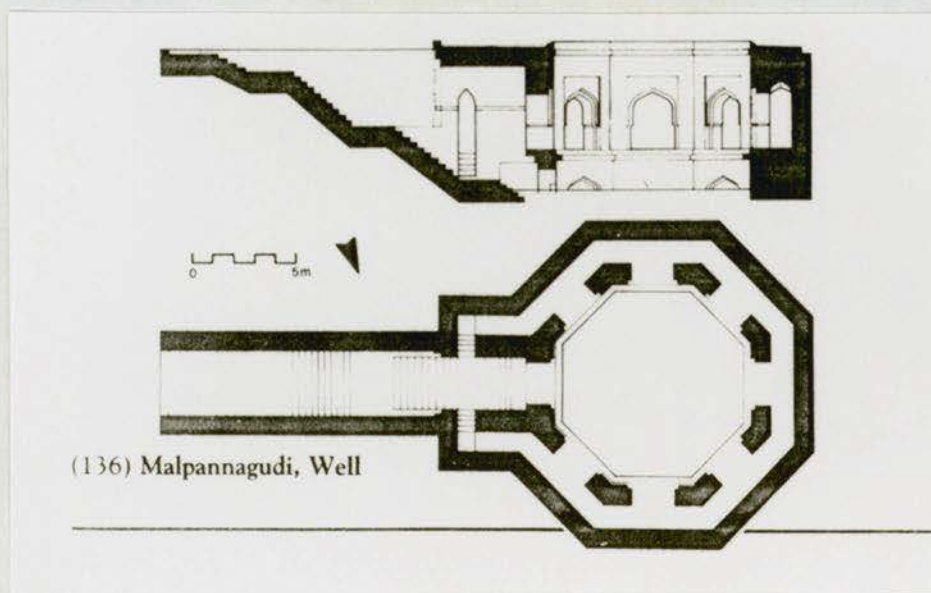


Figure 56 Malpannagudi well



Figure 57 Dada Harir *vav* - exterior



Figure 58 Dada Harir *vav* - first level



Figure 59 Tank in upper town of Tughluqabad

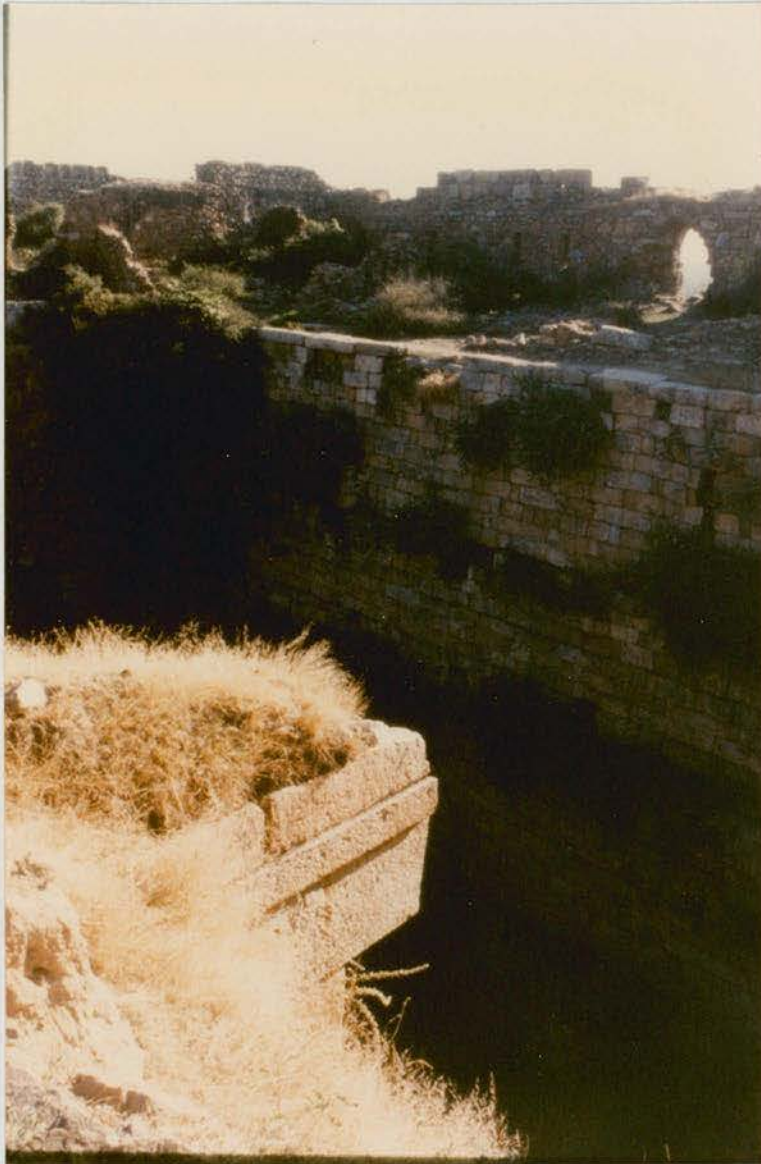


Figure 60 Large tank in citadel at Tughluqabad



Figure 61 Sluice gate - south wall of Tughluqabad



Figure 62 Satpula - south side - water face



Figure 63 Satpula - north side - air face

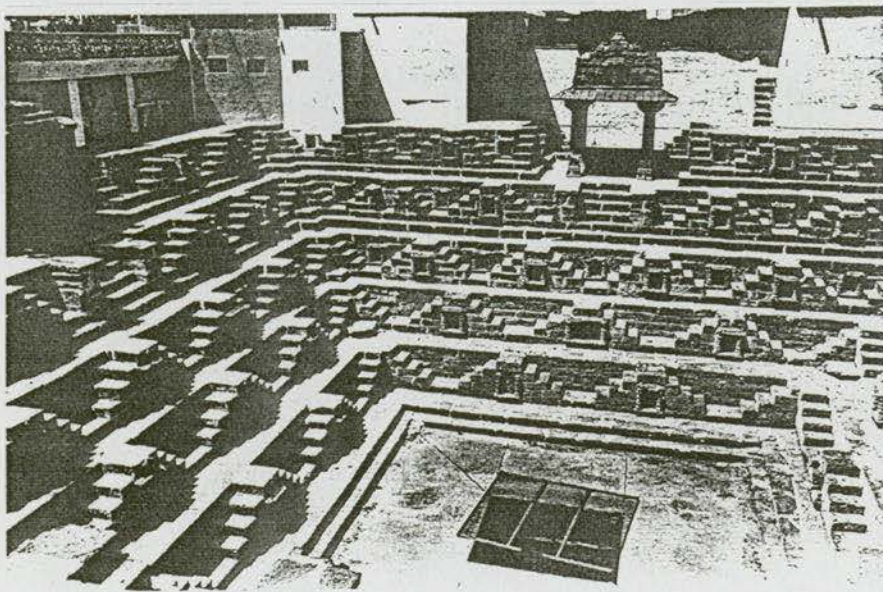


Figure 64 Stepped tank at Kapadvanj

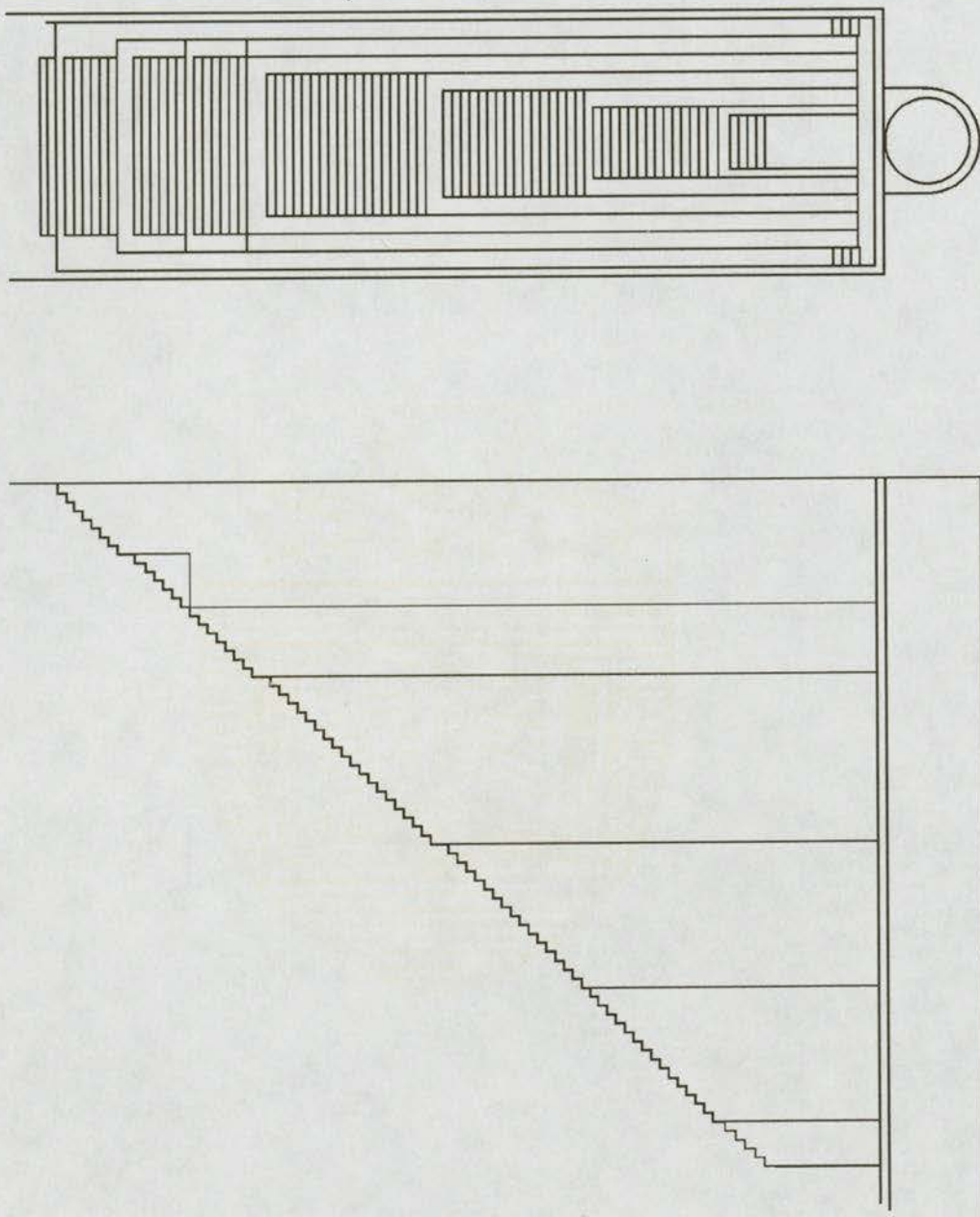


Figure 65 Plan and section of Gandak-ki *Baoli*

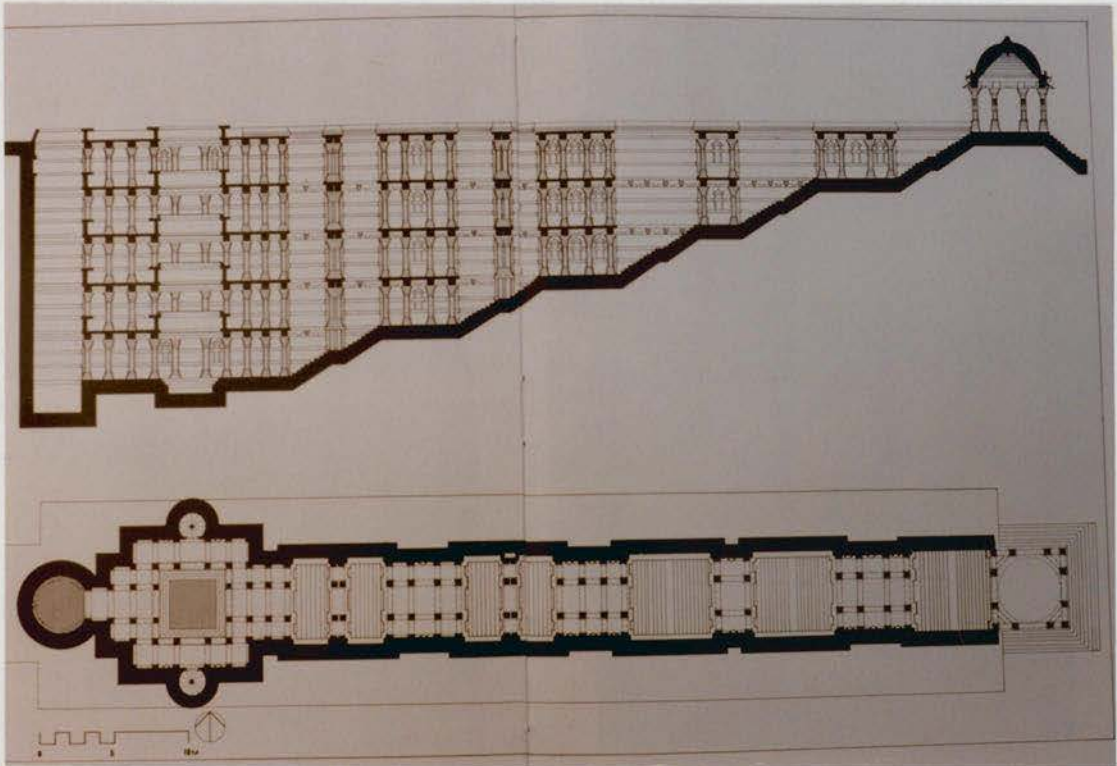
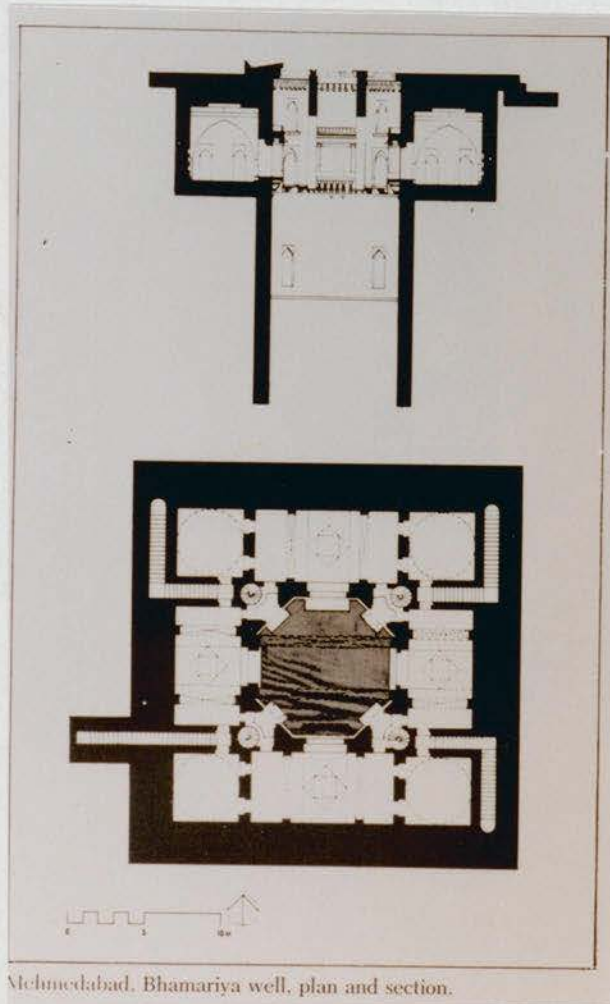


Figure 66 Plan and Section of Dada Harir *vav*.



Mehmmedabad. Bhamariya well, plan and section.

Figure 67 Plan and Section Bhamariya well.

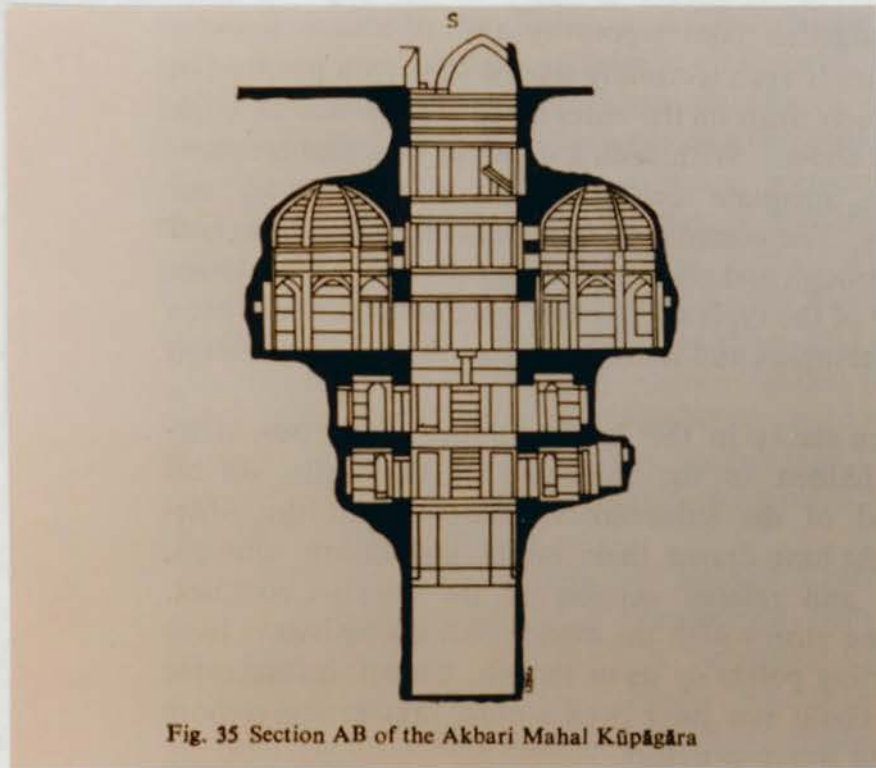
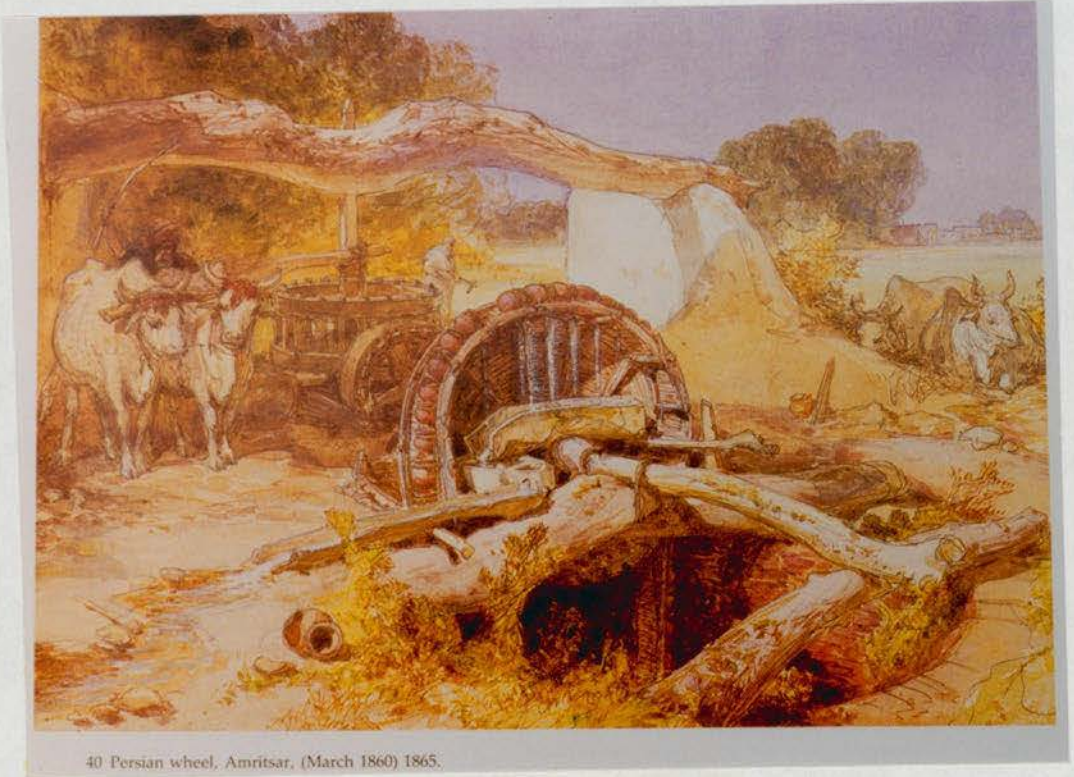


Figure 68 Section of Retreat Well at Agra Fort.



Figure 69 Detail of "Krisna and the Golden City of Dwarka" *Harivamsa*.



40 Persian wheel, Amritsar, (March 1860) 1865.

Figure 70 Persian Wheel at Amritsar. William Simpson 1860



Figure 71 Detail of Miniature of Construction at Fatehpur Sikri,
Akbarnama

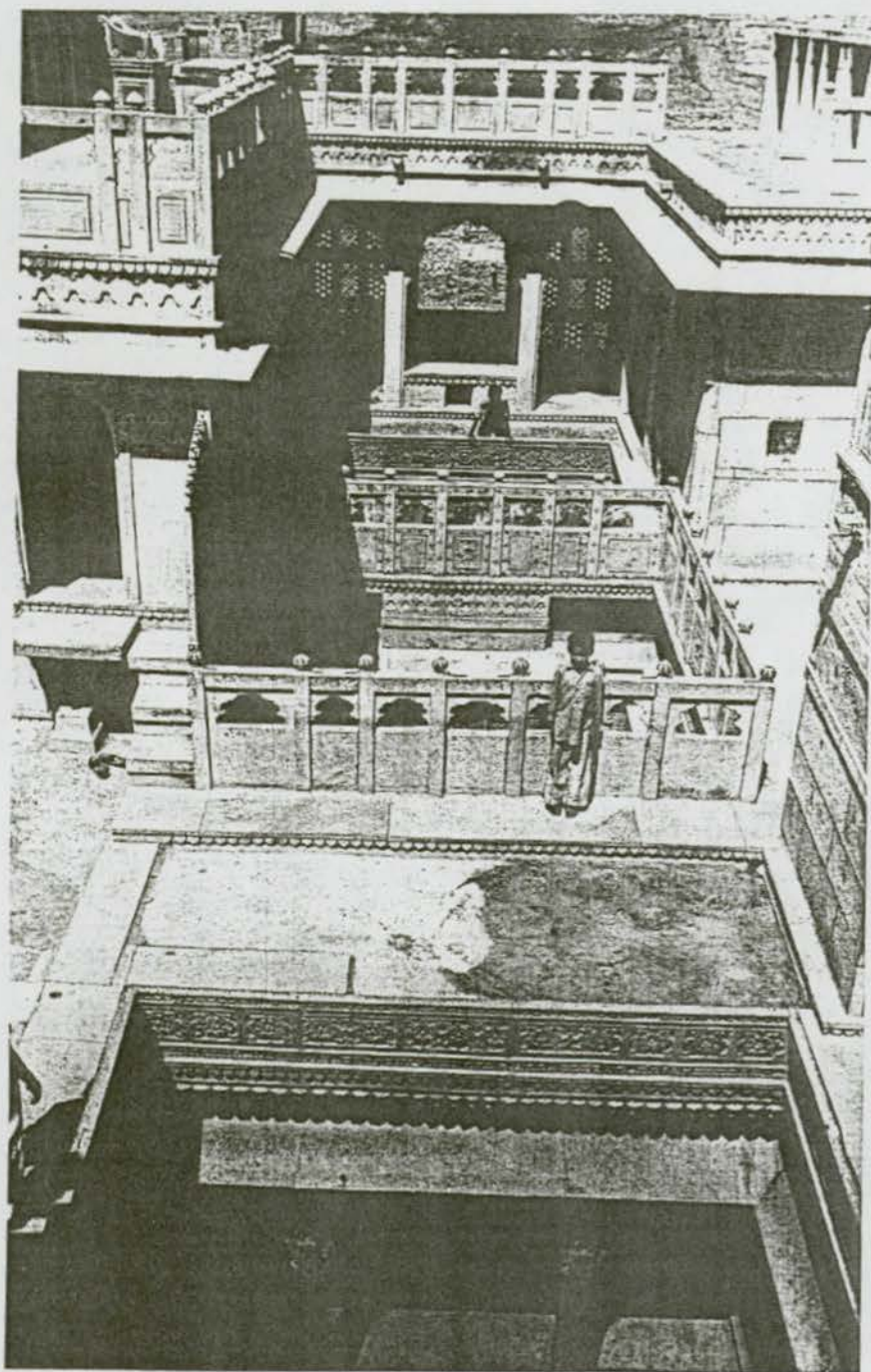


Figure 72 Haveli at Jaisalmer



Figure 73 Mata Bhavani Stepwell, Ahmadabad. Late 11th Century.



Figure 74 Detail of carving at Rudabai Stepwell - Adalaj.

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Author

Jennifer Elizabeth Lort

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