
Deccan Sultanate Water Works at Bijapur with Special Reference to Gol Gumbaz and Ibrahim Rouza

Kishore Raghubans¹

¹. Archaeological Survey of India, Dharwad Circle, Dharwad, Karnataka, India (Email: sarvagyaana@hotmail.com, sarvagyaana@gmail.com)

Received: 22 July 2014; Accepted: 18 August 2014; Revised: 13 September 2014

Heritage: Journal of Multidisciplinary Studies in Archaeology 2 (2014): 198-222

Abstract: To study hydraulic system during Deccan Sultanate period at Bijapur for revitalization of Deccan Sultanate Water Works with special reference to Gol Gumbaz and Ibrahim Rouza.

Keywords: Deccan Sultanate, Bijapur, Hydraulic System, Water Works, Gol Gumbaz, Ibrahim Rouza, Gunj

Introduction

India in general and Karnataka in particular, the first wave of Islamic rule was aggressive and uncompromising. Gradually however, it adapted to the social and cultural context of the country and assimilated many local customs and traditions. As Islam developed in India, complex interaction emanated at all levels between the Muslim faith and established Hindu culture. Moreover, it practices a two-way cross-fertilization of ideas and beliefs that wrought perceptible changes in both cultures. This process of interaction was slow and obscure, but it had enormous repercussions for the development of religious, cultural and artistic traditions of India.

The profound antithesis of spiritual and aesthetic ideals of polytheist Hinduism and iconoclastic Islam devoid of imagery could hardly induce any sort of fusion. Yet in spite of fundamental differences of outlook and belief, a syncretism did develop in such a way that society was able to make its own contribution to the Deccan Sultanate architecture.

Geometry and symmetry, a variety of calligraphy, foliated decoration, the interplay of light and shade and similar other vital components of decorative arts gradually were enriched by the free use of Hindu architectural and decorative motifs including paintings. A judicious and harmonious blending of such architectural and decorative elements characterize the Deccan Sultanate architectural manifestations in Karnataka irrespective of whether they are forts, palaces, mosques, tombs, madrasas or water works.

Aims

A preliminary investigation on hydraulic system during Deccan Sultanate (Fig. 1) period at Bijapur for revitalization of water works and emphasis model study on Gol Gumbaz and Ibrahim Rouza and in future such studies to be carried out to the other water structures.

History of Bijapur

The Chalukyas of Kalyani established Bijapur in the 10th - 11th centuries. The Bijapur came under Khilji Sultanate in Delhi by late 13th century. In 1347, Bijapur became part of Bahamani Sultanate of Gulbarga. By 1518, the Bahamani sultanate having lasted for over 190 years began to lose power. Soon the five provincial governors took over and began ruling as independent Sultans. The five kingdoms and their dynasty were Nizam Shahis of Ahmadnagar (1490), Adil Shahis of Bijapur (1490), Imad Shahis of Berar (1490), Qutab Shahis of Golokonda (1518) and Barid Shahis of Bidar (1528) (Cousens, 1889) and (Michell and Zebrowski, 1999).

Bijapur became the capital city of the Adil Shahis - a dynasty that lasted from 1490 to 1686, that is, for over 190 years. Yusuf Adil Shah was the founder of the dynasty and the city of Bijapur owes much of its greatness to him. During the rule of the Adil Shahis, Bijapur was developed into a major township with monuments strewn all over. The rule of this dynasty ended in 1686 when the Moghul emperor Aurangzeb conquered Bijapur. In 1724, the Nizam of Hyderabad established independence and Bijapur came under his rule. The Maratha Peshwa defeated Nizam of Hyderabad in 1760 and took control of Bijapur.

The British defeated the Peshwa in 1818 in the third Anglo-Maratha war in which Bijapur passed into the hands of the British East India Company and was assigned to the Princely state of Satara. In 1848, the territory of Satara along with Bijapur was annexed to British Bombay presidency. The present day Bijapur and Bagalkot were part of the district of Kaladagi under the British. In 1885, Bijapur was made the administrative headquarters of the district (Michell and Zebrowski, 1999). Until 1956 when Bijapur was assigned to the then Mysore state, it was part of the Bombay state. In 1997 Bagalkot was split from Bijapur (Jeelani, 2006).

Bijapur Sultanate Rulers

- Yusuf Adil Shah 1490 – 1510
- Ismail Adil Shah 1510 – 1534
- Mallu Adil Shah 1534 – 1535
- Ibrahim Adil Shah I 1535 – 1558
- Ali Adil Shah I 1558 – 1580
- Ibrahim Adil Shah II 1580 – 1627
- Mohammed Adil Shah 1627 – 1656
- Ali Adil Shah II 1656 – 1672
- Sikandar Adil Shah 1672 – 1686

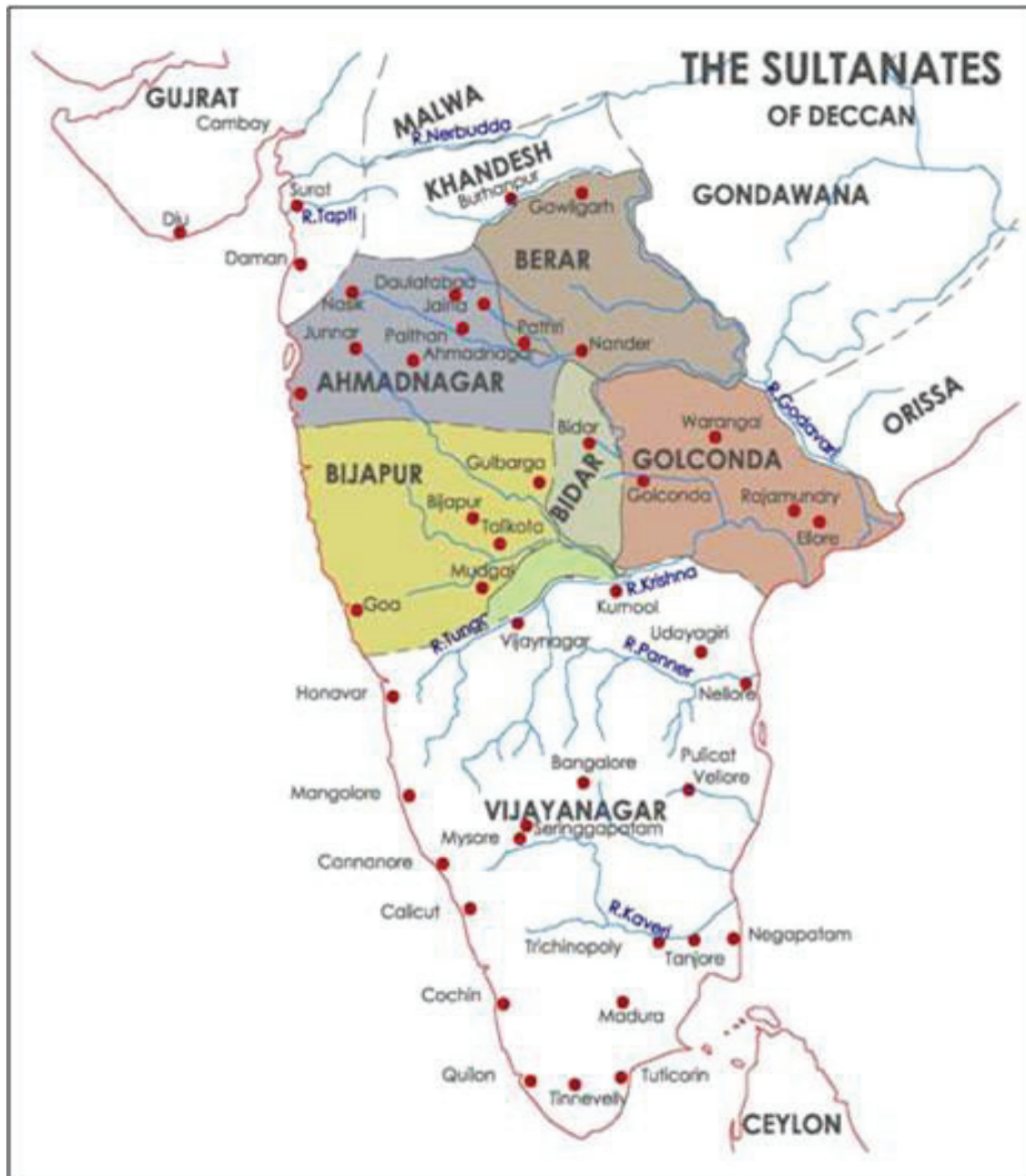


Figure 1: Map of the Sultanates of Deccan

Adil Shahi rulers were great builders and patrons of all aspects of fine arts. The capital city with its citadel enclosed by a fortification was embellished with many magnificent tombs, mosques and palaces, gorgeously painted pleasure resorts and elaborate hydraulic systems. The remnants of these still stand as sentinels to the marvellous architectural innovations. The Deccan school of miniature painting was at its zenith during this period. The monumental heritage of the Adil Shahi illustrates the Deccan style developed into a mature style both in regards to methods and conception as well as in the field of ornament and decoration. This highly developed style is marked on the one hand by the monumentality and grandeur of conception that is

characteristic of the Deccan style, while on the other hand, it developed a few features of its own. The bulbous, proportionate and shapely dome with its drum concealed within a band of conventional petals. The use of attractive pendentives, projecting and richly ornamented chajjas and tall slender minarets, and finials and frequent use of masonry piers of considerable size instead of pillars, the treatment of the pointed arch and the graceful curve of its outlines are some of the salient features of the Adil Shahi style. These edifices are remarkable for the treatment of ceilings, built without any apparent support. Equally typical is the richness and variety of its ornamentation, all executed with great artistic skill in stone carving, cut-plaster and painting. Another aspect is the intrusion and assertion of Hindu elements in building techniques and methods as well as in the decoration. The edifices of the period Ibrahim Adil Shah - II, especially the Ibrahim Rouza, present a harmonious and judicious blending of the two stylistic features. Thus, these architectural splendours with distinct and unique features present masterpieces of human creative genius (Campbell, 1884 and Cousens, 1889).

Water Works

The Adil Shahi rulers made an elaborate arrangement of pure and wholesome water for the people of Bijapur and its suburbs. The water works, bearing ample testimony to the sophistication of the engineers of that period, are the most fascinating aspect of Bijapur. The main sources of water were reservoirs, lakes, tanks, ponds and wells. The tanks during the Adil Shahi period can be classified as those, which supplied drinking water to Bijapur, its suburbs and tanks meant for irrigation, and for maintaining water works.

Bijapur city received water from two principal sources – one from Torvi to the west and the other from Begum Talab to the south. The Medieval period had special fondness for the presence of water. They knew well and appreciated the cooling effect of tanks and cisterns of cold water within and around their dwellings. These together with lime-covered and thick masonry wall and roofs, afforded a luxurious retreat from the glare and scorching heat of summer (Cousens, 1889).

From Torvi, the water brought towards the city by a great subterranean tunnel. It starts from the Surang Bavadi near the tombs of Afzal Khan's wives, beside the Muhammad Sarovar. It then, makes a beeline for the Moti Dargah, where it turns more to the east, and passes through into Ibrahim Rouza enclosure. To this point it's direction is easily traced by airshafts, placed at frequent intervals along its course; but beyond this it is lost (Cousens, 1889). From the Begum Talab, on the south of the town, the water brought through terracotta pipes. These pipes are in short lengths, made with a shoulder on one end of each length into which the next pipe fits and it is embed in concrete. Along the line of these pipes at regular intervals gunj or water tower were built for relieving the water pressure and for filtering the water (Cousens, 1889).

The principal tanks and wells in the town are Taj Bavadi, Chand Bavadi near the Shahapur gate, the Bari and Mubarak Khan's Bavadis in the southeast, the Masa and

NimBavadis in the northeast quarter of the city, the Hal and Nagar Bavadis, and the Jama Masjid Bavadi to the south of the Jama Masjid.

The masonry dam constructed at Torvi village, which is located 8 kms to the west of Gol Gumbaz and another dam constructed on its eastern side. These two dams fed the reservoirs of Torvi and Afzalpur (Ramlinga tank, Figure 2) ($16^{\circ} 51.187'N$ and $75^{\circ} 41.280'E$). Water from the Torvi reservoir was supply to the citadel trenches and palaces of Bijapur. The Ramlinga tank served the needs of the suburbs of Shahpur, Khudavandpur and Khwaspur in the northwest of Bijapur (Campbell, 1884 and Cousens, 1889).

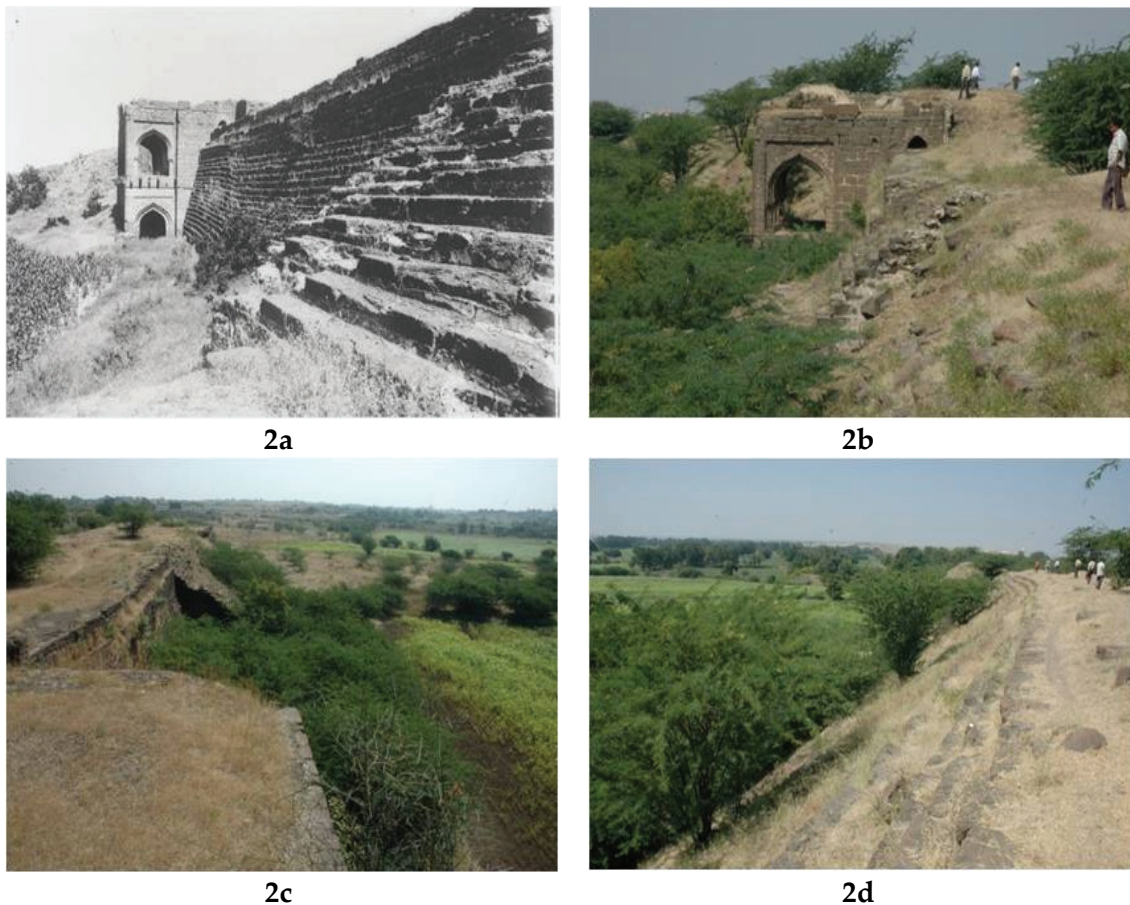


Figure 2: Ramlinga Tank

The Bijapur city was poorly service by Torvi sources and to augment the existing water supply Mohammad Adil Shah constructed Jahan Begum Talab (Fig. 3) ($16^{\circ} 47.479'N$ and $75^{\circ} 42.554'E$) in 1651 in memory of his wife Jahan Begum. The Talab is located 4.8 kms to the south of Gol Gumbaz is of 234 acres. This Talab fed the southern and eastern sides of Bijapur and ensured drinking water supply to the city. To the right side of the lake is an underground room from where water supplied to the city through terracotta pipes. The pipes were laid to the depth of 15 to 50 feet and were joined and encased in masonry (Cousens, 1889).



Figure 3: Jahan Begum Talab

Many water towers of height 25 to 40 feet called Gunj (Fig. 4) built to release pressure of water and prevent pipes from bursting. These towers also allowed dirt in pipes to remain at the bottom and the water to flow.



4a



4b



4c

Figure 4: Gunjs in Bijapur City

The Tanks and lakes named Rangrez Talab between Bahmanhalli and Shahpur gates, Quasim Talab, Fatehpur Talab and Allahpur Talab near Bijapur city provided water to the city. The chief sources of irrigation were the tanks or reservoirs. The two tanks of Mohummadpur and Kumatagi watered 674 and 56 acres of lands. In addition, to supplement the water needs of the people in and around, the Sultans and nobles constructed wells in different sizes.

Kumatagi (Fig. 5) ($16^{\circ} 49.015'N$ and $75^{\circ} 53.561'E$) is now a small village east of Bijapur. It was at one time a place frequented by the nobles and perhaps the court of Bijapur as a pleasure resort. On one side of the lake are the remains of many buildings, walls, and gateways. Chief among these are several little pavilions with tanks and cisterns around them. On the walls of one of these are some very remarkable and interesting frescoes.

Kumatagi was evidently use by the nobles of Bijapur as a hunting centre and the great artificial lake upon the border of which several of these little chateaux stand must have made it a favourite and pleasant resort. In fact the elaborate waterworks in and around these buildings are the chief characteristics of them. Out in front of the painted pavilion, and rising out of a large square tank, is a two storeyed building, through the masonry of which pipes carried up scores of jets on both storeys. These all open outwards and when the water was on it spouted forth from every conceivable point and fell splashing into the tank below it must have been a very pleasant sight. The water rose by manual labour to a cistern on the top of a high tower, and from this distributed through pipes to the various points below. Not content with this grand display before the pavilion they must have more of it within. From a large tank on the roof, water allowed to descend through a great-perforated rose in the centre of the ceiling, forming a magnificent shower bath with a cistern below it to splash in.



5a



5b



5c



5d

Figure 5: Kumatagi

Taj Bavadi (Fig. 6) ($16^{\circ} 49.513'N$ and $75^{\circ} 42.590'E$) Ibrahim Adil Shah, who ascended the throne after Adil Shah I, built Taj Bavadi in 1620 in memory of his wife Taj Sultana. Termed as the biggest and the grandest of all, this Bavadi lays to the east of the Mecca Gateway, a 35 feet high magnificent entrance (behind the present bus stand) and has arch. It is 120 feet long, 100 feet wide and 53 feet deep. There are octagonal domes on either side of the main gate with a parapet wall facing the entrance. The steps that commence from both the sides of the spacious halting rooms adjoin this wall and descend until the water level. There is a six feet wide passage on three sides of the

inner wall with resting places to the east, west and south built for the convenience of the travellers. One can have a full view of the Bavadi from the gallery, which has arches engraved with motifs.



6a



6b

Figure 6: Taj Bavadi

Chand Bavadi (Fig. 7) ($16^{\circ} 50.071'N$ and $75^{\circ} 42.656'E$) built by Ali Adil Shah in memory of his queen Chand Bibi in 1549. The Bavadi is at a distance of about 400 feet from the Shahapura Gateway of Bijapur city. It measures 144 feet from the east to the west and 156 feet from the north to the south. The stone steps around the square Bavadi taper down and the main door of the bigger arch adjoins the walls of the Bavadi. A large arch forms the entrance and smaller arches face the Bavadi. A four foot pathway runs parallel to the inner wall of the Bavadi. This was probably a model for the Taj Bavadi, which built subsequently.



7a



7b

Figure 7: Chand Bavadi

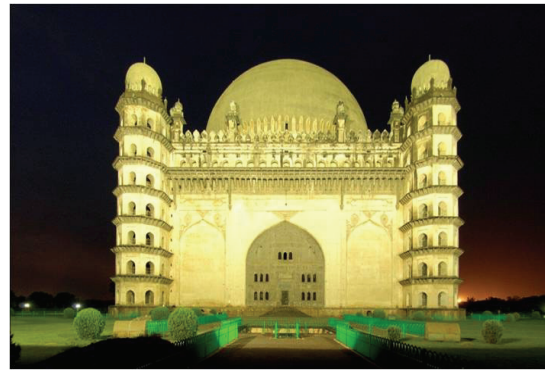
Ibrahim Bavadi occupies the third place in terms of its size, beauty and magnificence. Situated across the Ibrahimpur railway gate, this Bavadi hidden behind a small compound and belies the fact that such a grand structure exists within. Almost at the entrance, there are steps to go down, and a three-foot wide passage starts midway down the steps, leading to small halting places on the left and right. The entire Bavadi can only be view from the left side and presents a pleasing picture with its depth, spaciousness, and the arch wall at the front. It is an architectural marvel.

Gol-Gumbaz

Gol-Gumbaz (Fig. 8) is the mausoleum of Muhammad Adil Shah II, the seventh Sultan of the Adil Shahi dynasty (1627-57). Gol Gumbaz is the largest and most conspicuous building in Bijapur and one of the most celebrated in India. Yaqut a master builder of Dabul built it in 1659, at the architectural zenith of the Adil Shahi dynasty. It is a masterpiece of Muslim architecture, designed to eclipse the spectacular tomb of Ibrahim Adil Shah II, father of Muhammad Adil Shah. Gol Gumbaz constructed on a square podium measuring 183 Sq. meters. The tomb resembles a giant cube crowned by a hemispherical dome with a seven-storey octagonal tower at each of its four corners, capped by smaller domes.



8a



8b



8c



8d

Figure 8: Gol Gumbaz

The great dome of Gol Gumbaz is the second largest dome in the world. It measure 37.9 meters in diameter, compared with 42.4 meters at St Peter's in Rome and 32.9 meters at *St Paul's* in London. The space it encloses is the largest in the world covered by a single dome measure 1682.35 Sq meters compared with the Pantheon in Rome which measure 1470.80 Sq meters. The most ingenious aspect of its construction is the use of groined compartments or pendentives, which counteract the outer thrust of the dome, a grand example of the sophistication and confidence of the architecture of the period. The facades of the mausoleum have a large central arch, above which are a cornice of grey basalt and a row of small arches carrying a second line of plain work corned by a 1.8 meters high balustrade. The corner towers are entering from winding

staircases in the walls of the main building. Each storey has seven arched windows. At the sixth storey is a broad gallery popularly known as *whispering gallery*, around the dome, which has remarkable acoustic properties of 10 to 12 fold echo of the faintest sound can be obtained at the diametrically opposite end. The mausoleum exhibits a reverberation time of 26 seconds, the largest count in any such buildings. From the base of the dome, there is a fine aerial view of the city. Over the south doorway, there are three inscriptions giving the date of Muhammad Adil Shah's death on 1657. Below the dome, in the centre of the chamber, is the tomb of Muhammad Adil Shah. To the east are the graves of his youngest wife and his son Ali Adil Shah II; on the west are those of his favourite dancing girl called Rambha, his daughter and eldest wife. The real tombs however are in the cellar, in the same order.

A Preliminary Investigation at Gol Gumbaz Complex

The complex has an excellent hydraulic system as suggested by the presence of a number of water tanks, fountains, tank cum lifts, tank cum distributor and wells. At present, there are 28 features within the complex and preliminary investigation relates to hydraulic system are as follows:

Structure 1 ($16^{\circ} 49.851'N$ and $75^{\circ} 44.033'E$) marked as water body but it has not revealed any feature relating to hydraulic system.

Structure 2 (Fig. 9) ($16^{\circ} 49.885'N$ and $75^{\circ} 44.068'E$) is a tank, receives water from Structure 23, which is evident from feeder channels. The feeder channel are formed by terra cotta pipes laid on the channel cover with lime mortar and soil and finally the channel is covered by rectangular stone blocks, which is the significant hydraulic feature observed at the complex.

Structure 3 (Fig. 10) ($16^{\circ} 49.881'N$ and $75^{\circ} 44.107'E$) is a trough or water storing structure, which has not revealed feeder channels along the structure.



Figure 9: Structure 2



Figure 10: Structure 3

Structure 4 ($16^{\circ} 49.896'N$ and $75^{\circ} 44.146'E$) similarly, to structure 3, it has not revealed feeder channels along the structure.

Structure 5 ($16^{\circ} 49.763'N$ and $75^{\circ} 44.047'E$) is a gateway on the brim of the pond locally known as "Khandak", which is one of the main sources of water for the complex.

Structure 6 (Fig. 11) ($16^{\circ} 49.780'N$ and $75^{\circ} 44.067'E$) is also on the brim of the Khandakon the eastern side. It is a tank cum lift, which lifts the water from the Khandak and distribute to structure 7, which has been evident by feeder channels.



Figure 11: Structure 6

Structure 7 (Fig. 12) ($16^{\circ} 49.776'N$ and $75^{\circ} 44.083'E$) is a junction, function as a tank cum distributor, receives water from structure 6 and 17 and distribute to structure 23 and 9, all these features are evident by feeder channels made in similar fashion as mention in structure 2. The structure has revealed inlet and outlet channels on the walls, where as there is a vertical channel on the bottom of the tank, which function as a piston to control flow of water to the feeder channels.

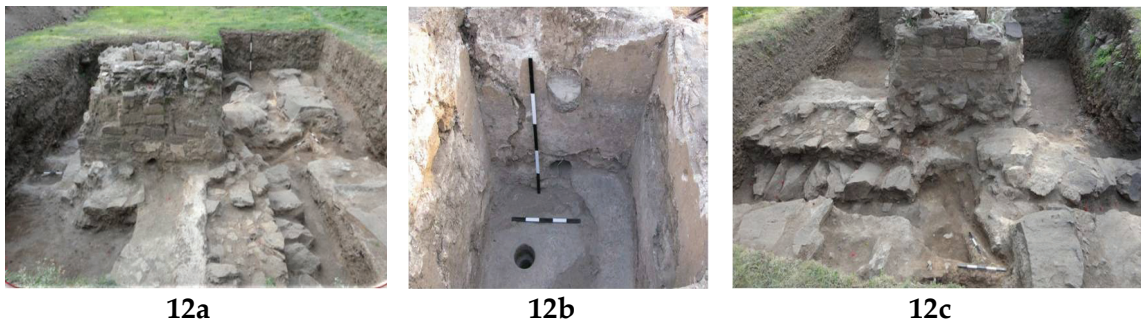


Figure 12: Structure 7

Structure 8 ($16^{\circ} 49.774'N$ and $75^{\circ} 44.130'E$) is a deepest tank around 4 meters laid on plinth wall of the Gol Gumbaz. It receives water from structure 16 and distribute to structure 21, which is evident by feeder channels.

Structure 9 (Fig. 13) ($16^{\circ} 49.794'N$ and $75^{\circ} 44.125'E$) is a tank in front of the fountain (structure 19). It receives water from structure 17 via structure 7, distribute to structure 19 and 21, which is evident by feeder channels. At the bottom of the tank, it has vertical channel made of terra cotta to control the flow of water to the feeder channels.

Structure 10 (Fig. 14) ($16^{\circ} 49.865'N$ and $75^{\circ} 44.253'E$) is a main tank cum distributor on the eastern side of the complex, receives water from Masa Bavadi (structure 26), which is one of the main water source area to the complex and distribute to structure 11, 12, 13, 13A, 14, 15 and 15A. The feeder channels made in similar fashion all over the complex mark these features.



13a



13b

Figure 13: Structure 9



14a



14b

Figure 14: Structure 10

Structure 11 ($16^{\circ} 49.847'N$ and $75^{\circ} 44.255'E$) is a feeder channel running towards structure 12, 13, 13A, 14, 15 and 15A.

Structure 12 ($16^{\circ} 49.835'N$ and $75^{\circ} 44.253'E$) is a feeder channel in continuation to structure 11 running towards structure 13, 13A, 14, 15 and 15A.

Structure 13 and 13A (Fig. 15) ($16^{\circ} 49.812'N$ and $75^{\circ} 44.259'E$) marked as a feeder channel and a fountain. The fountain has revealed vertical channel at the centre of the walls, which function as a piston to control flow of the water to the fountain. It receives water from structure 10 via structure 11 and 12 and further distributes towards structure 14 and 15.

Structure 14 (Fig. 16) ($16^{\circ} 49.787'N$ and $75^{\circ} 44.255'E$) is a fountain, which receives water from structure 10 via 11, 12, 13 and 13A, further distributes and receives water from

structure 15 and 15A, which has been mark by double line feeder channels and indicates that water has not travelled further.

Structure 15 and 15 A (Fig. 17) ($16^{\circ} 49.777'N$ and $75^{\circ} 44.261'E$) isa tank cum distributor, which receives water from structure 10 via 11, 12, 13, 13A and 14 and further structure 15 store the water and supply to structure 15A, which again recycle the water to structure 14 via double line feeder channels.



Figure 15: Structure 13 and 13a



Figure 16: Structure 14



17a



17b

Figure 17: Structure 15 and 15a

Structure 16 (Fig. 18) ($16^{\circ} 49.734'N$ and $75^{\circ} 44.106'E$) is a tank, which receives water from structure 17 and further distribute to structure 8, which are mark by feeder channels.

Structure 17 (Fig. 19) ($16^{\circ} 49.740'N$ and $75^{\circ} 44.079'E$) is a double storeyed tank; function as a main tank cum distributor in the complex. It receives water from Begum Talab, which is towards south of the complex, the water is brought through water towers or gunjs built at regular intervals in Bijapur city. The structure served as distributor to three different tanks that is structure 16, 7 and 9, which are evident by feeder channels.

Structure 18 (Fig. 20) ($16^{\circ} 49.794'N$ and $75^{\circ} 44.050'E$) is also double storeyed tank, function as tank cum distributor. This structure has not supported with evidences.

Structure 19 (Fig. 21) ($16^{\circ} 49.806'N$ and $75^{\circ} 44.124'E$) is a fountain adjacent to Gol Gumbaz on the west. It receives water from structure 9 via structure 7 and 17, which are mark by feeder channels.



Figure 18: Structure 16



Figure 19: Structure 17



Figure 20: Structure 18



Figure 21: Structure 19

Structure 20 (Fig. 22) ($16^{\circ} 49.795'N$ and $75^{\circ} 44.201'E$) is also a fountain adjacent to Gol Gumbaz on the east. It has inlets in all the four sides. It receives water from structure 27, which is partially establish and it also shows feeder channels on the eastern side of the fountain and moving towards south, which is also partially establish.

Structure 21 (Fig. 23) ($16^{\circ} 49.773'N$ and $75^{\circ} 44.158'E$) is a main fountain in front of Gol Gumbaz. The strategic position of the fountain gives its significance. It receives water from structure 8, 9 and 27. It also has three small tanks on its north, east and west sides. It is assume that small tanks also had a fountain, which is prove by finding of copper fragments from (outlet) in the centre of the tank at the floor level. Even though no conclusive evidences obtain from similar small tanks on the east and west sides, but it is likely that they also had fountains.

Structure 22 ($16^{\circ} 49.705'N$ and $75^{\circ} 44.284'E$) identify as a well situated on the eastern side of the complex. It has not revealed any connection with the hydraulic system within the complex.

Structure 23 (Fig. 24) ($16^{\circ} 49.843'N$ and $75^{\circ} 44.086'E$) is a tank, which receives water from structure 7 and distribute to structure 2, which are mark by feeder channels.

Structure 24 (Fig. 25) ($16^{\circ} 49.671'N$ and $75^{\circ} 44.162'E$) identify in archival reference as a fountain of which only fountain pipe were visible. Features were unearth but not able to find the relevant structure.



Figure 22: Structure 20



Figure 23a: Structure 21



Figure 23b: Structure 21



Figure 24: Structure 23



Figure 25a: Structure 24



Figure 25b: Structure 24

Structure 25 ($16^{\circ} 49.722'N$ and $75^{\circ} 44.217'E$) in archival reference identify as a recharge pit/depression but not able to find the structural features.

Structure 26 (Fig. 26) ($16^{\circ} 49.961'N$ and $75^{\circ} 44.168'E$) known as Masa Bavadi. It is one of the main water source areas for the complex and mainly supplies to eastern side of the complex to structures 10, 11, 12, 13, 13A, 14, 15 and 15A, which are mark by feeder channels. The significant feature about the feeder channels that it runs continuously for 185 m from Masa Bavadi to structure 10.

Structure 27 (Fig. 27) ($16^{\circ} 49.764'N$ and $75^{\circ} 44.165'E$) is a tank, situated between Gol Gumbaz and Museum. It distributes water via a junction to structure 20 and structure 21, which has been partially marked by feeder channels.



Figure 26: Structure 26



Figure 27: Structure 27

Structure 28 (Fig. 28) ($16^{\circ} 49.775'N$ and $75^{\circ} 44.049'E$) known as Khandak, which is one of the main water source areasto the complex. There are two water tanksbuilt at the brim of the structure, on the eastern brim is structure 6 and on the northern brim is structure 18.

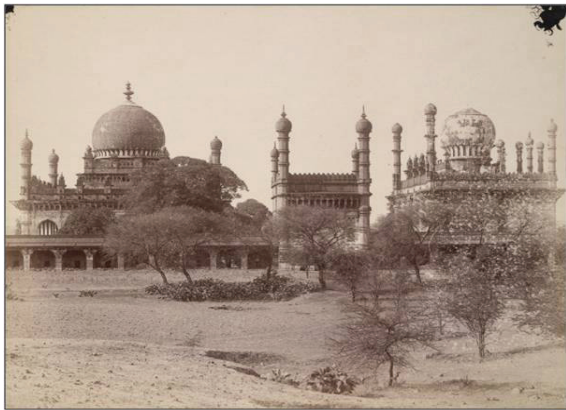


Figure 28: Structure 28

Ibrahim Rouza

Ibrahim Adil Shah II, the sixth Sultan of Adil Shahi dynasty, constructed Ibrahim Rouza (Fig. 29) in 1626. It stands as a beautiful and picturesque group of two building, which include the tomb of Ibrahim II, his queen Taj Sultana and four other members of the family. The magnificent group stands upon a high terrace in a rectangular enclosure about 400 sq. ft with a lofty entrance tower in the middle of the north wall ornamented with four graceful minarets. The tomb, which is the most ornate building in Bijapur, has a double row of arches forming two open colonnades. It surmounted by

a dome resting on a second square rising out of the flat roof of the building with its base ornamented by a number of small minarets. The columns of this colonnade is curiously wrought from the springing of the arches in imitation of woodcarving and the arches themselves are of a very quaint shape and are encrusted with carvings in a beautiful variety of design. Enclosed by this inner colonnade is the square chamber forming the tomb? The exterior wall of the sepulchre is most elaborately decorated. To each of the four sides is a doorway flanked by an exquisite ornamental window with interlaced Arabic script. However, the most remarkable feature is the hanging ceiling. It is composed of stone slabs with no apparent means of support, the secret lying in the exceptional tenacity of the mortar. Above is another chamber in the dome, reached by a narrow staircase. Over the north door is a Persian inscription, including a chronogram of 1626. Over the south door, is the date 1633, with an inscription praising Ibrahim and another commemorating the architect? Around the tomb, is a colonnaded veranda with a beautifully carved and decorated ceiling divided into compartments and inlaid with arabesques and flowers. Traces of the gilt and azure color remain. It is one of the finest examples of Islamic ornamental decoration in India. Outside, the double arches are crowned by a fine cornice with corner minarets and eight smaller ones between them. To the west, within the enclosure, is the Mosque in similar style. It is with five elegant arches beneath a finely detailed cornice enriched with stone chains carved from single blocks of stone. Four slender minarets with onion domes crown the four corners. This is an old-fashioned plain mosque with brick and mortar minarets over the corners and central piers.



29a



29b

Figure 29: Ibrahim Rouza

A Preliminary Investigation at Ibrahim Rouza Complex

The hydraulic system in the complex is mark by presence of water tanks, fountain and well. At present, there are 13 features within the complex and preliminary investigation relates to hydraulic system are as follows:

Structure 1 (Fig. 30) ($16^{\circ} 49.631'N$ and $75^{\circ} 42.062'E$) known as Mantapa Bavadi function as a main water source area for the complex. It has revealed feeder channels running towards Structure 2.

Structure 2 (Fig. 31) ($16^{\circ} 49.625'N$ and $75^{\circ} 42.100'E$) has two tanks adjacent to each other that function as a tank cum distributor, which receives water from Structure 1 and distributes water to Structure 3, which is evident by feeder channels.



Figure 30: Structure 1



Figure 31: Structure 2

Structure 3 (Fig. 32) ($16^{\circ} 49.642'N$ and $75^{\circ} 42.099'E$) functions as a tank cum distributor, receives water from Structure 2 and distributes to Structure 4 and 5. The northern feeder channel constructed with rough sand stone with thick lime plaster, the eastern feeder channel constructed with thin lime plaster whereas the southern feeder channel constructed with thick lime plaster. There is interesting feature for preventing the dirt carried by the water, which is mark by a filter fitted to the terra cotta pipe.



32a



32b



32c



32d

Figure 32: Structure 3

Structure 4 (Fig. 33) ($16^{\circ} 49.654'N$ and $75^{\circ} 42.104'E$) is a channel constructed with rubble stone and lime and capped by stone blocks. It runs almost three-fourth along the structure. It receives water from structure 3 and distributes to structure 6 laid on the outer side of the monument.

Structure 5 (Fig. 34) ($16^{\circ} 49.648'N$ and $75^{\circ} 42.133'E$) is a tank having additional tank behind the structure and it receives water from the Structure 3.

Structure 6 (Fig. 35) ($16^{\circ} 49.659'N$ and $75^{\circ} 42.098'E$) is behind to the Structure 4 on the outer side. It is rectangular structure identified as (Vaju?) with two compartments adjacent to each other for storing water. It receives water from Structure 4, which is evident from the channels and pipelines.



Figure 33: Structure 4



Figure 34a: Structure 5



Figure 34b: Structure 5



Figure 35: Structure 6

Structure 7 (Fig. 36) ($16^{\circ} 49.621'N$ and $75^{\circ} 42.139'E$) is a huge fountain between the tomb and the mosque. It has small tanks at the four corners with inlet / outlet channels

and steps leading to the bottom of the fountain. It also has stone pillar base over it wooden structures were form.



Figure 36: Structure 7

Structure 8 ($16^{\circ} 49.593'N$ and $75^{\circ} 42.133'E$) is stepped well situated on the backyard of the complex.

Structure 9 ($16^{\circ} 49.569'N$ and $75^{\circ} 42.159'E$) is a well situated outside of the complex, which distribute water to the southeastern corner of the complex.

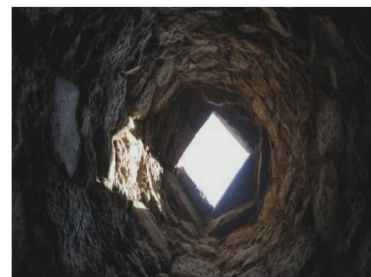
Structure 10 (Fig. 37) ($16^{\circ} 49.648'N$ and $75^{\circ} 42.116'E$) is a tank, circular at the bottom and square at the top, capped by stone slab. It is made of stone masonry with 2 m diameter having depth of 2.20 m. It lies in between Structure 3 and 5.



37a



37b



37c

Figure 37: Structure 10

Structure 11 ($16^{\circ} 49.641'N$ and $75^{\circ} 42.124'E$) is an ancient pathways running in east – west orientation.

Structure 12 (Fig. 38) ($16^{\circ} 49.637'N$ and $75^{\circ} 42.158'E$) is an ancient pathway, which is in continuation with structure 11 running in east-west directions, and in the west, it joins to the main pathway towards monument and in the east, it connects to dalans. It has

sub-pathways running towards north-south direction and connecting to the northern dalan and to the south, it connects to monument plinth wall. The main pathway towards the monument is measuring 1.7m width. In both the side of the pathway is well-dressed stone was placed with thin lime plastered up to 0.40m width in both the sides and in the middle of the pathway is simple stone chips were filled with mud plastered. In both the edge of the pathway there is ring stone placed at the distance of 1.5m. This ring stone 0.35m in thickness and inner diameter is 0.15m and outer diameter is 0.20m.



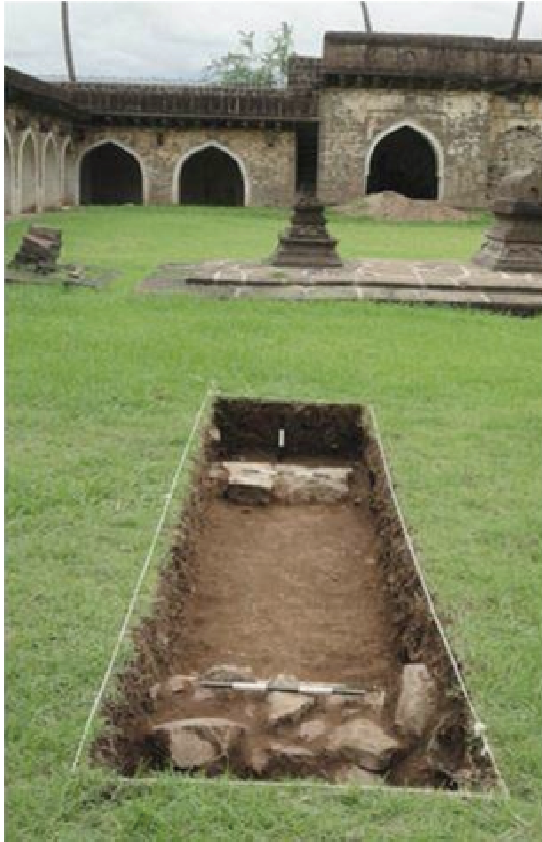
Figure 38: Structure 12

Structure 13 (Fig. 39) ($16^{\circ} 49.599'N$ and $75^{\circ} 42.158'E$) is an ancient pathways running in east – west orientation on the backyard of the complex.

Conclusion

The **Gol Gumbaz Complex** (Fig. 40) has revealed fabulous evidences regarding hydraulic system. It receives water from three main sources i.e. Begum Talab (4.8 kms south of the complex), Khandak (within the complex on the west) and Masa Bavadi (adjacent to the complex on the north). The complex has received water from Begum Talab through Gunj's at regular intervals to structure 17, which has been establish partially through the evidence of feeder channels towards south and behind the structure 17. However, due to the sapota plantation and water logging in the southwestern part of the complex, there was a hindrance in establishing the connection between Begum Talab and structure 17. This observation supported through map of Bijapur prepared during Adil Shahi period showing water works and other monuments including Gol Gumbaz.

The next source of water receives by the complex is from the Khandak, which is on the western side of the complex. On the brim of the Khandak, there are two water tanks, which lift the water i.e. structure 6 and 18. At structure 18 due to the disturbance at the



39a



39b

Figure 39: Structure 13

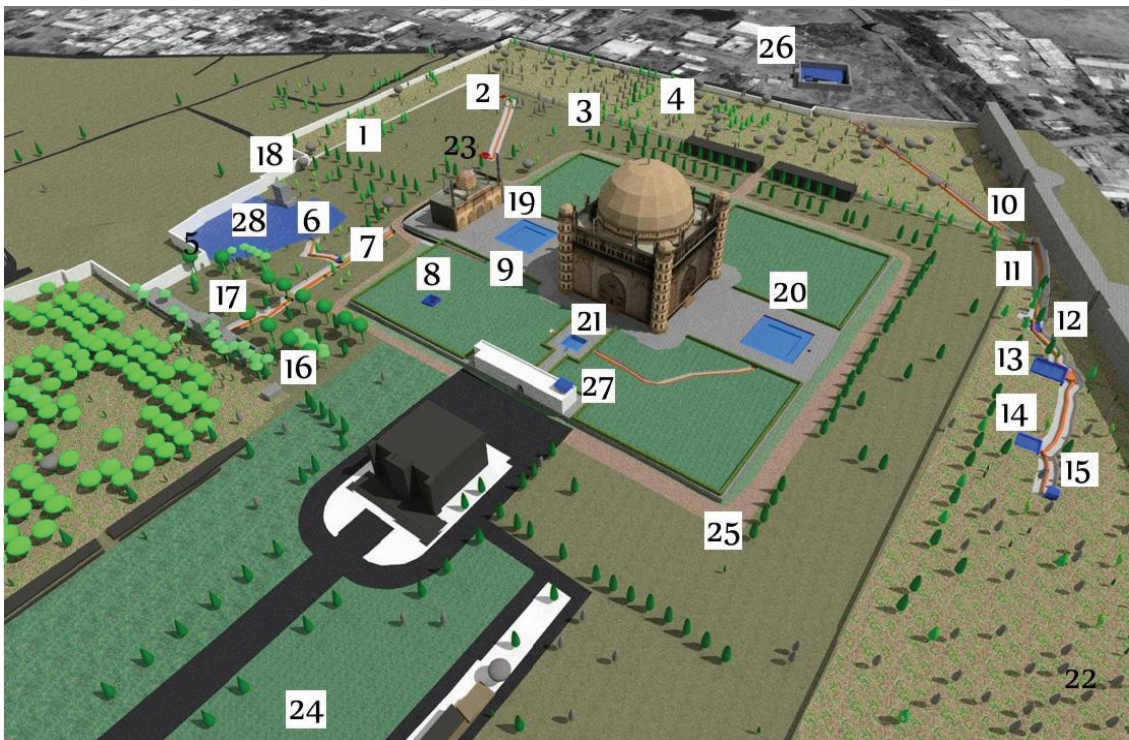


Figure 40: Location Plan of Gol Gumbaz Complex

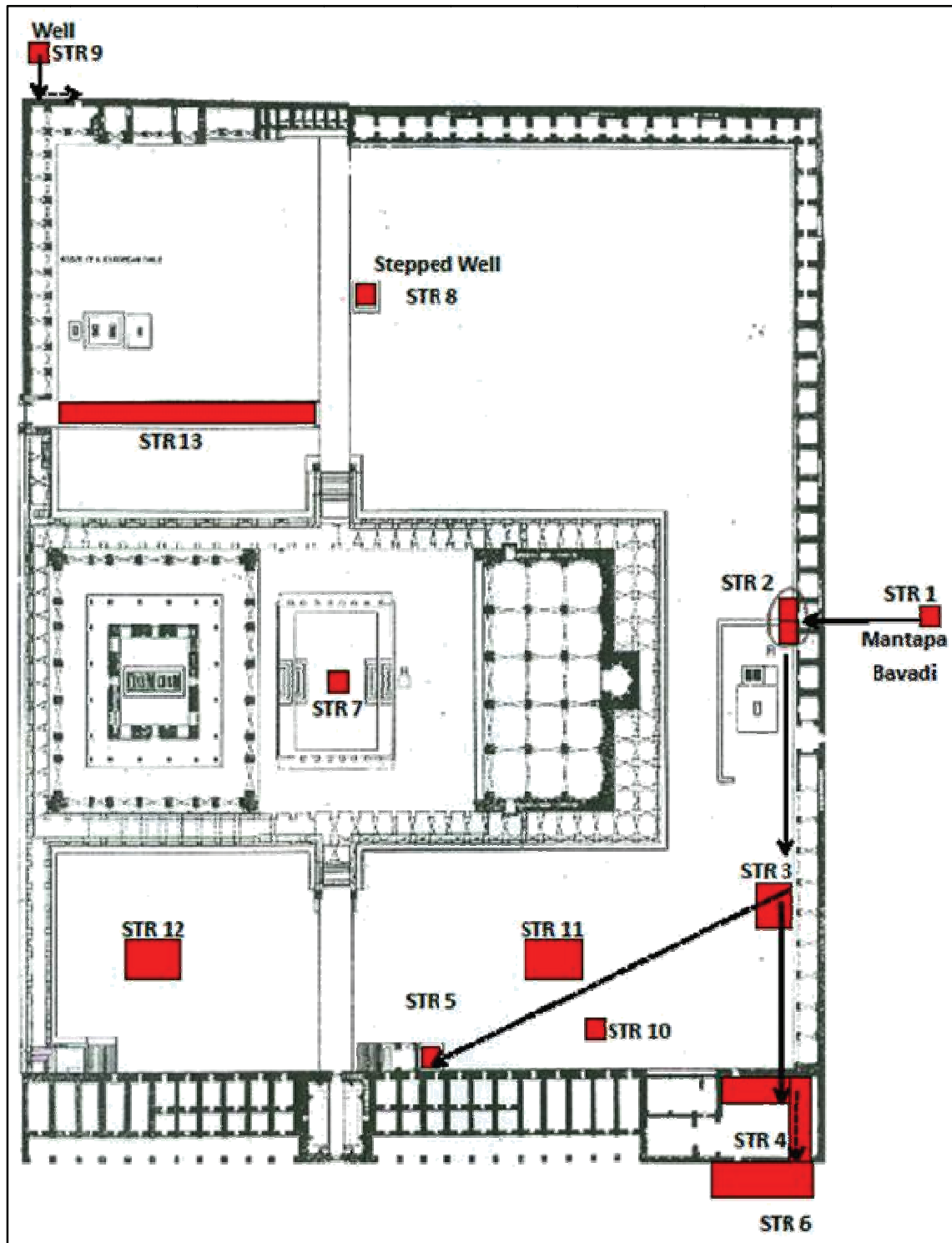


Figure 41: Locational Plan of Ibrahim Rouza Complex

site it was not feasible to establish connections whereas structure 6 has lifted the water from Khandak and distribute to structure 7. The third source situated on the northern part of the complex, where water is lift from the Masa Bavadi and distribute to structure 10. Now, it seems to be very significant feature of engineering where water

has travelled almost 185 m without any lift. Structure 10 collects the water and distributes to structure 11, 12, 13, 13A, 14, 15 and 15A. The water from Masa Bavadi has concentrated only on the eastern part of the complex, which has established thoroughly.

These water sources only give the outer dimensions of the hydraulic system whereas there are intricate inner dimensions within the complex. One of them is structure 7, plays a vital role on the western side of complex. It functions as a tank cum distributor, receives water from structure 6 and 17 and supply water to structure 2 via structure 23, it is also connected to feeder channel running from structure 17 to 9. The position of structure 16 seems to be very important in the complex. It receives water from structure 17 and distribute to structure 8 and then from structure 8 to 21 (which is the main fountain within the complex). Structure 17 is also an important feature in the complex, it distributes water to structure 16, 7 and 9, which further distribute it to structures 16 – 8 – 21, structures 7 – 23 – 2, structures 9 – 19 and 9 – 21. Overall structure 17 supplies the major portion of the water bodies within the complex. Another feature of a junction observed between structures 20 – 21 – 27, which show the alignment towards structures 21 – 20 – 27.

There are two features, structure 3 and 4, identified as a trough or water storing structure. The purpose of these structures is for domestic uses or for providing water to the animals. While the remaining features i.e. structure 1, 5, 22, 24 and 25 can be taken up as a limitation or for future studies.

The Ibrahim Rouza Complex (Fig. 41) is in low-lying area in a trough like formation, which can be easy flooded during seasonal rain. The only evidence established of bringing water to the complex is through Mantapa Bavadi, which is evident by feeder channels running towards the structure 2. The complex has received water from Mantapa Bavadi to Structure 2 further it has moved to Structure 3. Structure 3 has and formed a junction, which receives water from Structure 2 and it distributes it to Structure 4 and 5. Structure 4 further distributes the water to Structure 6. It has also revealed that Structure 5 has underground tank adjacent to it on the north. Structure 6 has been identified as Vaju. Structure 7 is a fountain within the complex. Whereas Structure 8 is a stepped well located to the south of the complex. Structure 9 is a well situated on the southeastern corner outside the complex, which has revealed a channel running towards the ancient toilet blocks. Structure 10 is a unique structure within the complex identified as a tank made of stone with mud plaster and the bottom is paved with stone pebbles. Structures 11, 12 and 13 are as ancient pathways within the complex.

References

- Campbell, J. M. 1884. *Bijapur Volume-XXIII*. Government of Karnataka, Bombay.
- Cousens, H. 1889. *Bijapur – The Old Capital of the Adil Shahi Kings*. Orphanage Press, Poona.

- Cousens, H. 1926. *The Architectural Antiquities of Western India*. The Indian Society, Victoria street, London.
- Imaratwale, A. G. 2007. *History of Bijapur Subh (1686-1885)*. New Delhi, India.
- Jeelani, S. A. 2006. *Karnataka Gazetteer Bijapur District*. Government of Karnataka, Bangalore, India.
- Michell, G and M. Zebrowski. 1999. *The New Cambridge History of India* Vol. I: 7 Architecture and Art of the Deccan Sultanate. Cambridge University Press, Cambridge.
- Nayeem, M. A. 2007. The History of Gardens and Gardens Culture in the Deccan. *Deccan Studies* Vol. V, Number-2, Hyderabad, India.
- Nayeem, M. A. 2008. *The History of the Adil Shahi of Bijapur*. Hyderabad, India.
- Siddhanti, V. 2011. Water Management and Conservation Systems in the Adil Shahi Dynasty of Bijapur Sultanate A Study. *South Asian Journal of Tourism and Heritage*, Vol. 4 No 1.
- Wagoner, P. B. and J. H. Rice. 2001. *From Delhi to the Deccan: Newly Discovered Tughluq Monuments at Warangal – Sultanpur and the Beginnings of the Indo-Islamic Architecture in Southern India*. ArtibusAsiae.