

**INDUSTRIAL VISIT TO IRRIGATION & HYDRAULICS STRUCTURE PROJECTS  
(VANI VILAS DAM, SHANTHI SAGAR SPILLWAY, CANAL REGULATOR,  
AQUEDUCT) AT DAVANGERE & CHITRADURGA ON 17<sup>TH</sup> & 18<sup>TH</sup> OF FEBRUARY,  
2017 TO VI SEMESTER B.E. CIVIL ENGINEERING STUDENTS.**

**SHANTHISAGARA**

**Shanthisagara** is also called as Sulekere. It is having Asia's second largest irrigation tank. It is located near to Kerebilchi of Channagiri taluk of Davanagere District in Karnataka, India.

**Importance of the Lake**

Shanti Sagara tank, created by an embankment with sluice outlets, built in 1128, the tank has a history of 800 years. It took three years to construct the massive tank. The tank, which has a water spread of  $26.51\text{km}^2$  (2,651 ha), has a circumference of 30 km (19 mi). It has a total drainage basin of 81,483 acres (32,975 ha). It irrigates 4,700 acres (1,900 ha) of land and more than 50 villages are benefited by it.

The tank receives the drainage of twenty square miles. All of the drainage pours into the gorge where it is built (the main stream bearing the name of Haridra, a tributary of the Tungabhadra). The embankment is constructed between two hills, and embankment is of no great length; it is around 950 ft (290 m), but it is of stupendous width (Max 120 ft (37 m), min 70 ft (21 m)), height and strength, though not quite straight. The main road connecting between channagiri and Davanagere pass through on this embankment. It has resisted successfully the floods of centuries, but owing to the great pressure of the volume of the water in tank.

It has two sluices. That to the north is called the "Sidda", and that to the south the "Basava". Notwithstanding the damaged state of the sluices and the great force of the water when escaping through them, the embankment has always remained firm and uninjured, a satisfactory proof of the solidity of the structure.

If required (as during drought) the tank can be fed by surplus water from Bhadra Dam's right bank canal.



Fig :1



fig : 2

## CANAL REGULATORS

- Regulators Constructed at the off taking point are called head regulators. When it is constructed at the head of main canal it is known as canal head regulator. And when it is constructed at the head of distributary, it is called distributary head regulator.

### **Function:**

- To control the entry of water either from the reservoir or from the main canal.
- To control the entry of silt into off taking or main canal.
- To serve as a meter for measuring discharge of water.

### **Construction:**

The components of head regulator depends upon the size of canal and location of head regulator. It consists of one or more gated research openings with barrels running through the bank. For large canals head regulators are flumed to facilitate the measurement of discharge.

### **Cross Regulator**

- A Regulator Constructed in the main canal or parent canal downstream of an off take canal is called crossregulator.
- It is generally constructed at a distance of 9 to 12 km along the main canal and 6 to 10 km along branch canal.

### **Functions:**

- (i) To Control the flow of water in canal system
- (ii) To feed the off taking Canals
- (iii) To enable closing of the canal breaches on the d/s
- (iv) To provide roadway for vehicular traffic

### **Construction:**

For Cross Regulators abutments with grooves and piers are constructed parallel to the parent canal. The sill of regulation is kept little higher than the u/s bed level of canal across which it is constructed. Vertical lift gates are fitted in the grooves. The gates can be operate from the road.





fig : 3

## CANAL DROP

A **drop structure**, also known as a *grade control*, *sill*, or *weir*, is a manmade structure, typically small and built on minor streams, or as part of a dam's spillway, to pass water to a lower elevation while controlling the energy and velocity of the water as it passes over. Unlike most dams, drop structures are usually not built for water impoundment, diversion or raising the water level. Mostly built on watercourses with steep gradients, they serve other purposes such as water oxygenation and erosion prevention.

### **Environmental effects :**

Drop structures have been shown to either be beneficial or detrimental to habitat in the stream. They create complexity of habitat by breaking up a stretch of stream into a series of pools. Surface turbulence, eddies and bubbles are generated by drop structures that provide hiding and cover for fish and other aquatic organisms. Water is aerated as it passes over drop structures. Sediment is collected and sorted in scour pools, which provide energy dissipation.

On the other hand, drop structures may also become barriers to fish. The downstream channel may erode and slowly and unexpectedly increase the height of the structure, to a point where migratory fish, such as salmon, cannot pass over the structure. Other causes may be that the plunge pool is obstructed or the water flow is too shallow. However, many properly functioning drop structures themselves may impede the upstream and downstream migration of fish.

Unless the structure is designed to maintain them, existing fish spawning pools will be impacted or lost.

### **Erosion control :**

Erosion is usually reduced by drop structures, and natural river channel processes, such as channel migration, meandering, and creation of stream pools and riffles, are also reduced. Drop structures can be used for flow control and to stabilize waterways and prevent the formation of gullies. They also have the potential to operate as inlets and outlets for other conservation structures, such as culverts.





fig : 4



fig : 5

## VANIVILASASAGARA

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### Introduction:

VaniVilasaSagara, popularly known as **Mari Kanive** is a dam near Hiriyur Taluk, Chitradurga District, in the Indian state of Karnataka. It is the oldest dam in the state.

The dam was built by the Mysore Maharajas pre-independence across the river Vedavathi. The dam is an exquisite piece of architecture, an engineering marvel for that time, and provides water to lots of surrounding cities, towns and villages, which are largely dry lands of the Deccan area of Central Karnataka.

### Significance :

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This dam is the source of domestic water for Hiriyur and Chitradurga. It irrigates more than 100 km<sup>2</sup> of land in Hiriyur and Challakere taluks through right and left bank canals. This place is 160 km from Bangalore on the NH-4 highway and 40 km from Chitradurga. The dam was initiated by the regent queen who was a widow of Maharaja ChamaraajaWodeyar. She is known for her social works which were exemplary. For the construction of this dam royals of Mysore had to pledge royal jewellery due to shortage of money, that is why it was named as "VaniVilasaSagara". VaniVilasa was the name of youngest daughter of the then Maharaja of Mysore. This dam is higher than KRS dam of Mysore.

### History :

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The Mari Kanive irrigation project was initiated by Sir. Mark Cubbon, the British Resident of Mysore. Further improvements to the dam was initiated by DiwanSheshadriIyer in 1897 at the order of his Highness the Maharaja of Mysore Sri KrishnarajaWodeyar IV.

The dam has been a tourist attraction for many years, but has been apparently neglected as a prime tourist destination. Recently, though, the development work undertaken by the forest department to restore the nearby forest cover, and the 'panchavati' gardens - a garden of medicinal plants with the old Indian cultural theme has improved the tourist figures, making it a popular weekend picnic spot. The 'panchavati' garden has medicinal plants lined up representing cultural themes - the 'Rashis', 'Saptaswaras', 'Nava grahas' and many more. The tourists who visit Chitradurga and Hosdurga often visit Mari kanive on the way. The historic

maarikaamba temple here also attracts many tourists. The place is around 20 km drive from Hiriyur on a deviation from NH4 (Bangalore - Mumbai National Highway).

Vanivilas dam is about 160 km from Bangalore. So it is highly advisable to tag Chitradurga fort with this beautiful place. No clear sign boards are available on the highway(but one land mark is there after we reach and cross hiriyur bypass right side from Bangalore to Puna highway we see one sugar factory opposite side service road we take left and go straight in 18 km) , so once you reach Hiriyur, slow down for the next 5 km and ask the locals for the correct deviation. Once the deviation is taken clear sign boards are available and the place is about 20 km from the deviation from the highway.

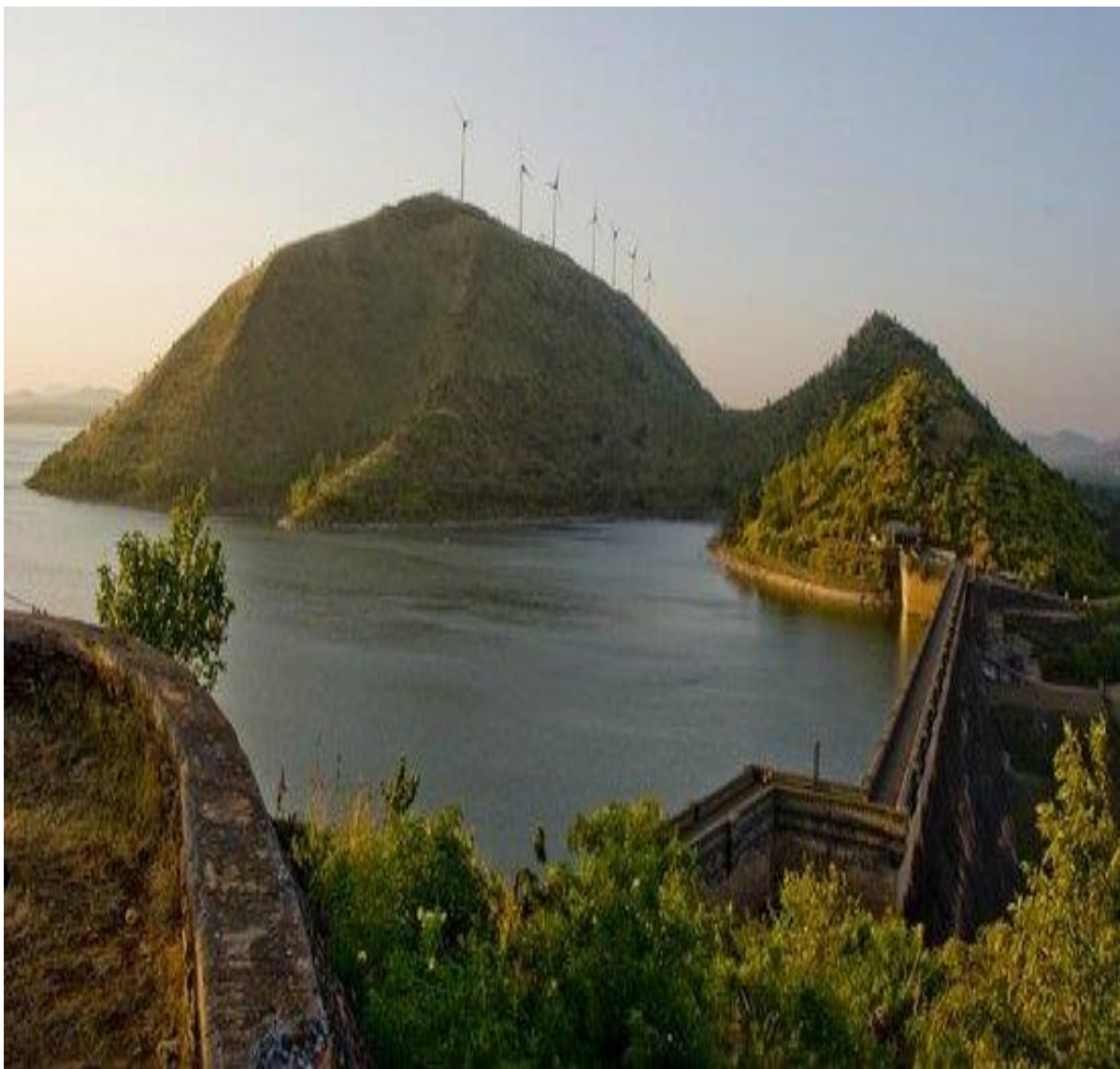


fig : 6





fig : 7



fig : 8



fig : 9

**CHITRADURGA FORT :**

**Chitradurga Fort** or as the British called it **Chitaldoorg**, is a fortification that straddles several hills and a peak overlooking a flat valley in the Chitradurga District, Karnataka, India. The fort's name *Chitrakaldurga*, which means 'picturesque fort' in Kannada, is the namesake of the town Chitradurga and its administrative district.

The fort was built in stages between the 17th and 18th centuries by the dynastic rulers of the region, including the Rashtrakutas, Chalukyas and Hoysalas as well as the Nayakas of Chitradurga, feudal lords in the Vijayanagar Empire. The Nayakas of Chitradurga, or PalegarNayakas, were most responsible for the expansion of the fort between the 15th and 18th centuries. They were defeated by Hyder Ali at Chitradurga in 1779. Later the fort was expanded and strengthened by Hyder Ali and his son Tippu Sultan, who succeeded MadakariNayaka V, the last ruler of the Nayaka clan. The fort is built in a series of seven concentric fortification walls with various passages, a citadel, masjid, warehouses for grains and oil, water reservoirs and ancient temples. There are 18 temples in the upper fort and one



huge temple in the lower fort. Among these temples the oldest and most interesting is the Hidimbeshwara temple. The masjid was an addition during Hyder Ali's rule.



fig : 10



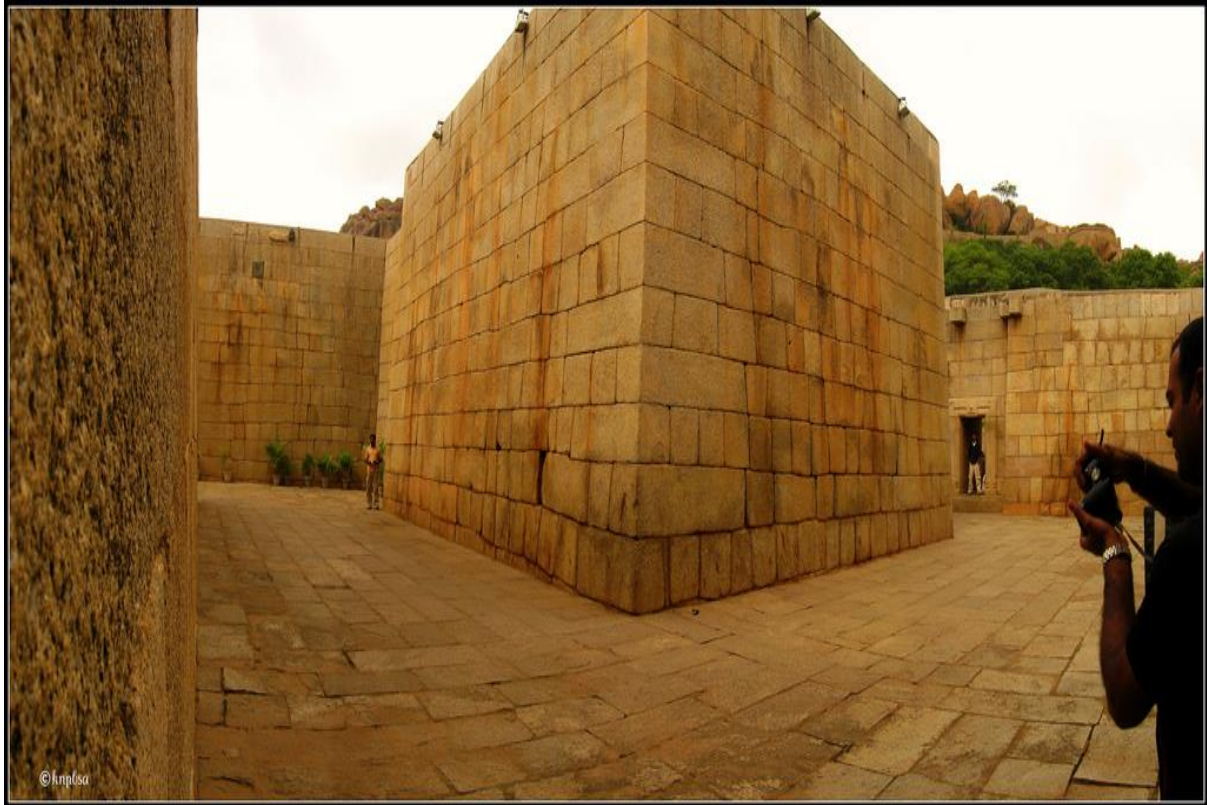


fig : 11

**HISTORY :** A number of inscriptions of the Chalukyas, the Hoysalas and the Vijayanagar kings have been found in and around the fort. These inscriptions trace the history of the fort to the 3rd Millennium B.C. Ashokan period rock edicts found near Brahmagiri also link Chitradurga to the Mauryan Empire during the reign of the royal dynasties of Rashtrakutas, Chalukyas and Hoysalas. However, the area where the fort now exists achieved prominence only under the dynastic rule of the Nayakas of Chitradurga or "Paleygars" (called "little kings") as a feudatory of the Vijayanagar Empire.

Between 1500 AD and 1800 AD, Chitradurga Fort witnessed a turbulent history starting with the Vijayanagar Empire; the empire had gained control of this region from the Hoysalas. Vijayanagar rulers brought the Nayakas, the traditional local chieftains of the area, under their control as their feudatory, until their dynastic reign ended in 1565 A.D. Thereafter, the Nayakas of Chitradurga took independent control of the region and their clan ruled for more than 200 years until the last of their rulers, MadakariNayaka V, was defeated by Hyder Ali of Mysore Kingdom, in 1779. During all these years, Chitradurga Fort was central to the reign, particularly of the Nayakas.

TimmanaNayaka or ThimmappaNayaka, a chieftain from Matti, during the rule of SaluvaNarasimha, was the first ruler in the hierarchy of the Nayakas of Chitradurga. Initially, he was a chieftain under the Vijayanagar Empire but was soon elevated to the rank of Governor of Chitradurga by the Vijayanagar ruler in recognition of his excellent provenance in military service to the empire. His rule covered areas of the Chitradurga District including Davangere, Jagalur and Harihar of present Davangere District. His rule lasted for a brief period and ended with his incarceration and death in the jail of the Vijayanagar Empire. His son ObanaNayaka or MadakariNayaka (1588–1602) succeeded him. MadakariNayaka was followed by a series of hierarchical or other adopted forms of successions of the same clan; MadakariNayaka V was the final ruler of the clan from 1758 to 1779. BharamappaNayaka, who ruled from 1689 until 1722, is regarded as the greatest of the Nayaka rulers famed for building forts, palaces, tanks and temples, including several gateways and bastions. He fought several battles against the Mughals.

However, it was during the reign of MadakariNayaka V (1758 to 1779) that the city of Chitradurga and the fort were besieged by the troops of Hyder Ali. MadakariNayaka used the fort effectively for defense during three battles against Hyder Ali. At times he had allied himself with Hyder Ali of Mysore Kingdom and at other times with the Marathas. Hyder Ali attacked the Chitradurga Fort the first time in 1760, the second time in 1770 and the third time successfully in 1779 when he defeated MadakariNayaka. Nayaka was taken a prisoner and killed. Nayaka's gamble of playing with both Hyder Ali and the Marathas did not work out. He was betrayed by the Marathas and some local Muhammadan officers in his service. Subsequent to his death the treasury at the fort is said to have yielded a rich bounty. It was during one such war that the heroics of OnakeObavva, the wife of a soldier guarding the fort, became a legendary event.

The dynastic reign of the Nayakas lasted for over 200 years and the Chitradurga fort was their stronghold and the very heart of their province.

In the Fourth Mysore War, Tippu Sultan was killed by the British in 1799, and the Mysore Kingdom was reordered under the Wodeyars. Chitradurga became a part of Mysore province. The British considered Chitradurga Fort a potentially useful base for providing a strong line of defense to Mysore's northern border. Between 1799 and 1809, the British garrisoned their troops in the fort. Later, the control of the fort was restored to the Government of Mysore.

A woman named Obavva, the wife of a soldier called MaddhaHanumappa, was guarding a fort tower, substituting for her husband during a lunch break. She was guarding the Chitradurga Fort at a crack opening, a secret opening where only one person could barely squeeze through. Her heroics have entered the annals of legendary folklore of the Karnataka State. While fetching water, she heard the muted sounds of enemy soldiers attempting to enter the fort through the crevice. With great presence of mind she immediately hid behind the crevice in the fort and hit at each soldier trying to squeeze through the crevice with *onake*, the name given in Kannada to a masse or pestle, a wooden rod used for pounding paddy. In this process, she bravely killed several enemy soldiers. By the time her husband appeared on the scene, she had already dragged several bodies of dead soldiers into the fort wall and was standing around the dead bodies with the blood stained *onake* in her hand.

MaddhaHanumappa blew the bugle, and other soldiers joined him and killed all the enemy soldiers. This brave act saved the fort on that day from further attacks by Hyder Ali's soldiers. Her heroic act was commemorated with her impressive statue (sculpted by Ashok Gudigar) erected in front of the District Commissioner's office in Chitradurga town. The stadium in the town was named after her. This act earned her the epithet "OnakeObavva" and the crevice in the fort where she showed her bravery is called "OnakeKindi". However, in the battle for the fort, MadakariNayaka V lost and Chitradurga Fort eventually fell to Hyder Ali.



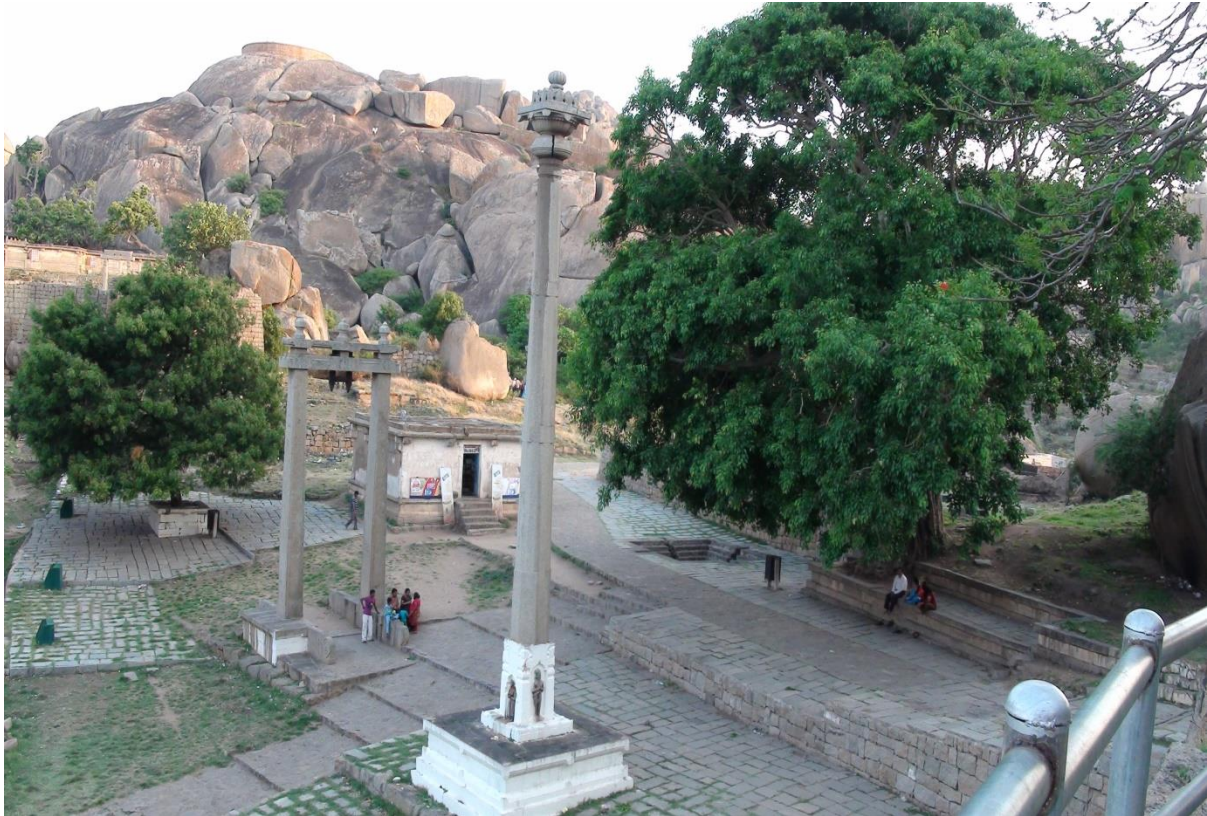


fig : 12

**TEMPLE OF FORT :**

Eighteen temples were built in the upper fort. Some of the well known temples were the Hidimbeshwara (an ancient legend is linked to it), SampigeSiddeshwara, Ekanathamma, Phalguneshwara, Gopala Krishna, Lord Hanuman, Subbaraya and Nandi.

Hidimbeshwara temple displays the tooth of Hidimba, the giant (Rakshasa in Sanskrit). It is said that Hidimba and his sister Hidimbi, a giantess, used to live in this temple. Hidimbi, who fell in love with Bhima (the second of the Pandava brothers of Mahabharata) married him and had a child by him named Ghatotkacha. A large cylinder about 3 metres (9.8 ft) in circumference and 2 metres (6.6 ft) high made of iron plates known as *Bheri* or Drum of Bheema is also located here.<sup>[citation needed]</sup> A monolithic pillar and two swing frames are also seen at the gate to this temple. SampigeSiddheshwara temple is at the foot of the hill. In the Gopalakrishna Temple, inscriptions date the idol to the early 14th century.

In the lower fort, a temple dedicated to the tutelary deity of the NayakaPalegars, the Uchchangamma or Uthsavamba, was built amidst the rocks of the fort complex on the hill.

The MurugarajendraMatha, a famous religious institution of the Lingayats, which was originally located within the fort, is now situated about 2 kilometres (1.2 mi) to the northwest of Chitradurga.



fig : 13





fig : 14



fig : 15





fig : 16



fig : 17



fig : 18



fig : 19





fig : 20



fig : 21





fig : 22



fig : 23





fig :24



fig : 25





fig : 26



fig : 27



