

**CONSERVATION WORKS OF
THIRUMALAI NAYAKKAR
MAHAL**

Editor

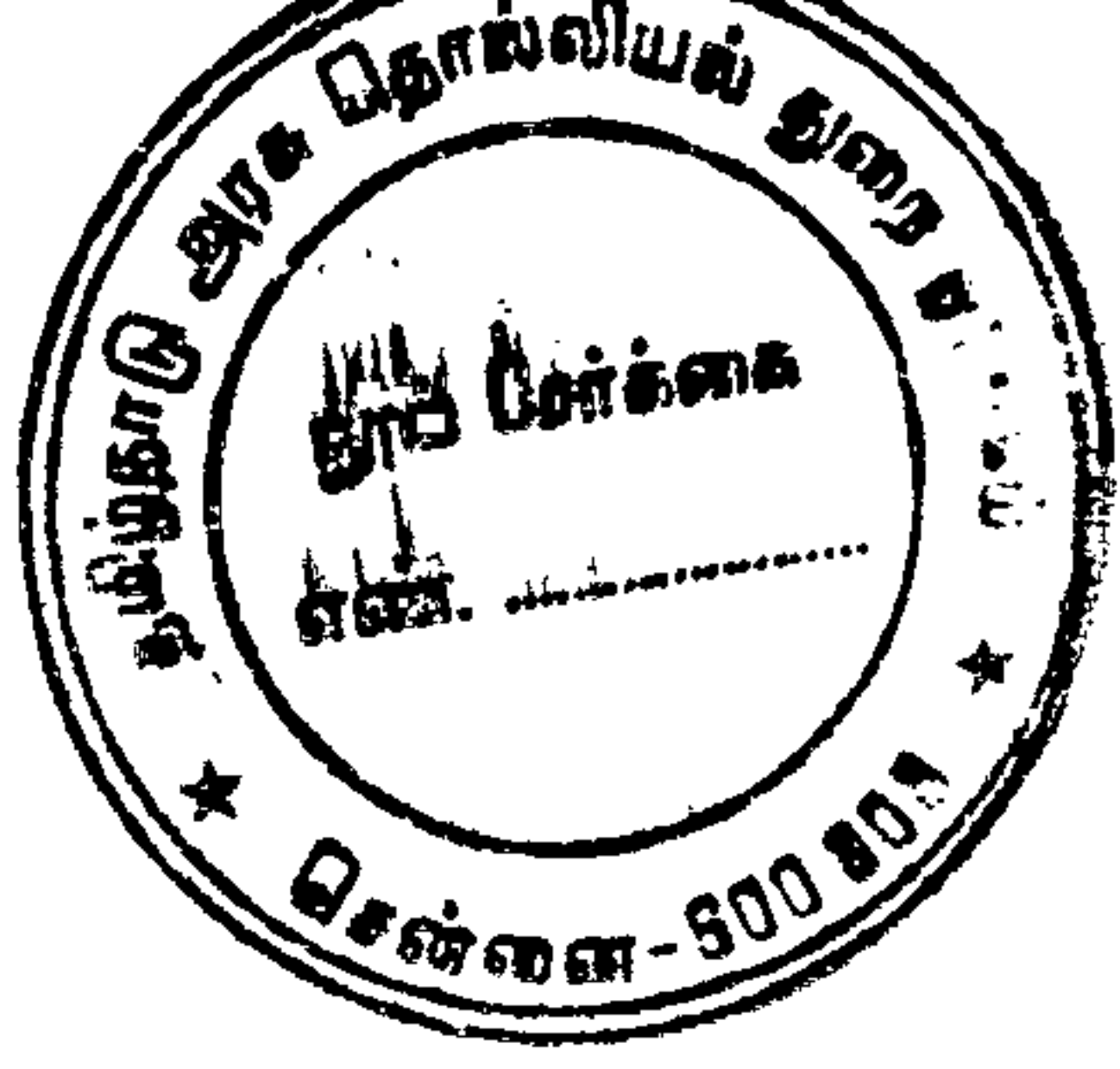
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PREFACE

Tamil Nadu is a grand repository of ancient cultural and natural treasures of exceptional value. In this the temple city of Madurai has played a remarkable role in the history of South India. Madurai Nayak principality was established in 1530 A D. Thirumalai Nayakkar, builder of the Palace, who the seventh ruler from 1627-59. This Palace is considered as the most marvellous secular building in south. By conserving the Palace, by allocating funds under various schemes including 12th Finance Commission the Government has encouraged the Conservation of the Palace and ensured its longevity for the benefits of posterity. In this way, for conserving the Palace, the Government have allotted Rs 100.00 Lakhs under XI Finance Commission Grants during 2002-03 and Rs 300.00 Lakhs under XII Finance Commission Grants during 2006-07 as recommended by the State High Level Committee, headed by Chief Secretary.

The Government has allocated the fund directly to the Public Works department for the execution of Conservation works. Restoration of old structures is a major engineering task due to non-availability of old materials and non practising of old techniques. In order to follow the archaeological norms and principles and to preserve the cultural edifices, an experienced Archaeological Technical Consultant, Thiru M.G. Chellapillai, a retired Assistant Superintending Archaeological Engineer from the Archaeological Survey of India, was appointed both for XI and XII Finance Commission Works.

In this situation, the efforts were taken by the then Directors and Commissioner of Archaeology. Dr. Sitharam Gurumurthi IAS, took keen interest to obtain Government approval for execution of works under XII Finance Commission Grants.

I wish to compliment the Chief Engineer (B) Public Works Department and his team of Engineers who were engaged in the execution of XII Finance Commission works and for the prompt completion of the Mahal works. I wish to acknowledge the Engineers of the TNSDA, who rendered assistance for the execution of works and complete it in time.

The “Report on Conservation of Monuments 2002-2005” was already published by this department to facilitate those who are engaged and interested in the conservation of Heritage buildings. I wish to place on record my appreciation for the efforts of Thiru R. Narayanan, Assistant Executive Engineer, State Department of Archaeology in compiling this document in a thorough, professional and systematic manner, with support from the section Engineers.

I hope that this publication, containing historical evidence on the methodology of conservation of heritage building will serve as a guide book for the general public and engineers alike. This is first time we have attempted to publish the monument’s current status from the date of its declaration in 1971.

Chennai

25.3.10

Dr. T.S.Sridhar I.A.S.

Principal Secretary and Commissioner

Department of Archaeology & Museum

COMPLETE REPORT ON THIRUMALAI NAYAKKAR PALACE, MADURAI

Tamil Nadu is a grand repository of ancient cultural and natural treasures of exceptional value. In this way temple city of Madurai has played a remarkable role in the history of South India. The antiquity of this city goes back to 2500 years. The Third Tamil Sangam functioned from this city. History reveals its glorious trade relations linked to the Roman empire of Italy in early 2nd century ACE. Sandal, Pearl, Semi precious stone beads, conch, bangle, cloths were exported to Rome, Wine, Arretine (Ancient Roman pottery) revaluated potteries are some of the imports. Tamil Nadu State Department of Archaeology has excavated 2nd century roman settlement site at Alangankulam near the delta of Vaigai River which runs through Madurai city. Important findings such as artefacts, roman coins etc are the evidence of the above trade relation.

In early Pandiyan period, Madurai town layout was like a lotus. Madurai was referred as Koodal Maanagar, Mukkoodal, Alavaay Nagar in old Sangam literature and in inscriptions. The three Tamil Sangam literary Associations were operated at Madurai by Pandiyan Kings. The sangam literature refers to the wood workers from Rome who were utilized for making pillars and Podigai for early Pandiyan Palace decorative works.

HISTORY OF THIRUMALAI NAYAKKAR PALACE

This Magnificent Palace was constructed in the year 1636 A.D. by King Thirumalai Nayakkar (1623-1659 ACE) who ruled as the seventh ruler of Madurai Nayak dynasty and designed by an Italian Architect, with huge tall pillars of 32 feet (average) height and 18 feet (average) circumference.

The early Palace enclosure may have its main entrance at Manjanakara Street with enclosures of a theatre, a Palace shrine, Queens's apartments, an armoury, building for housing palanquins, royal bandstand, quarters for relatives and servants, a pond garden etc. The length of enclosure walls are 900 feet length in East West and 660 feet in North South and 40 feet height. It took seven years to complete the old Palace which is four times bigger than the present one. The Palace originally consisted of Swarga Vilasam & Ranga Vilasam. Ranga Vilasam was purely a residential quarter in which Muthialu Nayakkar, brother of Thirumalai Nayakkar lived. In addition, Rajarajeswari Amman Shrine, Queens Chambers, Armoury, a water fountain, a Pool,

residential quarters of servant and relatives were located. Only one forth of the Palaces is now in existence, which is the king's pavilion, pooja room, dancing hall and the bed room.

The original entrance of this palace stood on the Northern side of the present palace, i.e. through Ranga Vilasam Palace remains of which are now called as Ten Pillars lane. The four boundaries of those twin palaces are East Veli Street, south Veli Street, West- Manjanakara Street, North Vilakkuthoon. These Palace enclosures are having a compound, and also having a city enclosure fortification wall all around outer Veli Streets with seventy two bastions. These fortifications were dismantled in the year 1901 by a British Engineer Mr.Marrat with the help of Perumal Maistry. Only one bastion is now in existence at the western end of Nethaji Road near Katta bomman Statue Roundana.

CAUSES FOR EARLY RUINS:

The Nayakkar Palace was shifted to Trichy by King Chokkanatha Nayakkar, who was the grandson of Thirumalai Nayakkar. During shifting the Golden Plates laid over the inner ceiling of Raja dome was removed and other ornamental embankments were also taken away from this Palace to Trichy which was made his capital. After the shifting, the Palace was used as an Armory Centre. According to 1821 Survey Account, the part of the palace was occupied then by a paper factory, worked by convict labour and as per the jottings of the then Madurai Collector Blackburn, weavers also used it for their work during 1837. In the later period due to heavy rain and cyclone some of this uncared palace portions fell down and walls developed cracks in 1857. The remaining portions are preserved by the then Governor of Madras Presidency, Lord Napier who took interest and spent Rs. 5.50 Lakhs of rupees during 1858 ACE. The Government architect My. Chisholm was sent for renovation of the surviving portion. He had constructed buttress walls, stitched the bricks structures, constructed walls wherever found missing and fixed M.S. Flats and tie rods for vaults, domes, across Gothic arches etc. He also converted the wicket gate on the Eastern side as main entrance with Ashlars masonry. Later British Government started making annual allotments for the upkeep of the Palace from further ruins. The various public offices were then located in the restored portions, and to accommodate them the cloisters were partitioned off into sets of rooms with dwarf walls which quite spoiled their appearance. The District courts continued to function in the building till 1970, when they were shifted to the new building. The District Judge who had office in this building seemed to have found difficulty

even to get access to his office as the approach way was filled with the fallen debris of the building. Hence all the public offices were shifted to some other places and this building was handed over to the Archaeology Department in the year 1971. Since 1971 the palace is preserved as a protected monument by the Tamilnadu State Department of Archaeology (TNSDA).

After declaring as a monument, a major face lift work was carried out by spending 2.50 Lakhs, before presenting to the delegates of the World Tamil Conference held at Madurai on 4.1.1981. The Tamilnadu Government have also arranged Sound & Light Programme on Thirumalai Nayakkar in the Palace, which is in the heart of the city, as a part of the cultural programme on a permanent basis with a permanent gallery to seat 300 persons. The arrangements for the Son-et-lumiere programme were made by Philips International at a cost of Rs 25.00 Lakhs.

ARCHITECTURAL BEAUTY OF THIS PALACE:

From an architectural point of view it is believed to have been designed by an Italian Architect and considered the “most marvellous” building south of Bombay.

The Main portion of the rectangular open court yard in the centre of the palace measures 50.00 Meters East and West by 32.00 meters North and South surrounded by inner and outer corridor with rows of various sizes tall colonnades on either side, the vaults and domes supported by gothic arches rest over the capital of the pillars. The Makara thoranas are embedded at the edge of the gothic arches. The top parapets of open court yard are decorated with bhuthavari and dragons etc. The inner corridors are having three domes on each side. The square base resting over the four pillars are covered as octagonal sides by providing four triangles, supported by teak wood beams with Thuthiyali figures which rest over an elephant which is standing over a pillar. The octagonal side walls raised are converted as sixteen sides by providing eight triangular projection having Thuthiyali with pucharam. Then, these sides are converted into spherical shape and embedded with lotus stucco works of four petals with kodi, kodipalai and gandarvas behind the petal. The gothic arches are having kodi mangai at its top. The angels, doves, parrots and other miniature ornaments are decorated inside the spherical domes. Inclined ventilators are

provided at the side walls for natural lightning and air circulation. Complete ornamentation is worked out in the exquisitely fine stucco using Chunam.

The Raja dome at Swargavilasam which is called king's celestial pavilion can be approached by a flight of steps guarded by sculptures of horse riders having 75 meters from north to south by 52 meters across and 32 Meters height which rest over twelve pillars, three in each corner enclosing a square which is 21 meters across. These columns are first linked together by massive indo saracenic arches. Four similar arches are then thrown across the corner and the octagonal drum rises from these piers. Above these cornice 15 metres up, the octagon changes to a circle and the dome rises, surrounded on all sides by arcades of very great beauty. The supporting pillars are of stone 12 metres in height and are joined by foliated brick arcade of great elegance and design carrying a cornice and entablature rising to upward of 20 metres in height. The Eastern façade of Swargavilasam are decorated with Niches, Makara thoranas, Flower petal pouring angels and Naasithalai at the top of the Gothic arches. Veena Saraswati, Vishnu , Kodimangai, Pushpapothigai , Kodikarukku etc; are seen on the sides. The octagonal side walls are strengthened with mukhabadras at its junctions. Cavity walls with segmental arch opening of two rows are provided in first floor for natural cooling at the king's pavilion on the west and also for the vaulted roofs of ministers seat on the south and north side of Dharbar hall. According to the historical records, the Great Nayakkar ruler used the pavilion for celebrating festivals like Chitrai and Navarathiri during which vassals used to pay tributes and present costly jewels and other gifts to the king. The bottom of the adjacent domes at Swargavilisam is decorated with palm leaf bracings. The barrel vaults of the adjacent ceiling are decorated with bhutha ganas holding the roof intact.

The most beautiful stucco works are embedded at the dancing hall or natakasalai which is basically the replica design located on the North West corner of the building. The roof of is a pointed arch of brick work strengthened by granite ribs springing from a double series, one above the other, of pointed arches supported on columns. Behind the upper series of these arches runs a gallery of Pallavas style as at Mamallapuram. The special feature of the dancing hall is the king's seat on the western corridor and the dance performance was held at the depressed floor at the eastern steps below it. The ministers and other gents were seated in the raised portions adjacent to east of the dancing floor. The royal Queen and other maids would be seated on the

eastern corridor of the first floor. The royal ladies in first floor were unable to see the gents on the ground floor platform but they can see the performance & the king only. Similarly, the gents on the eastern platform are also unable to see the ladies behind them on the first floor. The concept guiding these techniques is the parapet wall in front of the queens on eastern corridor of first floor which is 6.5 feet breadth by which the eye angle inclination will fall in to the dancing platform and beyond.

The ribs are raised up to the roof on either side. The pancharas with Nagabandas rest over the capital of the dancing hall short pillars. Kodi coming out of a dragon mouth in the pancharas are of minute ornamental beauty. Swans, parrot, lion with wings dove, Dvarabhalahas, makharathoranas with yali, lion, elephant, cow are decorated at the edge of the Gothic arches.

The karukku decorated at the edge of the thoranas over the steel fishplate of British period, indicate the later period architecture. The lion with wings are found to be of foreign influence. The elevated middle facades are full of stucco works of great architectural beauty.

The Pooja room is having Ashtangavimana with a flat ceiling at the edge of inclination at the top of inner roof. The flat ceiling is decorated with lotus of colourful beauty. The pooja room is having two black polished granite pillars on south side with a highly elevated madras terrace roof behind it. The doors are raised to a height of 20 feet in so that the elephant which carry the sengol procession from Meenakshi Amman temple enter to this pooja room easily during Dashara festival. The Madras terraced roof was constructed during British period after dilapidation of the roof which is seen on the adjacent ground.

The harem portion side walls were constructed by the British where as the original main walls are adjacent to it at the basement level. The bed room is the only square building having an elevated hemispherical dome at the middle and vaults around it. Ventilators are provided at the octagonal side walls. The ribs and kumba pancharas are decorated inside the roof.

There are 248 pillars all over the Mahal portions as detailed below:-

1. Entrance	2
2. Pillars in Corridor	158
3. Pillars in Ground Floor	40
4. Pillars in Pooja Room	2
5. Pillars in Grinding Room	2
6. Pillars in Natakasalai	24
7. Pillars in western side of Natakasalai	12
8. Pillars in Palliyarai (Square)	8
Total Pillars in Nayak Palace	248 Nos.

Other details:-

Height : 4.15M; 8.30M & 12.50 M

Diameter : 1.56M (av)

Circumference : 4.90 M (av)

The pillars' central core is with granite stones of semicircular and circular shapes. During renovation works, 5 layers of plastering were removed from court yard pillars, 32 paintings of Thirumalai Nayakkar period was brought to light which denote that during Tirumalai Nayakkar period these pillars were with crude granite stone only. These line drawings drawn as ladies with kalasam, mulaipari and other auspicious things welcoming the inmates with kolavai sound which is the traditional welcome of the Pandya country. These pillars are spread with semi solid ground lime mortar by hand as a base coat and other four layers of plastering were laid decades later. Paintings have been preserved Intact, with plastic sheets visible for public after chemically treating them as directed by Dr. T.S.Sridhar, Principal Secretary and Commissioner of Archaeology

The sub-columns are provided at the Kalyana mahal portion in front of Swaragavilasam in order to increase the arch width, for safe distribution of big barrel vaulted roof load into the basement. The beam was squared and projected beyond the capital on the northern side middle bay pillar which led to cracks and failure in early British period and was mended by State Department of Archaeology.

The lotus stucco works are found in the outer hemispherical Raja dome, Kalyana mahal vault, Eastern hemispherical domes, etc. The Raja dome kalasam is of 9'-6" height, where as the minister dome kalasam is of 6'-6" height. The kalasam are having a teak wood decoration at the middle with a painted edge penetrated in to the roof structure. The kalasam are five and eleven numbers in vaults and single in hemispherical domes. There are thirteen domes and six vaults all over the roof area of ground, first and second floors.

The foliations in Gothic arch projections are having wooden reapers twisted with coir ropes, mended with brick bats and plastered. The corbels in vaults and domes are having teak wood beams, twisted with coir ropes and coping with flat tiles in lime mortar. The floorings are provided with cut stone pavement over a base of pebble stone lime concrete. The basements are with two stages with upa- pidam and adishthanam of ashlar's masonry.

FOUNDATION TECHNIQUES ADOPTED:

This 368 years old Palace still remains strong basically due to its stable foundation. A trench of 4'-6"x4'-6" was excavated to a depth of 7'-6" which is filled with sieved sand and compacted layer by layer. The circular granite pillar pieces were laid over it and embedded with RR Masonry of 6'-00" width and 3'-00" height. The same pillar cores were raised by embedding the brick wall to a height of 2'-6". The plain pillars were separated beyond these heights up to capital to resist the roof load pillars having 19'-00" circumference at Raja dome, 18'-00" in courtyard and 16'-00" in dancing hall were having semicircular granite stones. 6'6" circumference sub-columns were also with circular stone pieces.

There are some cracks of minor nature on the walls and on the ceilings of the various parts of the palace found at the time of taking over the building. As a first step, the damaged portion of the pillars in the corridors and the floor were repaired, by spending about 3.50 Lakhs for pillars and Rs 30,000/- for flooring in the year 1981. Cracks have been monitored by using tell-tale

glass process, and it was observed that the cracks were developing gradually. Government has decided to conserve this historical and glorious monument and formed on **EXPERT COMMITTEE** in the year 1990 in G.O. Ms. No 80 Tourism & Culture Department dated 3.5.1990 to investigate the causes for deterioration of the structure for the benefit of posterity. The following officials have been appointed as members in the expert committee under the chairmanship of the Secretary, Tamil Development & Culture Department.

- Secretary, Finance Department
- Chief Engineer, (Buildings) Public Works Department.
- Superintending Engineer, HR&CE Department
- Superintending Archaeologist, Archaeological Survey of India, (Southern circle), Chennai
- Dr. Madhava Roi, Deputy Director, SERC.
- Dr. T.B.Ganesan, Professor, IIT.
- Dr. Zacharia George, Secretary, Indian Concrete Institute.
- Dr. Santhakumar, HOD & Professor, Anna University Chennai.
- Dr. Chitharanjan, Assistant Professor, Anna University, Chennai.
- Dr. Lakshmipathi, Professor, Anna University, Chennai.
- Prof. Annamalai Swamy, (Retd), Thyagarajar college of Engineering, Madurai.
- Thiru. Natana Kasinathan, Director, department of Archaeology – Member and Secretary.

The Expert Committee deliberated at Madurai on 13.6.1990 after analyzing the structure in various angles and came to the following conclusions and recommended the following measures:-

- A) The building is 350 years old, built with traditional materials like timber; brick and there are some deterioration in these materials. Due to temperature variation and ground water level variation has led to some cracking in the structure. However, the committee is of the opinion that there is no imminent danger to the structure as a whole. The building has to be repaired and conserved.

B) For the conservation, the steps to be taken are as explained hereunder:

- The survey of building at various levels and elevations will have to be undertaken to indicate the layout, sizes of the walls, arches etc. This survey should also indicate the layout of the building at roof and arches. Madurai Thyagarajar engineering College may be requested to do this survey with an active support and assistance of the Engineers of the Archaeology Department. These Engineers are familiar with the building. The estimated expenditure for the survey will be Rs 25,000/-. The college will also do two bore holes for soil testing of the compound. This survey is expected to be completed by First week of July, 1990.
- A plinth protection in the form of an apron to be built around the building for immediate action. This will help to control the moisture variation in the soil around the building. This apron of 3 Metres (10'-00") width with adequate slope to be built in concrete. Out side of this apron, around the building, a trench of 1.50 metres to 2 metres depth is to be cut. The protruding roots of trees visible in this trench should be cut and burnt. The trench may be filled back. It is estimated that the apron work will cost around Rs. 1, 50,000/-.
- As an immediate step, the cracks, existing in the ceiling, are attended to. For this purpose latex/epoxy modified cement mortar have to be used. This is considered as a temporary measure to prevent leakage and falling of plasters. This repair works is expected to cost around Rs 50,000/-
- Tell-tale paper tapes/gauges are to be installed across the cracks to study the progressive variation of the existing cracks. Thyagarajar Engineering College, Madurai can provide the requisite supervision for this work.
- On completion of the survey as in (1) above, a small group of the Expert Committee will meet and study the survey report and recommend repair measures to be taken. The expert Committee may then meet and finalize the recommendations. An expert in soil mechanics may then be co-opted to recommend the repair measures in foundation.

- The works of repairs on such monuments are delicate and as such, it can only be entrusted to builders who have previous experience with such work. It is also likely that the repair measures to be suggested by the sub-group may involve modern methods of construction like guniting, grouting, core-drilling, diamond saw cutting, pre-stressing etc. The contractor to be selected for this work should also have previous experience in this field.
- The Government may make an initial allocation of Rs 5, 00,000/- to the Archaeology Department to take up the initial operations as out lined above.

As suggested a detailed structural study was commissioned to conduct the various test through the Thyagarajar College of Engineering headed by one of the Expert Committee member Professor Thiru. Annamalaisamy.

The Investigation report of the Thyagarajar College of Engineering college stated as follows:-

General:

The preliminary investigation of the structure of T.N.Mahal reveals that the structure is on sandy silt soil of considerable depth. The chief materials of constructions used are brick, lime mortar, stone slabs & segments and timber logs of teak wood. The structural elements of roof are mostly vaults, arches and domes of brick in lime mortar. They are largely compression elements in their structural form. Timber logs round and sparingly sized have been used wherever tension occurs in horizontal beams. They have also been used in tension zones of cantilevers and corbels. The logs have been wound with coconut fibre ropes for their entire length to improve the bonding of lime mortar which has been used to cover the beams to form cornices and ornamental projections. The columns are of cut stone segments set in lime mortar with facing of burnt bricks in lime mortar. They are resting on stone pedestals and have cut stone capitals at top. It is observed that all the walls have been plastered with ground lime mortar whereas the columns have been finished with sea shell lime Chettinad plaster. Stone pavements below ground level covering the whole area of the roofed portion are supposed to form the foundation on which the entire structure rests.

Necessity for the present Investigation:

Cracks have appeared at some portions of the roof and walls. The lime plaster of the walls has lost bond and has started to blister. There are many evidences show that many modifications and strengthening have been done to the structure for more than 200 years by the successive rulers and others. All efforts have been taken by the British rulers from time to time to preserve this historic monument. History reveals that the existing structure is about one fourth of the then constructed palace of T.N.Mahal. Hence Government feels that the remaining portion at least has to be preserved as historical monument and is to be maintained and transferred to posterity as such. This desire of the Government is the motive force behind the endeavour of the present investigation.

The proposed Investigation:

The Expert Committee appointed by Government of Tamilnadu suggested that the investigations may be oriented towards the study of the general safety of the structure with special emphasis on the study of the cracks which are found at the western roof and walls of Swarga Vilasam portion of the palace. It also suggested a detailed study of soil at the site, study of the effect of the variations of ground water level on the stability of the structure and that of the present strength of the various building material used in the construction.

Suggested modes of Investigation:

A committee of civil Engineering Professors of Thyagarajar College of Engineering who visited the palace suggested the following studies.

- a) Study of the soil at the foundation level to decide the possible settlement due to overloading or /and due to alternate soaking and drying of soil at site due to rain water.
- b) Study the present strength of building materials used in the structure.
- c) Study of the natural cracks.

1. STUDY OF THE SOIL

a) SETTLEMENT STUDY OF SOIL BELOW FOUNDATION DUE TO POSSIBLE OVERLOAD:

As the structure has a well knit stone paved foundation connecting different pillars exact mathematical enumeration of the pressure on soil is impossible. Hence the region near the Swargavilasam where lots of cracks are located has been isolated for pressure calculation. Approximate weight of the structure above is calculated and the approximate pressure of soil is assessed. Plate load test on the soil at the outer neighborhood of the western wall of Mahal has been conducted to assess the safe bearing capacity of the soil at the foundation level of the structure.

To get second opinion of the safe bearing capacity of the soil, soil samples have been collected at the foundation level and tested in the soil mechanics Lab of Thyagarajar College of Engineering, Madurai.

The final assessed S.B.C. of the soil is the lower of the two values and is given as 12 t/sq.m for the soil at a depth of 5.0 m. outside the Mahal western wall. It is compared with the pressure on the soil from the super structure.

As the tested value of S.B.C. of soil is more than the calculated pressure on the soil. **It is concluded that the crack in the roof is not due to settlement of soil because of over load.** Visual observation shows that there is no indication of separation between column, wall & the flooring at their junctions thus ruling out the possibility of settlement of wall or column due to overloading. This agrees with the former calculation of no settlement due to over load based on the test results.

b) POSSIBLE SETTLEMENT OF SOIL DUE TO ALTERNATE WETTING & THAWING OF SOIL DUE TO SEASONAL MOISTURE VARIATIONS:

One will wonder at the ingenuity with which the builders of the Mahal have provided drainage for rain water. All roof of the structure have been drained to the periphery and not a single drop of rain water from roof flows into the central open court yard.

However as no ground level drainage has been provided at the periphery, all the rain water collected at the roof falls freely from the roof drains by a vertical distance of about 12.0 metres in to the immediate vicinity of the outer walls. This results in the erosion of the soil near the outer walls. The aftermaths of this effect are:-

- (1) The rising of ground water level in the outer portions of the sub-soil in winter and lowering of the ground water to a depth of about 70 metres from ground level in summer. The result of this alternate wetting and thawing may result in lateral and vertical movement of soil at the foundation level. Later rulers of Madurai seem to have understood this problem and provided subsequent additions to the structure like buttresses and batters in the outer wall which take care of the tendency for outward movement of the outer walls. Ties and steel bands have also been provided at the spring in the domes & vaults of the roofs to prevent the lateral movement of supporting walls due to the lateral thrust produced by the domes & vaults.
- (2) Due to capillary action, the rain water falling near the outer wall results in dampness on the outer walls and pillars nearby thus resulting in spilling of plaster on the wall & pillars at the adjacent bays of the outer walls.

To arrive at the suggestion, detailed levelling surveying has been undertaken in the present investigation and contour maps have been drawn at 0.1 m interval at ground level first floor and second floor levels. Proposal for the construction of pavement along the outer periphery of Mahal and construction of set rain water drains (with design of sizes of drains at various place also). The Mahal has been originally designed with a net work of storm drainage system for getting the storm water to the outer periphery of the building. The outer carrier

drainage systems at Ground level are not present now. It has been proposed to let out the storm water collected from the top floor and first floor to a system of storm drain laid 3.50 m away from the building outer walls by providing a floor of any suitable materials for a width of 3.50 M. The contour plans of all the floors were studied in depth and it was found that the drainage area of the floors can be divided in to 5 different zones. To effect economies in the drainage system a uniform section viz a rectangular section with 30 cm base width has been recommended for adoption. The bed levels at various critical points have been fixed up for such lined storm water drains. **The water effluxing from the 5 drain systems are to be let out to three out let points at the boundary of the present Mahal premises. These have to be connected suitably to the municipal sewer system.**

2. STUDY OF THE BUILDING MATERIALS USED IN THE CONSTRUCTION OF MAHAL

Construction materials used in Mahal are

- Brick & Tiles
- Lime mortar
- Stone
- Timber.

The present study is to find the strength of the above materials used in the construction.

Bricks & Tiles:-

The bricks used are found to have a 2 compressive strength of 43 N/ Sq.mm which is more than the strength of common burnt clay solid bricks as per IS 3102/1971 of strength 235 N/Sq.mm when tested as per is 3495/1976.

Lime Mortar: -

Samples of lime mortar from the structure was collected and tested in the chemistry lab of Thyagarajar College of Engineering, Madurai. The silica lime ratio was 1:1 (to be very precise

43: 49.5) other additives like white of egg, Jaggery and Gallnut water are said to have been added to the mortar during grinding. The lime mortar is used as binding material in the masonry construction and is also used as plaster on the walls. It has been observed that due to aging & weathering for nearly 350 years, lime mortar has lost its bonding capacity and plaster has started peeling off. Immediate remedial measures are to be taken to rectify this defect to safeguard the structure.

Stone:

Cores, capitals and pedestals of all columns are of stone segments. The foundation of the entire structure is on a stone pavement. No sign of distress due to overloading or deterioration due to weathering is found in any stone made part of the structure. Hence it is decided that no study need to be done on this material.

Timber:

Logs of teak as such and in some cases sized to a square section have been used in tension zones of horizontal beams and corbels. All logs have been wound with coconut fibre rope to their entire length and plastered and finished with lime mortar to form copings, Statues and other ornamental figures. The rope has been used to improve the bond of lime mortar on the logs. The logs contained sapwood and cambium layers. Most of the portions of the logs have deteriorated due to chemical action with lime and ravaging effect of rain water and insects. Peeling of plaster cover resulted in exposure of timber to atmospheres which further accelerated the deterioration. Extensive damage to the structure has been caused due to rotting. Many wooden beams & corbels are exposed to atmosphere due to flaking of plaster. **This warrants immediate attention and corrective measures so that the structure is prevented from further deterioration.**

3. STUDY OF CRACKS

Even though minor cracks are seen in many parts of the structure, the most wide and serious cracks are observed at the western most bay of the Swargavilasam. The seriousness of these cracks has been understood the extensive strutting with pipe staging has been done in the past by the Department of Archaeology.

In the present study, it has been decided to observe whether the cracks are dormant or live in nature. Normally dead cracks are less dangerous than live & propagating cracks.

Demo points are fixed at different location of cracks observed on the floor of first & second floor of the structure. The gauges are oriented one orthogonal and another parallel to the cracks. The orthogonal gauges give extent of widening or closing of cracks and parallel points give the sliding of the cracked portions. Dummy points are used in the un-cracked neighbourhood of cracks to take readings of correction for movements due to temperature & moisture variations.

SOIL TEST

Strain gauge is used to observe the readings between the relevant points at regular intervals. From the reading taken it is concluded that the opening & closing of cracks are due to the entry of rain water in to the cracks. The movement is secondary in nature and is due to expansion & contraction of masonry due to soaking & drying and also due to thermal variations. The same may also be due to the absorption of water by the timber joists embedded inside the masonry. They are not due to settlement of foundation.

SUGGESTED REMEDIAL MEASURES

- The foundations wall & columns of the structure are massive and have shown very little sign of distress. The maximum pressure on the soil is within the safe bearing capacity of soil. It is hence concluded that there is no settlement due to overloading of soil below foundation
- However it has been observed that the dampness rise up the outer walls & pillars during rainy days because of the absence of the rain water drains along the periphery of the structure. It is suggested that the rain water is drained well off the outer walls by an impervious pavement of 3.50 m width provided all around the outer walls of Mahal. Storm water drain as designed & suggested may be provided at the further end of the pavement to drain the water due to precipitation into the existing corporation drains. This offset the possible damage to foundation and outer wall of the structure due to the capillary action of rain water.

- Most of the building materials used in the construction, burnt bricks, tiles and stones are of good strength and quality. Hence failure due to damage to them is very remote. But lime mortar used in the masonry and plastering has lost its strength. All mortar joints are to be raked to about 10 cm depth and refilled with cement mortar and finished. This venture may be quite expensive. International organizations like United Nations Organization may be approached for financial assistance for this endeavour. As a temporary measure the damaged portions of masonry and plastering can be rectified by replacing masonry with concrete and lime mortar with cement mortar. To preserve the archaeological shape and beauty of the structure it is better to reproduce all decorative cornices, statues and figures in the structure in cement mortar.
- The mostly ravaged materials of the structure are timber which is of teak logs used in tension zones and corbels of the structure. As and when deteriorated timber log is found, it may be replaced by rolled steel sections with concrete or cement mortar cover.
- If a prohibitive expense is not a bar, epoxy resin impregnation may be used in places where damaged lime mortar is located.
- As the cracks noticed at the western bays of Swargavilasam are found to be due to rain water penetrating through them, they may be sealed with polymer resin or with cement mortar grouting. Investigation has shown that they are mostly dormant. Hence it is presumed that they may not cause any further problem after sealing.
- It is observed that there are some rooms with Madras Terraced roofs in the first floor of Mahal nearer to Swargavilasam. They appear to be additions during British period. These added structures may be removed so that the Ground floor roof pillars are relieved of their added weight.
- It appears that in the past whenever damages like cracks were observed in the roof, additional weathering course were added. Now it is found that the total thickness of weathering course in most of the roof portion is about 50 cms. This has resulted in over loading of the roof as dead load. The added weathering course can be removed and course of lesser thickness can be provided so that the total dead load on the roof is reduced.

- It is observed that the capital of pillars in the central open yard cut timber joists have been embedded into the masonry & fished with plastering. In many places the plastering has given way and timber sections are exposed. They have decayed due to weathering, leaving a hole above almost all the capitals of pillars. These holes are presently used as shelters by birds. These holes may be filled with concrete and finished so that no further deterioration occurs at the springing level of arches over columns.
- In front of the Swargavilasam at the eastern side below the Kabothagam, mortar encased timber cantilevers are provided. Due to spilling of mortar the joists are exposed resulting in their decay. They are to be replaced wherever necessary with steel joists and plastered.
- During the investigation it is observed that there is no provision for a permanent maintenance staff in the rolls of the Archaeological sections concerned. One wonders how a big and prominent historical monument like Mahal is being maintained by periodically engaged casual labour. It is suggested that a band of devoted and trained staff including a mason, a carpenter, a painter, a sculptor etc; may be employed permanently to attend to the repair works in the structure then and there so that the structure is prevented from any further deterioration. If due attention is not paid to the maintenance of the structure from now on, it is feared that our next generation will have to forgo one of the beautiful historic and architectural monuments of Nayak period which remains unique and unparalleled in the history of Tamilnadu.

REGARDING SAFETY OF THE STRUCTURE IN THE NEAR FUTURE

The only part of the structure most damaged due to the deterioration is the roof of ground & first floor in the western and where extensive cracks appeared. Most of the cracks are due to loss of strength of mortar and the rotting of timber used. If the damaged portions are repaired and maintained there will not be any problem of imminent collapse of the structure.

Most of the roofs are of curved structural forms like domes & vaults. They are compression structures. The structural form is very stable and hence collapse in the recent future is ruled out. But however if the present trend of deterioration is not arrested and rectified, compression structures are liable for brittle & sudden failure. Hence the present investigation

reveals that immediate attention is necessary for remedial measures of the damaged parts of the roof.

Second meeting held at Thirumalai Nayakkar Mahal on 4.3.1992 and the suggested the following conservation measures to be carried out immediately in two phases after inspection of the monument. The prepared estimate should be scrutinized by the Archaeological Survey of India for necessary recommendation before submission of the same to the Government of Tamilnadu.

A. First Phase: (TOP PRIORITY).

Rs. in Lakhs

For face lift of the interior portion of the monument, this is necessary to remove all dust and dirt, cobweb etc. This monument has got Sound & Light programme where in not only attracting foreigners participating	1.00
Providing water facilities with bore well and pumpset	2.00
Removal of Accretionary Madras terrace roof in First Floor	0.25
Purchasing of Tubular scaffolding material and minimum T&P required	3.00
Removal of dead weather course and relaying	7.00

B. PHASE II: (Following –VP action)

1.a. Earth work excavation about 4.0 M width and 1.0 m average depth including leveling and sectioning all around the Mahal to expose the original features as well as for providing apron	1.00
b. Providing apron for 2000.00 Sq.m. with four sides dressed granite stone flooring slabs	7.00
c. Providing proper drainage with necessary let out around the monument	1.00
2. Wet dry grouting filleting replacement of decayed timbers by RSJ/ RCC and finishing	3.00

3.Grouting the cracks wherever found in the interior portion with brick stitching	1.00
4. Undertaking necessary conservation work of Brick arches of interior portion	0.75
5. Removal of weathered plastering and re-plastering the interior as well as the exterior of the monument wherever found necessary	3.00
6. The vaulted/ circular dome in the monument has cracks on exterior by existing plaster may be removed and necessary water technique may be done	5.00
7. Chemical cleaning of all stucco figures as well as decorative work in the interior of the Monument	2.00
8. Provision for fixing R. S. joist for cracked stone beam and wooden beams found at T.N. Mahal	1.00
	38.00

Apart from the above works trees which are grown adjacent to outer walls of the monument should be removed with immediate effect.

The committee unanimously recommended that the estimate in details should be prepared at the earliest by the department of Archaeology and submitted to the Government as decided in Principle on 24.2.1992 meeting.

The following members were participated.

- Mr. K.T. Narasimhan, Superintending Archaeologist, ASI, Madras.
- Prof. T.Annamalaisamy, Thiyagarajar Engg. College, Madurai
- Er. Thirumalai Kumarasamy, Executive Engineer, PWD, Madurai
- Deputy Director, Department of Archaeology, Madras-113

Accordingly estimate was prepared by the Department of Archaeology for complete repairs in three phases.

First phase work: 115.00 Lakhs (1994-95)
Second phase work: 116.00 Lakhs (1995-96)
Final phase work: 177.00 Lakhs (1996-97)

During the 21.6.1993 Meeting the “discussion on firm and final estimate for Conservation of Thirumalai Nayakkar Mahal, Madurai were made based on the estimate prepared by the State Department of Archaeology”

Initiating the discussion Dr. Zacharia George insisted that the works of tying the internal walls and outer walls adopting the latest technology may be included in the estimate. The Committee members agreed on this and the rough cost worked out for about Rs 2.00 Lakhs. Further he felt that removal of dead load on the entire roof alone will not be the remedial solution. Prof. Annamalaisamy explained the various survey works conducted at T.N. Mahal and the opinion of the result of the survey works. Since the cracks are not active and the thicknesses of the walls are about 4 to 5 feet there is no need for additional support on stability of structure. However the preservation work as suggested in the estimate may be taken up as early as possible.

The Superintending Engineer, HR&CE suggested that the Palace may be renovated using modern materials like granite, cement, concrete etc considering the fact of durability. Further he pointed out that the Tamilnadu Construction Corporation Ltd. may be entrusted with these works.

Dr. Chitta Ranjan, Anna University pointed out that entire work should not be entrusted to single agency, and the works may be executed by engaging skilled and suitable technical personals as required for the conservation works. Dr. Zacharia George said that since the lime mortar lost its binding capacity due to variation of climatic condition the study of cracks need further attention.

Dr. T.P. Ganesan, suggested that some permanent measure has to be followed to the regular maintenance of T.N. Mahal including mending the cracks.

Dr. Chitta Ranjan, Anna university and Dr. Lakshmipathy, Anna University stressed that to arrest the development of cracks immediate remedies should be taken including removal of old weathering course, Madras terrace building etc as suggested in the estimate.

Superintending Engineer, HR&CE Department told that Tamilnadu Construction Corporation executed renovation works of Srivilliputtur temple and Kanchi Ekambareswarar Temple using cement, granite, concrete etc. Hence this agency may be entrusted to take up the T.N.Mahal works. The Superintending Archaeologist, archaeological Survey of India pointed out that cement may be avoided wherever possible and good quality of lime mortar may be used for conservation works.

The Secretary, Tamil Development- Culture pointed out that the immediate works that are to be attended may be taken up from the sanctioned estimate already.

The Secretary, Tamil Development- Culture Department explained to the Deputy Secretary Finance Department about the huge financial involvement of this work.

The Secretary Tourism Department who also participated in the meeting agreed the need for taking up this major work, since the existing Palace building should be preserved at any cost. Further the Secretary, Tamil Development-culture Department said that the sound & light system may be replaced completely and the cost may also be included in the estimate. Further the Secretary agreed that the part of the fund available now on maintenance of Sound & Light system may be placed at the disposal of Department of Archaeology for maintenance of T.N..Mahal. After renovation works, replacement of Sound & Light system the admission fees may be enhanced suitably. So that the expenditure may be met out and the financial burden may be reduced.

Secretary, Tamil Development-culture finally said that some final touches may be given to the estimate like providing more amount for unforeseen items of works, replacement of sound & light system etc. and the finalized estimate will be submitted to Government of India seeking financial assistance from other agencies like UNESCO, Culture Department etc. Further action on this proposal will be taken up in due course.

Thus the studies made by the conservation experts bring forth all the facts behind its stability of the foundation and materials used for the construction.

Based on the report, as suggested by the Experts Committee, works proposed to the tune of Rs 410.00 Lakhs in 3 phases were scrutinized by the Government and sanctioned Rs 78.00

Lakhs vide G.O.Ms No. 105 / Tourism Development Culture Department/ dated 27.5.1994. Accordingly comprehensive estimate was prepared and carried out as follows.

- To avoid dampness, from the surrounding dumped earth were removed.
- By providing damp proof course, dampness arrested inside the Palace.
- RCC pavement provided around the outer wall.
- Gutters provided for the easy flow of storm water drain.
- Flooring provided at the inner court yard.
- Certain decayed wooden rafters replaced.
- Cleaned and mended the part of the stucco figures and minute ornaments at western side and part of the northern side.
- Zinc water pipes partly provided to drain the rain water from the terrace.

The value of the works actually executed was as follows.

1994-95 – Rs	49,000-
1995-96 – Rs	1, 20,000-
1996-97 – Rs	38, 90,890-
1997-98 – Rs	13, 22,452-

Remaining works were left over due to inadequate Technical staff and closing of Division. In the mean time, for restoring the protected and declared monuments of historical importance and antique historical value to its original condition, Rs 5.00 Crores has been earmarked by the Government under the heritage protection component of XI Finance Commission Grants for the period of 2000-01 to 2004-05. Archaeological prescription as notes of inspection was issued in order of priority by Dr. R.Kannan,I.A.S. after inspecting the T.N.Mahal on 1.10.2002. From these, an amount of Rs 100.00 Lakhs proposals were submitted on priority basis to the Government for approval.

Works proposed by the Public Works Department are as follows:-

- Dismantling existing additional madras terraced structure and other over loads from roof and conveying and clearing the dismantled materials.
- Grouting the cracks in roof, stitching the cracks in walls and pillars, thoroughly clearing the top of roof using wire brush, removing the plastering from domes and replastering with combination mortar 1:1:5 mixed with water proofing compound.
- Removing the damaged wooden beams and providing new teak wood beams with coir ropes and coping etc.
- Construction of buttress wall in RR masonry and with ornamental cut stone works.
- Removing the damaged plastering from walls inner and outer and replastering ewith combination mortar in two layers of 20 mm thick including scaffolding charges.
- Replacing damaged teak wood doors, windows and iron grills.
- Repairs to Natagasalai (where site museum is located)
- Repairs to side additional building.
- White washing, colour washing and painting of outer and inner walls.
- Clearing scrub jungle and site clearance around.
- Provision for purchase of grinding machine etc. for preparing combination mortar.
- Provision for minor electrical works and new separate service connections.
- Provision for rain water harvesting arrangements.
- P.S. charges and Contingencies.
- Labour welfare fund.
- Documentation charges, tender advertising charges and photographic charges.
- Provision for unforeseen item.

The list of works was examined and slight modifications asked after inspecting the monument by Thiru. K.Ashok Vardhan Shetty, I.A.S., Commissioner of Archaeology on 23.1.2003 and the following remarks are offered.

- The Executive Engineer, Public Works Department felt that the dismantling of the Madras terrace structure on the roof (which is a subsequent addition to the building may not be necessary, although this was suggested as one of the works to be taken up by the Experts Committee. After clarifying this point with Thiru. K.T. Narasimhan, Superintending Archaeologist, Archaeological Survey of India, (who was one of the members of the Experts Committee), I am of the opinion that dismantling the Madras terrace structure is necessary. The Executive Engineer, Public Works Department must however execute the dismantling work with a great deal of caution so as not to cause shocks to the structure. He must take steps to remove the wall half a metre at a time, and gunny bags filled with hay should be placed below to cushion the impact of the falling materials. The debris should be removed at least twice a day to avoid the accumulation of dead load on the roof. For breaking down the last 1.50 Metres of the wall, use of crow bars should be avoided and chippers should be used to minimize shocks.
- The Assistant Engineer, Archaeology, Madurai and the Assistant Executive Engineer, Public Works Department; buildings were requested to identify and measure the dimensions of the cracks in the roofs and the walls thoroughly and re-work the provision made in the rough cost estimate for Rs 30.94 Lakhs for grouting, etc which seems to be on higher side. Savings, if any, should be diverted for new works indicated later on in this inspection notes.
- The stone beam at the main entrance to the T.N.Mahal is cracked. Provisions should be made for repairing this out of the savings realized as above.
- The office of the T.N.Mahal is presently operating in an additional building at the entrance to the Mahal. It needs to be shifted to another additional building on the side which is proposed to be repaired in the estimate. Sales of Publications are presently being done from a bunk located inside the monument, and only people who purchase entrance tickets are in a position to buy the publications. The sales counter should be open to all and should be

shifted to the additional building near the entrance where the office is presently functioning. Repairs should be carried out to this building also out of the savings realized as above. Apart from the sales of publications, this space should be utilized for locating sculptures and, sometime in the future., a “History of Madurai” museum can be set up.

- A separate electricity service connection should be obtained for Archaeology Department. At present, there is common service connection in the name of the Tourism department which is running the Sound & Light show, and the departments are sharing the current consumption costs- an arrangement which is unsatisfactory as archaeology Department is paying out more than its proper share of the costs.

As a suggestion, certain items of works were also recommended for the next phase proposal as detailed below.

- Only repairs to the damaged portions of the pillars have been included in the proposal already sent for Rs 1.00 Crore. Re-plastering the 248 pillars is a major item of work to be included in the next phase. While the moghul plaster of some of the pillars is still in good condition that on most of others has peeled off in several places giving a shabby appearance to the pillars. It is necessary to scrape the existing plaster to some extent, wet the pillar thoroughly, and the apply moghul plastering once again. Since the pillars are the main feature of the T.N.Mahal, any face-lift to the Mahal will be incomplete without this. A decision about the colour (whether white or lime yellow) will be taken separately at the time of execution of the works.
- Cleaning of the stucco works and the ceiling, minor repairs to the stucco works where necessary, and colour washing of the stucco works and ceiling of the entire building- need to be done.
- There is no decent toilet block for the hundreds of visitors who visit T.N.Mahal every day. The existing toilet block is very dirty and clogged. A modern toilet with separate entrances for ‘ladies and gents’ wings (with 2 European style toilets and 6 urinals in each wing) needs to be provided. If necessary, a bore well may also be provided. The maintenance of the toilet will be a problem, and I feel that it cannot be done satisfactorily departmentally. The possibility of entrusting it to a NGO like “Sulabh Shauchalay” or to any other sponsor

in Madurai city needs to be explored. The District Collector's and Corporation Commissioner's assistance may be requested to do this.

Government accorded a sanction of Rs 100.00 Lakhs in G.O. Ms No 73 / Tamil Development Culture & Religious Endowment Department / dated 16.5.2003. Thiru. M.G. Chella Pillai, L.C.E. Assistant Superintending Archaeological Engineer (Retired) from Archaeological Survey of India had been appointed as a Technical Consultant of Public Works Department works, on getting Government approval of the Government. Necessary provisions of not more than 2 % of the sanctioned estimate was provided for consulting charges by the minimum visiting duration of a visit being one day and other expenses of TA & DA as per his eligibility for the post held by him prior to retirement. In consultation with the Technical Consultant, estimate was prepared by the PWD, scrutinized by this department and counter signed after the spot inspection by the Commissioner of Archaeology with Technical Officers and in consultation with the Technical Consultant .

WORKS CARRIED OUT UNDER XI FINANCE COMMISSION GRANTS

AT T. N. MAHAL, MADURAI Estimate Rs 100.00 Lakhs

1. Dismantling the existing madras terraced roof in first floor
2. De-plastering the damaged portion from the inner and outer walls up to the level of the pillar cornice and re-plastering the same with combination mortar.
3. Restoring the court yard pillars with Chettinad plastering.
4. Stitching the cracks found on the walls, dooms, vaults etc including grouting and fixing RCC lintels.
5. Replacing the damaged teak wood beams.
6. Repairing the existing doors and windows.
7. Colour washing and painting.
8. Repairs to the additional buildings.
9. Construction of drinking water sump.
10. Pointing the stone masonry.
11. Providing stone pavement and drain at the entrance.
12. Providing granolithic flooring at the eastern corridor.
13. Mending the stone beam at the entrance.

14. New granite name boards at the entrance.

15. Barricade arrangement works at the approach.

During the execution, 32 mural paintings of Nayakkar period were brought to light while de-plastering the court yard pillars. These paintings show that ladies with kalasam, mulaippari and other auspicious things welcome the inmates with kulavai sound which are the traditional mode of welcome of the Pandya dynasty. As per the advice of the Special Commissioner Dr.T.S.Sridhar, IAS, the paintings have been preserved by enclosing PVC sheet, while the rest of the column have been plastered to its original condition.

During the execution of works; the Special Commissioner of Archaeology has inspected Mahal on various dates and advised to carry out the works as per the estimate without changing the aesthetic effect. On completion it is ascertained that the following works are to be carried out.

- Balance of stucco and ornamental works to be mended.
- De-plastering and re-plastering the inner vault dome, segmental roof and arches of Dharbar hall, Pooja room, Palliyarai, Harem portion, Natagasalai and inner walls above the level of pillar cornices etc. are to be carried out.
- Re-placing the worn out beams wherever required in ground and first floor.
- Providing expanded metal frame for opening as a protective measure.
- Providing barricades wherever required.
- Re-placing the decayed/worn out doors and windows.
- Improving and expanding the existing museum.
- Repairing the additional building.
- Providing lightning conductor.
- Repairing the tower clock.

As ordered, Junior Engineer (M) and Archaeological officer, Chennai has attended the committee meeting in connection with XII Finance Commission Grants, held on 15.12.2005.

The following working group officials were attended the meeting.

1. Thiru M.P. Vijayakumar, IAS., commissioner , Chennai Corporation
2. Thiru R. Kasinathan, IAS., Commissioner of Art and Culture
3. Thiru Arun Ramanathan, IAS., Special Commissioner, Department of Archives
4. Thiru Jatindra Nath Swain, IAS., Commissioner of Technical Education
5. Thiru M.A. Siddique, IAS., Director of Museum.
6. Thiru P. Annamalai, IAS., Additional Secretary to Government, School Education Department
7. Thiru. C.Muthukumarasamy IAS., Director of Information and Public relations / Ex-officio Additional Secretary of Information & Tourism
8. Thiru P. Dhanapal, Joint Commissioner (T) Department of HR & CE.
9. Thirumathi. V. Vanajakshi, Deputy Secretary to Government, Higher Education, Chennai
10. Dr. S. Bakathavatchalam, Assistant Director, Department of Tourism, Chennai-2
11. Thiru C. Giri Ranganathan, Joint Director of Collegiate Education, Chennai-6
12. Thiru.G.F. Kumar, Deputy Secretary to Government, TDC & RE Department, Chennai-9
13. Thiru C. Palanivelu, Chief Planner, O/o the CMDA, Chennai-8
14. Thiru A. Selvaraj, Under Secretary to Government, Higher Education, Chennai-9
15. Thirumathi V.V. Hemalatha, Under Secretary to Government, TDC&RE Department, Chennai-9
16. Section officers and Officials of various departments.

While welcoming the working group officials by the Secretary of TDC & RE Department, he has stated that the XII F.C. has recommended Rs.40.00 Crores for the Heritage Conservation to Tamil Nadu for the period 2006-10 at Rs.10.00 Crores per year and further stated that the, Museum, Archaeology, Achieves, Tourism, Art & Culture and HR &CE here furnished their list but the School Education has not furnished the list so far.

The Director of Museum has stated that the XI Finance Commission Grants sanctioned especially for the Heritage Buildings but XII Finance Commission has stressed the grant shall be used for the Preservation & Protection of historical monuments, archaeological sites, public libraries, museums, achieves and improving tourist infrastructures. Hence the above point to be considered for the XII Finance Commission.

As a reply, The Chair Person has informed that the INTACH & ASI may be preferred for the heritage building work and ASI guidelines to be followed. Further stated that as far the Chennai City concerned process of identifying the Heritage Building for its Preservation Maintenance is going on and further stated that regarding Heritage Protection Act, a meeting will be conducted separately.

The Corporation Commissioner has stated that the works are to be adopted with proper consultation, Technical Guidance and guidelines from the Government.

The Commissioner of Art & Culture has stated that seven (7) heritage buildings are under the control of his department. Hence he requested fund by giving priority, for its conservation works.

The Secretary, TDC & RE Department has stated that the Museum, Archaeology works were carried out by the PWD with the technical guidelines. Hence the Chief Engineer (B) PWD may be included for coming session.

The Joint Commissioner HR&CE has requested Rs.20.00 Crores for 112 Temples in state vide renovation.

The Commissioner of Archives stated that the archives require Rs.10.00 Crores for its further restoration.

The Secretary Information Department stated that under the XI Finance commission grant to a tune of Rs.34.00 Lakhs has been spent for Rajaji Hall as a first phase work and further requires Rs.36.00 Lakhs and Rs.30.00 Lakhs vice versa for II and III phase work.

The Director of Museum has stated that the entire heritage buildings neither side of the sea at beach road (i.e. from DGP Office to other end) may be preferred for XII Finance Commission.

When the turn of Archaeology Department came, the Junior Engineer has stated that the State Archaeology Department is preserving 87 monuments and 26 monuments were taken under XI Finance Commission Grants. Further proposals have been sent for the 44 monuments under XII Finance Commission to a tune of Rs 12.12 Crores.

Chairperson has asked the details of Monument available at Chennai city.

As a reply it is stated that the Memorial Pillar only available at Saidapet area in Guindy Mambalam Taluk is a protected monument.

Secretary TDC and RE Department asked the details of earliest secular buildings of the protected monument.

Director of Museum stated that the T.N.Mahal Madurai is very old one and it attracts large number of Tourist.

Secretary TDC and RE Department has pointed out the T.N.Mahal work has been completed under XI Finance commission grants.

As a reply Junior Engineer Archaeology has informed that the part of work to a tune of Rs. 1.00 Crore has been completed. Again proposal has been sent to the Government for Rs.180.00 Lakhs for its full restoration.

At the end of discussion, Chair Person stated that the priority for the Museum, Archaeology, and certain Hospitals like Kosha Hospital, Eye Hospital etc. and Temples at Mylapore, Tiruvanmiyur and Educational Institution may be given. In order to illuminate the Heritage Buildings will be desired after the joint inspection of the Director of Museum, PWD and CMDA officials.

Sub – Committee Meeting was held on 27.07.2006

Finalizing priority of works to be carried out under XII Finance Commission Grants, Sub – Committee Meeting was held on 27.07.2006 @ Secretariat, PWD Conference Hall, under the head of Special Commissioner & Secretary, TDC & RE Department.

The following officials were attended the meeting:-.

1. Thiru R.Karpoorasundarapandian, IAS; Special Commissioner & Secretary, TDC& RE Department
2. The Secretary, Higher Education Department
3. The Secretary, Tourism Department
4. The Special Commissioner, TNSDA
5. The Commissioner, Govt. Museum
6. The Commissioner, HR&CE
7. The Chief Engineer, (B) PWD

The Special Commissioner of Archaeology has explained about the action plan proposals of Archaeology under XII FCG which were already been accepted by the Second working group committee. During the explanation, the Secretary of Tourism has suggested,

“The fund of Rs. 180.0 Lakhs allocated to T. N. Mahal is not sufficient. As Tourism factor, repairs & restoration works are to be completed to its full requirements and should not be taken further and hence the proposal may be revised to Rs. 3.00 Crores”

The Chief Engineer (B) PWD has stated that the amount proposed by the Tourism Secretary is inadequate due to escalation of prices and it may come to Rs 3.50 Crores apart from the works already executed to a tune of Rs. 1.00 Crore.

The Special Commissioner of Archaeology has stated, “The archaeological conservation works are entirely different from the normal PWD works. Estimates are prepared five years in advance and hence due to fluctuation of cost, inadequate of skilled laboures, collecting same quality of materials according to site condition, the amount may be vary”

While accepting the points, the Special Commissioner & Secretary to TDC& RE Department has stated that necessary provisions for the fluctuation of cost may be added in the estimate

The Special Commissioner & Secretary to TDC& RE Department has enquired the Commissioner of Museum about their department proposals.

As a reply, by showing the picture of National Art Gallery, Commissioner of Museum has stated that it has been published so many magazines and hence provide necessary funds to protect it.

Instantly, by pointing out the decision finalized by the second working group committee, the Special Commissioner of Archaeology has stated that the committee has already been analyzed the fact and decided that the fund would be possible from the Ministry of Tourism, GOI and not to recommend the highest bit (i.e. 6.00 crores) under the XII Finance Commission Grants to one building under Heritage amount grants of Culture Ministry.

As a decision, the Special Commissioner & Secretary to TDC& RE Department has stated that the matter may be reminded to the GOI for obtaining funds within a week time and further informed that the funds proposed for air conditioning is welcome one but it may be a recurring expenditure of every month.

The Commissioner of Museum accepted the points and asked to delete the term (NAG).

As a next point, the Special Commissioner & Secretary to TDC& RE Department has stated that, if the AC plants not required, the provision for Generator set may also be not required; but the installation of transformer is a valid one.

By submitting the proposal, the Commissioner of HR&CE has pointed out that the fund of Rs. 1.00 Crore accepted by the second working group committee is not adequate and further stated most of the temple comes under Heritage component and thus the fund allocated may be increased by this chance. If the chance left out, there are no other sources to get the adequate funds.

The Tourism Secretary stated that the request of the HR&CE Commissioner is valid one as a heritage and tourism factor.

The Special Commissioner of Archaeology has also pointed out that most of the architecturally significant temple preserved by the TNSDA. Apart from the above, living heritage temple administered by the HR&CE may also be considered as a special case.

With the concurrence of Sub- Committee, the Special Commissioner & Secretary to TDC& RE Department has declared Rs 10.00 Crores and further informed to the Commissioner of Museum, that the proposals are to be finalized with the co-ordination of Archaeology & Tourism Departments.

Minutes of the meeting held with Chief Engineer (B) by the Special Commissioner on 11.08.2006

As scheduled, discussion was held with Chief Engineer (B) PWD by the Special Commissioner of Archaeology department on 11.08.06 for (Names) reviewing various scheme's status connected with this department.

- The Special Commissioner pointed out that the minutes for the sub- committee meeting under this grant was received for Rs.7.80 crores as originally proposed.
- The Chief Engineer (B) pointed out from the minutes, that the additional fund of Rs.1.70 crores requested to TN Mahal was not considered as orally accepted by the committee.
- The Junior Engineer of Madurai stated that the Madurai District collector asked various proposals under Tourism and Corporation fund for the improvement works for TN Mahal.
- The Special Commissioner strongly instructed that the works should not be repeated at any cost and hence restoration and repairs to inner Mahal should come under purview of this department and also he include that for the Tourism factor, the outer area may be improved with adequate safety measures and adequate fund for the recurring expenditure.

Based on the discussion, the Chief Engineer (B) Public Works Department has forwarded a rough cost estimate in 7 sets for conservation works to T.N. Mahal, Madurai to a tune of Rs. 3.00 Crores to the Secretary to Government, vide letter dated. 04.12.2006 with a copy to this office.

While observing the rough cost estimate, certain points were noticed.

- In the estimate, it is noticed that de-plastering, re-plastering the walls and domes & mending the ornamental stucco works of entire structure were concentrated.
 - The repair of human figure or divine is never to be attempted and that of floral design only in very exceptional cases as per archaeological norms.
 - As in practice old available broken can be mingled with together instead of mending broken images. According to site condition it can be minimized.
 - Single colour wash is needed to get rich look of Natakasalai without removing and mending the floral design or other ornamentals.
 - Cracks in roofs and walls to be grouted with lime or lime concrete instead of introducing RCC.
 - Lightning Conductor to be in activity after examination.
 - Finishing of top floor with dead load of one course pressed tiles is not necessary at present if there are no leakages.
 - Rough finishing stone may be used instead of polishing kota stone.
 - No provisions were found for repairing the clock on the tower and replacing doors and windows wherever necessary.
 - Details for the necessity of supplying and fixing T.W. beams not found in the report.
 - Provisions made for Archaeological consultancy charges, Documentation charges are shown on higher side.
 - Adequate scaffolding pipes are available at ex-go down of T.N. Mahal may be utilized on loan basis. This may reduce the cost.

Based on the above fact estimate cost should be prepared in cost effective

Manner and hence requested the Government to instruct the Chief Engineer (B) PWD to act upon according to the comments while preparing the detailed estimate with proposed value for countersignature.

In order to bring the Mahal conservation in full fledged manner, an action plan proposal for Rs 300.00 Lakhs has been submitted to the Government for administrative sanction under XII Finance Commission Grants. Accordingly Government have sanctioned the proposal to a value of Rs 300.00 lakhs vide G.O. Ms No 001 / Tourism & Culture (MA2) Department dated 10.1.2007 directly to the Public Works Department to carry out the work. As followed during the last Finance Commission works, Thiru. M.G.Chella Pillai has been asked to provide Technical Guidance for the Mahal work.

As offered by the Executive Engineer, Public Works Department, Buildings (Maintenance) Division, Madurai; Archaeological Prescription as notes of Inspection and Technical guidance were given after inspecting the monument on 12.5.2007 based on the eye view and discussion made to give priority based on the recommendation of the Expert Committee by the Technical team consisting Thiru. M.G.Chella Pillai, Assistant Superintending Engineer, (Retired) Archaeological Survey of India; Thiru. R.Narayanan, Senior Engineer Chennai HQrs of this department; Thiru. K.Olimalik, Junior Engineer, Madurai, Thiru. Nagalingam, Assistant Executive Engineer, Public Works Department, Buildings (Maintenance) Sub- Division II, Madurai; Thiru. K. Alagarsamy, Junior Engineer, Public Works Department, Buildings (Maintenance) Section, T.Kallupatty and Thiru. Muthiah, Junior Engineer, Public Works Department, Buildings (Maintenance) Section, Madurai.

Works identified: - CIVIL WORKS:

1. A complete architectural documentation of the building including interior and exterior walls of the inner yard as well as important details of decorations to be made thoroughly prior to work during and completion of works. Necessary provision is to be made accordingly. One set of documentary evidence to be furnished to this department for reference and record.
2. Restoration of plaster stucco on walls and ceilings is rarely admissible. Broken or damaged or loose plaster to be preserved with the help of lime grout or in some cases, of plaster of Paris injected into the hollow cavities behind the loose plaster and by applying a neat fillet of lime mortar round the broken edges, care being taken that the cavities and edges are first washed with clean water.

3. Merging stucco figures wherever worn out with available pieces at open court yard and Natakasalai may be attended after the close inspection as being a new indisputable documentation.
4. Left over floral designs at pillar top over cornice portion may be done without changing its pattern.
5. Cleaning the ornamental designs, minute designs, stucco works found on ceiling, arches, cornices to be done with soft brush and also using vacuum cleaner and colour washing the same with single colour by merging with existing colour.
6. As per archaeological norms, on roofs, and domes old plaster must be maintained in repair in order to keep them water tight. But in such portions, the new plaster should be coloured to match, as nearly as possible the old work and hence de-plaster and re-plastering the inner vault, segmental roof, bottom of gothic arches to be made wherever required at inner Dharbar hall, Corridors, Natakasalai, Pooja room, Palliarai and Harem portions
7. Similarly, de-plastering and re-plastering the inner walls at Natagasalai and inner corridors at the level over the pillar cornices and merging the colour with existing one.
8. Design offset found on wall sides (ie; at the end of vaulted roof) may be designed or moulded at the wooden rafter for maintaining the uniformity.
9. If it is contemplated to remove lime wash from the old surface, precautions must be taken to prevent damages/injury to any adjacent structures/designs/relief or painting beneath. Existing lime wash to be removed by brushing if required wooden chisel with wooden hammer may be used on exceptional cases.
10. While observing existing flooring at corridor certain portion of Swargavilasam and Natakasalai was found with 30 cmx30 cm granite stone flooring. Hence the same pattern of flooring may be provided as per the existing.
11. Replacing worn out/ missing teak wood beams, rafters for vaults and segmental roof portions, arch connecting points over the pillars etc as per existing. Replacing wooden members for doors, windows, grills (as per existing traditional designs) wherever decayed.
12. All doors, windows, joints in madras terrace roof and grills may be painted two coats with smoke grey colour over the priming coat except front entrance gate which is to be varnished/ melamine polished.
13. Providing mesh frame/glass/TW planks at opening as a protective measure to avoid the entry of birds wherever required as per existing.
14. Wooden ramp at south west corner of court yard may be provided with proper gradient for the access of handicapped persons. Similarly a lavatory at the northern side of the Mahal wall.
15. Ashlars stone masonry side wall of the basement around court yard found with white washed layers and the same is to be removed by brushing with native soap and water or light sponging by adding weak solution of Nitric acid. Or in case where the action of nitric acid

deleterious, of acetic acid may be used, followed by a thorough washing down with water in which a little carbonate may be dissolved. The above work may be carried out with consultation and supervision of the Department Chemist.

- 16.** The available old grills may be utilized as a barricade at Natagasalai corridor portion and outer open portion in the northern side area as a safety measure including at the frontage compound wall.
- 17.** Traditional water spout to be provided, the existing rain water harvesting pipe removed portions as per the availability of water spouts at southern side of Natagasalai. The water dropped portions at the ground level to be placed with granite slab to the required length to avoid erosion.
- 18.** Designed grill gate to be provided at the western side of the compound wall open portions as available at the north east outer compound.
- 19.** A portion of low level compound wall at the northern side to be raised.
- 20.** Replace the barbed wires available over the compound wall in the back yard of T.N.Mahal.
- 21.** Modifying the existing room as a power control room.
- 22.** Restoring and applying preservative coat for the available paintings at various places of ceiling, walls, arches, domes and vaulted roofs.
- 23.** Removing and clearing the dumped earth found around the Mahal and front yard of Mahal including clearing the blocks in storm water drain.
- 24.** P.C.C. flooring may be provided at the frontage area (ie; Vehicle parking area).
- 25.** An information board with emblem in Tamil and English version by using polished granite stone may be placed to the public view by providing pillars on either side with the consultation of Archaeological Officer of this department. Necessary details will be supplied by the department.
- 26.** Necessary provisions to be made for pruning the branches of trees which are affecting the clear view of the monument.
- 27.** Certain cracks found at south corner of southern corridor and southern side of Natakasalai is to be examined by adopting Tell-tale glass process and to be rectified by dowel method by using copper plates.
- 28.** Irregular structure found at south west corner of the outer wall to be rectified by providing necessary supports and steps.
- 29.** Sculpture yard to be formed with available sculptures at the open space of the northern outer area by providing necessary barricade.
- 30.** Frontage towers to be repaired with required amenities.
- 31.** Clock found at northern side towers also to be repaired.

32. Lightning conductor is to be checked in all domes to work properly by interlinking all points.
33. Front entrance stone masonry works to be preserved by applying preservative coat.
34. Polishing the granite pillars found at the entrance and pooja room.
35. Necessary provisions to be made not more than 2% for the technical consultant charges and travel expenses.
36. Necessary provisions for purchasing scientific material like vacuum cleaner, power drilling machine etc.

ELECTRICAL WORKS:

Similarly, regarding the electrical works, points discussed with the Electrical Assistant Engineer, PWD, Madurai after inspecting the site on 14.5.2007 and the works are identified as follows.

1. Separate 3 phase service connection for the TNSDA to be obtained.
2. Necessary Power control room will be altered at the available existing room.
3. Wiring to be made like gap encasing method and suited the colour with existing structure.
4. Dangerous power main provided openly for Sound & Light at the northern corridor to be shifted at the back yard of the control room as a safety and atmospheric measure.
5. Adequate electrical sockets to be provided at the corridors and Natakasalai walls at every 20.0 metres alternatively with lock and key box.
6. Servo stabilizer to be installed for control the voltage.
7. Static inverter provision for the entrance ticket counter and at the main entry with minimum lighting.
8. Necessary provision for additional/ spare bulbs to be included
9. Hallaid fittings to be placed for focusing sculptures at Natakasalai
10. Inductive load automatic Power Factor controller (APFC Panel) to be provided.
11. Exhaust fan to be replaced according to the opening found at Natakasalai.

With the above points, by enclosing the drawings and observed data; the following additional conditions are also enclosed for observing the above archaeological works and to be imposed in the tender notice and schedule.

- The original materials used in the construction of a roof should be adopted in conservation works so the original colour of the structure should be retained.
- All works should be reversibility process.
- The aesthetic and archaeological value of the monument should not be affected.
- Using pure cement strictly banned. All works to be carried out with combination mortar with a proportion of 1:1:5 using lime free from salt which is available at Pollachi as observed by ASI may be used. While using combination mortar an extract of gallnut and Jaggery in 8 Kg per Cu.m in equal proportion to be added at the time of execution of works.
- All wooden members used for the works should be made with teak wood.
- Sand blasting strictly banned for any archaeological works.
- At the time of de-plastering if any findings are noticed they should be left as it is till the clearance of archaeology department is obtained.
- De-plastering/removing worn out bricks should be done carefully, using power tools without giving shocks to the structure stage by stage. While dismantling, proper care should be taken to retrieve old materials in good condition as far as possible.
- During execution the works will be inspected by the archaeological department authorities and an instruction issued from time to time has to be followed.
- Concealed wooden rafters to be covered by lotus leaf and tied with coir rope in close manner for strict adherence of mortar.
- Pointing work should be a recessed pointing and should not be a flush pointing.

Minutes of the Meeting held on 10.07.2007 @ Thirumalai Nayakkar Palace Madurai , in connection with finalizing the estimate of works to be carried out under XII Finance Commission Grants and other works in progress.

Under the Chairperson of Thiru. Jawahar I.A.S. District Collector Madurai a meeting was held with the various departments' officials in connection with finalizing the estimate of works to be carried out through PWD under XII Finance Commission Grants at Thirumalai Nayakkar Palace, Madurai after inspecting the works in progress by the Tourism department and Madurai Corporation.

During the site inspection the Deputy Director of mining has explained about the receipt of stone quantity and to be received from the various firms. During the explanation the District Collector has suggested "Pointing gap should be minimized and corner broken stone slab should not be used / placed. While asking the details of using stone dust as a base, the Corporation Engineer has stated that the dust is purchased by the Madurai Corporation. As instant Deputy Director Mining has stated that the quarry dust will also be arranged to supply at free of cost .Finally District Collector instructed to complete the work before August and to be supervised jointly by the Assistant Engineer Corporation Madurai and Sthapathy TNSDA, Madurai.

Subsequently, the District Collector has asked the progress of sound and light programme rearrangement to the Tourist officer Madurai. As a reply, he has stated that the introduction works are completed and editing will be completed within a month .The District Collector instructed to the Tourist officer, "should see the works are to be completed before the end of August" and further suggested, "apart from the sound and light; the Tourism Department may also conduct various cultural programs at every full moon day as a sponsored program by promoting tourism factor".

The Junior Engineer of Archaeology has stated that "the Archaeological Rules 1971 section 8(1) says that , no protected monument shall be used for the entertainment and if the District Collector recommends a separate proposal may be submitted by the Tourism Department in order to obtaining permission from Government" .

Finally the District Collector Madurai has enquired the Executive Engineer PWD maintenance division Madurai about their proposals.

As a reply, by submitting the abstract of major estimate the Executive Engineer PWD has stated that the estimate has been prepared in full shape and the same was scrutinized by the TNSDA Engineer and Technical Consultant .After the rectification it will be submitted within a week to the Principal Commissioner of TNSDA for counter signature.

The District Collector analyzed the estimate, item wise and raised some points for clarification.

As a reply in connection with Archaeological Norms it was explained in detail by the Junior Engineer Chennai.

While accepting the points; the District Collector suggested the following

- PWD Engineers and TNSDA Officials should coordinate and complete the work in well versed manner without any problem
- While carrying Sudai works , TNSDA Sthapathy should supervise very cautiously
- Focusing light arrangements should be made for the proposed Information board.
- Illumination and lighting were to be arranged for the frontage of Mahal by attracting the publics as a Tourism factor without affecting the Archaeological Norms
- Electrical works at inside palace are to be minimized without spoiling the atmospheric condition.

As a final discussion, the District Collector Madurai has further enquired the various other problem faced at the Mahal.The following problems are brought to the notice and it was discussed.

- Re- plastering works at courtyard pillars in TN Mahal were completed under XI Finance Commission Grants. Now these plastering are split by forming pot holes.

After discussing with the Executive Engineer PWD maintenance division, Madurai, to rectify the same, the District Collector Madurai has asked the Executive Engineer PWD to attend collector's office with the contractor by whom the work was carried out for discussing the matter.

Day to day problem for maintaining common lavatory at TN Mahal was informed and requested to arrange sponsors. District Collector Madurai has instructed to send a proposal with rough cost estimate of recurring expenditure for arranging sponsors. Subsequently asked about the objection of providing the advertisement board by the sponsors.

In reply it was stated that, after getting the approval from the Principal Commissioner of Archaeology, a minimum size board may be admitted. Madurai District monuments are situated in remote villages or in hill areas hence theft incidents often occurred.

District Collector instructed that the complaint copy may be sent to the District Collector's office. If any problem raised, the officer concerned have to attend the collector's meeting which is conducted on every Monday with District Police Officials and inform the fact for action.

- Present bus stop activated at front of TN Mahal is obstructing the View of Entrance

As a remedy, the District Collector has stated that the concerned transport officials will be informed at the next meeting to change the present bus stop subsequently the District Collector Madurai has informed that, the District Registrar Office is proposed to be shifted to the new building which is nearing completion. As a suggestion it was stated that the Archaeological Museum functioning at Natakasalai may be shifted and improved in this building.

The following officials attended the meeting

1. The District Collector Madurai
2. The Executive Engineer, (B) PWD (maintenance Division), Madurai
3. The Deputy Director Mines, Madurai
4. Assistant Director in-charge TNSDA, TN Mahal, Madurai
5. Assistant Executive Engineer, (B) PWD (Maintenance Sub Division), Madurai
6. Tourist Officer, Tourism department, Madurai
7. Archaeological Officer, TNSDA, TN Mahal, Madurai
8. Tiru.M.G.Chellapillai, Technical Consultant for PWD work, Chennai
9. Assistant Engineer, Corporation Madurai
10. Spl. Gr. Junior Engineer, TNSDA, Chennai
11. Junior Engineer, PWD maintenance section, Madurai

12. Junior Engineer, TNSDA, TN Mahal, Madurai

13. Sthapathy, TNSDA, TN Mahal, Madurai

Based on the inspection notes, estimate was received on 19.7.2007 from the Public Works Department for Civil Works and it has been scrutinized by the Archaeological Conservation Wing and returned with remarks on 31.7.2007 for correcting the same.

CIVIL WORKS:

- Grouting cracks for stucco ornamental works, minute stucco ornamental works were shown using Silicon polymer which is not correct. It is not a adhesive. It will act as water repellent. For filling cracks by grouting, usually combination mortar slurry mixed in the ratio of 1 : 1 : 5 with an extract of Gallnut and Jaggery to be used. If it is minute crack adhesive like fevicol or other hardener may be injected. If required sample testing/method of execution will be conducted by this departmental Chemist and its result will be recommended for execution.
- Against preservation coat for the granite pillars polishing to be made either manually or mechanically.
- Information board to be provided in polished granite stone and letters to be engraved like inscriptions.
- Rates provided for cleaning stucco and ornamentals as shown is higher.
- Against the provision for purchasing of the scaffolding materials, adequate MS pipe and couplings available in TN Mahal stockyard may be used.
- All the L.S. provisions are found to be higher. No supporting quotations and drawings are enclosed. For instance providing grill door, repairing tower clock etc.
- Necessity of providing pre-cast slab to the drain is not known. Necessary certificate to be obtained from the Assistant Director (i/c) / Archaeological Officer, Madurai because, recently it was completed.
- L.S. provisions made for the Consultant Charges found to be abnormal. In case, such amount provided then the technical Consultant may visit Madurai frequently without calling/necessity. Hence an amount of Rs 1.00 Lakh may be provided against Rs 5.00 Lakhs.
- Labourers' rate provided for Sthapathy, Sudai Mason Grade I & II, Silpi Varga poochu I&II class are not followed as approved by the HR&CE. Instead of engaging Sthapathies from out side, departmental Sthapathies available at various headquarters of this department may be utilized for Sudai works.
- In general Abstract individual abstract total has been rounded to the nearest ten thousand rupees which is not correct. Because if the negligible/ left over amount added it comes to Rs 68,994/- unanimously. It should be corrected.

- 50% extra labour charges provided for re-plastering the curved surface and providing vargapoochu and nayam theervai to minute stucco works is not correct. If any special orders available may be enclosed.

ELECTRICAL WORKS :

- Detailed estimate not received for the electrical work with a sketch.
- L.S. provisions shown for the items are on higher side.
- Necessary provisions for constructing power room also to be included while preparing the detailed estimate.
- If any funds available either at electrical/civil works, following left over items are to be included in the estimate.

GENERAL:

- Traditional spouts for draining the terrace water to be provided as per existing.
- Special toilets for the handicapped persons.
- Provision to be made for rectifying the damaged pillars at court yard.
- Provisions for documentation, video graph, photography is high. It should be reduced to reasonable amount.
- The area for removal of vegetation should be consulted with Assistant Director (i/c) Madurai.
- In case of grinding charges of the labour, two different rates were shown which is not correct. Both the charges mentioned for grinding are high, it should be reduced to reasonable rate.

Estimate received back from the Executive Engineer, Madurai has been scrutinised and countersigned on 21.8.2007 with following conditions.

- The work should be carried out as per the archaeological norms. High skilled labours/Sudai masons and special materials should be adopted wherever required.
- The aesthetic and archaeological value of the monument should not be affected.
- Re-plastering may be made with combination mortar with a proportion of 1:1:5 using lime free from salt which is available at Pollachi, as observed by the Archaeological Survey of India. While using combination mortar No12 Sieve mesh may be used for screening sand and extract of Gallnut & jaggery in 10 to 12 Kg per Cu.m. in equal proportion is also to be added at the time of execution of work. Lime Mortar to be used should be well ground. To prevent blistering, the slacked lime should be left for minimum 2 weeks in a heap to stack, reground and used.
- All original bricks of various sizes should be measured and similar type of bricks only should be procured and used.

- All wooden members like joists/beams/windows/doors etc should be made with Burma teak wood and should certify by the PWD Engineers before use on work.
- For all construction activities on monuments only combination mortar should be used. Using of pure cement mortar is strictly banned.
- During the execution of works, the work will be inspected by the archaeological department authorities and instruction issued from time to time has to be followed strictly.
- At the time of de-plastering or excavation, if any new findings are noticed they should be left as it is till the clearance of archaeological department is obtained.
- De-plastering/removing worn out bricks should be done carefully, using proper power tools without giving shock to the structures stage by stage.
- While dismantling, proper care should be taken to retrieve the old materials in good condition as far as possible.
- Whenever strengthening / removing / chipping /dismantling works taken, necessary props/ strutting should be given whenever required to act as centring. This will free the load on the roof.
- Purchased tools and machineries to be handed over to this department on completion of works.
- Technical consultant duty norms and conditions will be informed separately in due course.
- No Substitute/supplemental items to be made without getting concurrence of this department. Detailed estimate to be submitted to this office for counter signature whenever lumpsum provisions made for the work.
- Quarterly progress with expenditure details should be submitted to this office under intimation to the Chief Engineer (B), PWD.
- Executive Engineer is also directed to report to observe with detailed analysis for special works for future guidance and preparing data.

WORKS TO BE CARRIED OUT UNDER XII FINANCE COMMISSION GRANTS AT T. N. MAHAL, MADURAI. AS PER THE COUNTER SIGNED ESTIMATE FOR

Rs 300.00 Lakhs

A. Conservation works for Minister's dome, Minor domes, Swargavilasam and Kalyana Mahal.

1. Cleaning the stucco, minute stucco and design works and de-plastering the damaged portion including re-plastering the same.

2. Filling the cracks found over the stucco with combination mortar slurry.
3. Finishing with fine grinded combination mortar (Nayam Theervai) by engaging skilled Sthapathy including all minute work such as floral design, kodi, thoranam etc.
4. Re-placing the rottened wood in vaults, Minister's dome and connecting points of pillars.
5. Re-plastering the dome ceiling and side wall surface using combination mortar.
6. Painting the stucco works with single colour by merging with existing.

B. Conservation works for corridor Vault roof, Pooja room, Palliyarai, Harem and Natakasalai

1. Cleaning the stucco, minute stucco and design works and de-plastering the damaged portion including re-plastering the same.
2. Filling the cracks found over the stucco with combination mortar slurry.
3. Finishing with fine grinded combination mortar (Nayam Theervai) by engaging skilled Sthapathy including all minute work such as floral design, kodi, thoranam etc.
4. Re-placing the rottened wood in vaults, Minister's dome and connecting points of pillars.
5. Re-plastering the dome ceiling and side wall surface using combination mortar.
6. Painting the stucco works with single colour by merging with existing.
7. Pointing with combination mortar at the existing cut stone flooring available at Natakasalai.

C. Providing granite flooring, Sculpture yard, weld mesh shutter, cleaning the site, white washing, colour washing and Painting wood & iron works.

1. Roughening the flooring by chipping at the corridor and placing the unpolished granite stones of size 30x30x2.5.

2. Forming sculpture yard using the available sculptures by constructing the pedestals and approaches paved with PCC slabs.
3. Providing teak wood framed weld mesh shutters and teak wood framed glass shutters in openings of cavity walls including painting the shutters.
4. Providing 32.0 meters length drain with pre-cast slab at the rear side of the Harem portion.
5. Leveling the low lying areas and conveying the excess debris to the outer city.

D. Miscellaneous.

- 1 Polishing the granite pillars at the entrance, Pooja room.
- 2 Cleaning the ashlar stone masonry side walls and applying the preservative coats.
- 3 Providing wooden ramp for the handicapped person.
- 4 Provision for the compound gate.
- 5 Provision for the caption boards to the sculptures and information boards.
- 6 Repairing Tower clock
- 7 Removal of vegetation over the roof of the T.N.Mahal, cutting branches of trees
- 8 Provision for the traditional rain water pipe.
- 9 Provision for the toilet to the handicapped person
- 10 Purchasing of special tools.

E. Electricl works

1. Providing new 3 phase service connection.
2. Providing street lights to the approach
3. Providing focusing lights for face lifting
4. Providing spot lights to the sculptures at Natakasalai with alternative switch control.

5. providing lighting arrangements to showcases
6. Providing voltage controlling unit
7. Constructing power room
8. Providing street lighting arrangements to sculpture yard

Based on the countersigned estimate, the Chief Engineer (B) PWD has stated that considering the special nature of works, cost involved and to get good response to tenders it has been suggested to split the work of conservation of Madurai T. N. Mahal into the following separate items:-

1.	CIVIL WORK:- Providing granite flooring in Mahal, Sculpture Yard, Teak wood framed weld mesh shutters and teakwood framed glazed shutters in opening, clearing site, white washing, colourwashing, painting of wood works and iron works etc.	Rs 93.00 Lakhs
2	Construction Work:- (Archaeology and Sthapathy Works) work in Palliyarai, Pooja room and roof portion corridor, harem and Natakasalai	Rs70.00 Lakhs
3	Conservation Work: - (Archaeology and Sthapathy Works) work in minister dome, minor dome, Kalyana mahal, open court yard portion.	Rs74.00 Lakhs
4	Electrical Works:	Rs 30.00 Lakhs
5	Miscellaneous Items: Like clearing old materials, compound gate, sculpture, repairs to clock, Advertisement charges, Labour welfare fund, Documentation Charges, technical Consultant Charges and P.S. charges	Rs33.00 Lakhs
TOTAL		Rs 300.00 Lakhs

Accordingly Government has issued orders in Government Order (2D) No 70 Public Works (G1) Department / Dated 7.11.2007 and after careful examination accepted the proposal

of the Chief Engineer (B) Public Works Department and order accordingly for splitting up of the works.

As approved by the Government, works have been split and Works awarded to the agency selected by the Public Works Department.

Notes of Inspection during the execution on 06.01.2008

Thirumalai Nayakkar Mahal, Madurai was inspected on 06.01.2008 by the Principal Commissioner of Archaeology, Chennai with the officials of PWD Civil & Electrical wing, Technical Consultant for PWD works and Archaeology Department in order to regularize the electrical work at TN Mahal; it was discussed with the Superintending Engineer, PWD, (Electrical) Circle, Madurai. On ascertaining the proposed work, as an archaeological point of view, the following advice made according to the usage of electrification and to avoid criticism.

- The Principal Secretary and Commissioner of Archaeology advised that “the electrical lights are not much required and should be minimized with the consultation of the Technical Consultant” without obstructing the view by providing minimum electrical posts at the front yard economically by avoiding various brand & quality lights at Natakasalai which are not possible to replace while fuse.
- 3Phase service connection has to be obtained in the name of Assistant Director, TN Mahal, Madurai.
- Usually protected monument of TN Mahal is to be opened only dawn to dusk. As such

T N Mahal there is no need of more heavy electrical lights and it may causes recurring expenditure also. Since Tourism Department is conducting S&L Programme after the sun-e only. Hence more and heavy general electrical lights are not need in corridors except Natakasalai.

- At Natakasalai, spot lights to the sculptures, only minimum general lights required and necessary fittings to the show cases may be provided.
- Minimum power points of 2 amps. with power out let and with locking arrangements may be placed at 2” above floor level of corridors.

- In view of public safety, existing S&L Main switch control exists may be retained in the same place and it may be safeguarded by providing lock & key panel board.
- For avoiding voltage variation necessary Stabilizer may be provided as informed.
- Illumination and minimum focus lights may be avoided without damaging the structures.
- Power room addition and alteration Proposal are not included in the civil estimate and it may be included in the electrical estimate without obstructing the view having minimum requirements.

In view of the minimum recommended works previous allocated amount of Rs. 30.00 Lakhs in the main civil estimate is reduced to Rs 20.00 Lakhs. Remaining amount of Rs 10.00 Lakhs may be utilized for landscaping around TN Mahal; as suggested by the Hon'ble. School Education Minister's Inspection dated on 06.01.2008.

The following officials were present.

- Thiru. M.G. Chellapillai, technical Consultant for PWD works, Chennai
- Superintending Engineer, PWD; Buildings Circle II, Madurai
- Superintending Engineer, PWD; Electrical Circle, Madurai
- Executive Engineer, PWD; Maintenance Division, Madurai
- Assistant Executive Engineer, PWD; Sub-Division, Tirumangalam
- Assistant Executive Engineer, PWD; Sub-Division, Tirumangalam
- Assistant Executive Engineer, PWD; Electrical Sub-Division, Madurai.
- Assistant Engineer, PWD; Section, Tirumangalam
- Assistant Engineer, PWD; Electrical Section, Madurai.
- Assistant Director,(i/c) TN Mahal, Madurai
- Archaeological Officer, Tirunelveli & Madurai

- Special Grade Junior Engineer, Department of Archaeology Chennai
- Junior Engineer, TN Mahal, Madurai

MINUTES OF THE INSPECTION NOTES

Date of Inspection: **05.04.2008**

Madurai District Collector and a team of Engineers from Public Works Department and State Archaeology along with Assistant Director (i/c) and Sthapathies jointly inspected the works of T.N. Mahal and park in front of the Mahal on 05.04.2008 and instructed the following points.

- Two fountains inside the park is to be completed. For this estimate has to be finalized before 15.4.2008. Design of this fountain should also be finalized and to get approval by the Collector.
- Maintenance of the park should be carried out by Corporation of Madurai.
- The Assistant Divisional Engineer, HR&CE Department, Tiruparuthikundram should assess the usage of Granite stones spread around the statue of Thirumalai Nayakkar and report the same before 10.4.2008.
- For Sound & Light show platform granite stones have arrived and they are to be laid by Assistant Engineer, Madurai Corporation on the stage before 15.4.2008.
- Size of the holes on the cover slabs laid around the court yard has to be increased in order to drain the rainwater quickly.
- The turfing work between court yard and corridor has to be done by PWD contractor attending civil contract work as a gratis and he has also agreed to do so.
- An action plan for various components of the civil work and Sthapathy work should be prepared by the PWD and submitted before 12.4.2008 to the Collector for approval and copies sent to the Assistant Director of Archaeology and Tourist Officer, Madurai for follow up.

- There will be a review meeting on every First Saturday of the month at 4.00 pm at Mahal itself besides special inspection. All concerned officers should attend this meeting. Mr. Chellapillai, Archaeological Consultant should also be invited for this meeting.
- Fortnight progress report should be submitted about this work through the Assistant Director of Archaeology.
- The existing gradient in the floor towards the courtyard should be maintained so as to avoid any water stagnation in the Durbar Hall.
- All workers must be given identity card duly signed by the Assistant Director of Archaeology and Executive Engineer, PWD.
- The workers must be educated about the importance and features of archaeological monuments and trained well so as to co ordinate with us.
- When mortar is laid for the flooring work as well as ceiling work, care should be taken to see that the pillars are not dirted with cement or mortar.
- Review meeting will be conducted with three contractors along with site Engineers.
- Out of three contractors, one contractor for the flooring work has commenced the work. The other contractors, Sthapathy work contractor, for brick work and Sthapathy work has commenced were on the north side. Another contractor ie Modern Engineers, Chennai is yet to commence the work. As the work nature for three weeks are independent and not overlapping one other, Executive engineer; PWD should ensure simultaneous execution on three works as per the Action Plan.
- The revised electrical estimate has to be prepared by the PWD electrical division before 15.4.2008 and obtain approval before 30.4.2008 and the agency has to finalized before 31.5.2008.
- Entire Sthapathy work should be supervised by Mr. palanisamy, Sthapathy and Junior Engineer of Archaeology Department. The progress report should also be submitted fortnightly.

- The weekly report for Sound & Light show work should be submitted through Mr. Antony, Electronic Technical Operator, Sound & Light show. He has promised to complete the work with in 15.5.2008. The District collector has instructed that the testing should be done before 10.5.2008.
- The Principal secretary and Commissioner of Archaeology has to be invited for explaining the suggestions to develop the area around the Mahal under Tourism Development Schemes.
- The hand pump in the court yard providing Corporation water has to be shifted out side the Mahal preferably near the ticket counter. The estimate for installation of suitable Drinking water plant has to be prepared by the Corporation of Madurai

MINUTES OF THE INSPECTION NOTES

Date of Inspection: 05.07.2008 & 06.07.2008

Madurai District Collector and the team of Engineers from Public Works Department and State Archaeology along with Assistant Director (i/c) and Sthapathies has been jointly inspected the T.N.Mahal on 05.07.2008 & 06.07.2008 for ascertaining the existing colours of various portions of varkams, floral and minute designs for finalizing the colours to the inner domes/arches.

After inspecting the site on 05.07.2008, the following colours are recommended.

- Ivory colour to the domes and ceilings, white colour for the borders as per the existing for the plain portion as found originally at corridors.
- White colour for the centre curved portions of the arches (Gothic arches) at corridors.
- For maintaining the similarity ivory colours for the ceilings and ochre colours for the side borders design work alternatively to be given to bring out the bas-relief design work.
- If there is floral design available, only for betel borders to be ochre colour to be given..

The District Collector of Madurai; while inspecting the Palace on 06.07.2008 after analyzing the colours in various aspects, he asked the Assistant Director (i/c) about “the opinion of the selected colour”

As a reply the Assistant Director (i/c) stated that “he agree with the proposed colours”

The Executive Engineer, PWD, Maintenance Division Madurai stated that “ in the sanctioned estimate, patch work and single colour washing for the ceiling has been proposed and hence now recommended colour are not covered in the estimate. Similarly, during the cleaning work, the existing plastering in the ceiling has peeled off; as a result, the entire ceilings are de-plastered and then re-plastered. Due to the above fact, the revised proposal is being prepared by this department for approval and provision of funds. Further requested the Technical Consultant, that the data for the Panchavarna colours and artesian works for preparing the revised proposals.

The District Collector and Technical Consultant for the PWD Works have also accepted the above views.

Further, the District Collector of Madurai advised that the colour washing to be made, after scrapping the overlapped washing / spit mortars, to avoid blistering.

By showing the Vandalism made by the visitors over the Chetnad / Madras Chunam plastering pillars; the Executive Engineer, explained that the “Pillars have been affected by scribbling letters using keys, ball-pens, pencil and paint etc and also bird’s droppings; which are not easily removable. On completion of other works, if the pillars are not suitably face lifted, public may criticize. As a permanent remedy, various opinions are discussed with the officials of PWD and Archaeology; as a special case, recommended as follows:-

Sound & Light Programme oriented with brightness of Pillars and hence only two pillars on either side of the entrance corridors, are to left and the other pillars are to be painted with two coats using ICI Brilliant white over the base coat of wall putty. Samples made at Manthiri (Minister’s) dome pillar and on seeing them the team members were satisfied.

On hearing the suggested points, the District Collector enquired about the restoration of the existing quality without introducing the new one.

In a reply, the Assistant Executive Engineer, TNSDA, Chennai & Madurai (i/c) explained “the process of special plastering work. If once affected by the above vandalism, not only stains are formed and also clarity of the pillars will become dull. Rectification of works may be made by de-plastering and re-plastering which is more costly. No adequate watch and ward is available at the Palace. Hence if vandalism continued, maintenance is again impossible”.

On hearing the suggestion, the District Collector instructed that to analyze by writing letters and cleaning the same as a experiment and report the fact for getting Expert’s opinion and obtaining adequate fund. Further stated that, the scaffolding arrangements are to be checked often and in view of the safety measures, necessary safeguarding arrangements to be insisted to the agencies.

Finally, the District collector expressed the slow progress of Sound & light cable works and informed that the plan of the Sound & Light scheme to be discussed briefly for coordinating the agencies to execute the works expeditiously and further stated that the Secretary to Government Tourism and Culture is proposed to visit Madurai on 16 & 17 of this month and hence, meeting may be conducted on 17.07.2008 at 4.00 pm. at T.N.Mahal, Madurai. Necessary officials from the TNSDA, Tourism, PWD, Madurai Corporation may be informed to attend.(Action: Assistant Director(i/c), T.N.Mahal, Madurai)

The following officials were present during the inspection.

1. The District collector, Madurai
2. Technical Consultant for PWD works, Chennai
3. The Executive Engineer, PWD Maintenance Division, Madurai.
4. Assistant Executive Engineer PWD Maintenance Sub-Division, Tirumangalam.
5. Assistant Executive Engineer, TNSDA, Chennai & Madurai (I/C)
6. Assistant Director (I/C) TN Mahal, Madurai.
7. Assistant Engineer, PWD, Maintenance section, T.Kallupatti
8. Junior Engineer, TNSDA; TN Mahal, Madurai
9. Junior Engineer, PWD, Maintenance section, Madurai
10. Sthapathies from Ramnad & Thanjavur.

Notes of Inspection: **02.08.2008**

Thirumalai Nayakkar Mahal, Madurai was jointly inspected on 02.08.2008 with a team of Engineers from the Public Works Department and State Department of Archaeology for ascertaining the progress of work during the month of July 2008.

De-plastering and re-plastering with combination mortar and colour washing works are completed in northern side corridor of the inner domes. Scaffolding arrangement works are progressing at the western side corridor and the northern portion of the Swargavilasam.

Restoration works of Boothakanangal at the northern side courtyard are almost nearing completion.

At northern side 75% of the stone flooring works completed and further laying works are in progress.

The Executive Engineer stated that, due to the duct work carried out by the Tourism Department in connection with Sound & light; the stone flooring works are affected and hence he requested Commissioner of Archaeology to address the department of Tourism to expedite the cable work.

After inspecting the works, the following suggestions are made by the Technical Consultant of PWD works and the Assistant Executive Engineer S.G. (M), Archaeology.

1. While carrying out the works the combination mortar mixture to be made in equal proportion. Otherwise minute cracks may occur.
2. Informed to Executive Engineer to watch the procurement of slacked lime being obtained from the Pollachi as recommended by the ASI and as per lead adopted in the estimate.
3. Requested the Executive Engineer to avoid grinding the lime mortar using grinder and recommended for manual grinding / using lime mortar kiln.
4. Due to flaming, certain granite flooring stones found broken at the corners, cracked and chipped out the top layers are to be re-placed.
5. It was also Informed to the Executive Engineer to prepare 2 or 3 samples for finalizing the suited colour with existing colour wash at Natakasalai and also to get the opinion of the District Collector, Madurai.

After the suggestions; The Executive Engineer has stated that, due to in adequate of funds the provisions for restoring mural paintings found at Kalyana Mahal, Natakasalai, Harem, Swargavilasam and certain portions at outer corridor, Minor and Minister domes are left over in the major estimate. The Executive Engineer further asked the Technical Consultant to supply data for the above works for preparing new proposal.

Executive Engineer (B) Maintenance Division has been informed that after getting the opinion/recommendation of the sub-committee, the mural paintings restoration works are to be made.

For rectifying the blister of plastering from the courtyard pillars, then Contractor had been invited and informed to rectify. Technical consultant stated that the fault occurred due to the negligence of re-grounding lime mortar and screening of lime. Technical Consultant suggested that the affected pillars are to be re-plastered after de-plastering.

But the Executive Engineer, PWD stated that the Earnest Money Deposit amount of Rs. 2.00 Lakhs only retained from the then contractor who executed the work

Under

X1. Finance Commission Grants, is not adequate for the recommended work.

Hence the Executive Engineer was requested to specify the other alternative. This problem may be decided after getting committee's recommendation.

The following officials were attended during the inspection.

1. Technical Consultant for PWD works, Chennai
2. The Executive Engineer, PWD Maintenance Division, Madurai.
3. Assistant Executive Engineer PWD Maintenance Sub-Division, Tirumangalam.
4. Assistant Executive Engineer, TNSDA, Chennai & (I/C) Madurai
5. Assistant Director (I/C) TN Mahal, Madurai.
6. Assistant Engineer, PWD, Maintenance section, T.Kallupatti

7. Junior Engineer, TNSDA; TN Mahal, Madurai
8. Junior Engineer, PWD, Maintenance section, Madurai
9. Sthapathy, Thanjavur.& the Madurai on deputation

Notes of Inspection on 03.11.2008

Nayakkar Palace at Madurai was inspected by the Commissioner of Tourism & Managing Director of Tourism Development of Corporation along with the District Collector of Madurai on 3.11.2008. The Commissioner of Archaeology also visited this monument. Technical team of Archaeology Department, Engineers from the PWD and The Technical Consultant were present during the inspection.

The Superintending Engineer, PWD Circle explained the current status.

After verifying the work schedule, the Tourism Commissioner expressed his concern about the slow progress of work.

The Commissioner of Archaeology enquired about the slow progress of work even after splitting the works in three phases. As a reply, the Assistant Executive Engineer (M) Chennai stated that the PWD is concentrating the open yard work to complete it before the rainy season and decided to carry out the interior work during rainy season without affecting the work at any cause.

The Commissioner of Archaeology discussed with the Commissioner of Tourism about the present status of reforming work of Sound & Light. The Commissioner of Tourism stated that the Sound & light fittings work are delayed due to the pending civil works to be carried out by the PWD and asked to complete it before the end of February 2009. (Action: PWD)

The Superintending Engineer PWD stated that the “works will be completed before 31.3.2009 as per the schedule and further stated that it will be preponed as suggested.

The Assistant Engineer, Electrical wing PWD explained the proposed electrical work at Mahal and the necessity of shifting Sound & Light panel boards from the inner yard. The

Commissioner of Archaeology advised to retain the panel board in the same place and protective measures to be taken as already advised.

To this the Assistant Engineer, Electrical stated that the protection work belongs to the civil side and necessary provision will be made in the estimate.

The Commissioner of Archaeology advised that the electrical lights are not much required and should be minimized based on the advice of the Technical Consultant. (Action: Electrical Wing, PWD)

The Executive Engineer, PWD; Madurai by showing the graffiti made over the pillars, explained about the sample work made by using glossy snowcem over the putty to rectify the vandalism made by the visitors and further stated that the rectification of Chunam plastering is very expensive and hence the Executive Engineer recommended the above said process to retain the white effect without affecting the Sound & Light Clarity.

The Commissioner of Archaeology enquired the opinion of the Technical Consultant about the alternative work suggested. The Technical Consultant expressed that the reason for doing alternative work is correct.

The Superintending Engineer, PWD Madurai stated that “this item of works has already been carried out under the XI Finance Commission Grants and hence not included in this estimate.

The District Collector, Madurai, stated as the public/visitors are not knowing the cultural importance such vandalism occurred and hence planned to arrange a campaign to rope in student volunteers to create awareness against vandalism and educate adults and further suggested that the pamphlets may be issued along with the entrance tickets”.

As a reply, the commissioner of Archaeology stated that, “the same matter has already been discussed with the Commissioner of Tourism to arrange pamphlets through the Tourism fund to create awareness and further planned that the matter will be arrange to print on the back side of the entrance tickets’. (Action: Archaeology, Chennai)

The Superintending Engineer, PWD stated that “bas-relief work was made as directed by the District Collector, Madurai as a sample work at northern side in anticipation of additional funds” and the same has been accepted by the District Collector, Madurai and further stated that “the bas-relief work only shows its carving/design effectively otherwise it may be merged with wall”.

Subsequently, the Superintending Engineer, PWD has stated that “in the sanctioned estimate, 30% patch work to the ornamental / boothaganangal and single colour washing for the ceiling has been proposed and multi colours are not covered in the estimate. While carrying out the work it has been found that 70% of the mortar was peeled off and potholes occurred due to aging and bird’s pecking and the same problem was brought to the notice of the Technical team of Archaeology and the District Collector of Madurai in detail. However as advised by the District Collector, the works are being carrying out to complete it within the stipulated period with an anticipation of additional fund.

The commissioner of Archaeology after hearing the non-analyzing the work in detail while preparing the estimate, advised that the additional fund requested for the subsequent 40% for the anticipated work is not correct, at least hereafter analyze the fact and work out in detail and send the actual requirement of the additional fund.

The District Collector of Madurai informed that “the present barricade arrangements are affecting the view of the monument and hence planned to shift it to southern side through the Corporation of Madurai”.

The Commissioner of Archaeology welcome the proposal and suggested that the barricade to be shifted symmetrically on both sides without spoiling the view.

The District Collector suggested the following proposals in orientation with Mahal improvements.

- The Korean grass landscape proposed around the Mahal by restricting the public movement / admitting the public by creating the passage under the tourism fund.
- The transport officials will be informed to change the present bus stop located at the frontage of the Mahal.

- The District Registrar Office has been proposed to be shifted to the new building. On vacation, it will be arranged to hand over to the Archaeology Department to form the Archaeological Museum separately.

Finally, the Commissioner of Archaeology insisted the PWD Engineer to complete the work before February 2009 without affecting the Sound & Light programme.

The following officials were present,

1. Thiru K. Arulmozhi, IAS, Commissioner of Archaeology, Chennai
2. Thiru M. Rajaram, IAS, Commissioner of Tourism and Managing Director TTDC
3. Thiru S.S. Jawahar, IAS, District Collector, Madurai
4. Thiru Dhandapani, Superintending Engineer, PWD, Building Circle I, Madurai
5. Thiru Sampath, Executive Engineer, PWD, Buildings Maintenance Division, Madurai
6. Thiru M.G.Chellapillai, Technical Consultant for PWD works, Chennai
7. Thiru R. Narayanan, Assistant Executive Engineer (M), TNSDA, Chennai
8. Thiru. Tamil Selvan, Assistant Executive Engineer, Buildings Maintenance Sub-Division, Tirumangalam
9. Thiru Arumugam, Assistant Executive Engineer, Electrical Sub Division, PWD, Madurai
10. Thiru P.Rajendran, assistant Director (i/c) TNSDA, T N Mahal, Madurai
11. Thiru T.Thangavel, Assistant Engineer (M) TNSDA, Chennai
12. Thiru Mouli, Assistant Engineer, Electrical Section, PWD, Madurai
13. Thiru Alagarsamy, Assistant Engineer, Maintenance Section, PWD, Madurai
14. Thiru Dharmaraj, Tourist Officer, Madurai
15. Thiru Ambrose, Junior Engineer, Maintenance Section, PWD, Madurai
16. Thiru K. Olimalik, Junior Engineer (M) TNSDA, T N Mahal, Madurai

17. Thiru S. Gurusamy, Sthapathy, TNSDA, Ramanathapuram

18. Thiru S.Sadasivam, Sthapathy, TNSDA, Thanjavur

19. Thiru Palanisamy, Sthapathy, TNSDA, Madurai

20. Thiru K. Anandan, Assistant Chemist, TNSDA, T N Mahal, Madurai

The Superintending Engineer, Electrical Circle, Public Works department, Madurai has submitted the revised electrical estimate for Rs 20.00 lakhs vide his letter dated 26.12.2008 was scrutinized by this department and found that the estimate was not prepared as directed by the Principal Secretary & Commissioner of Archaeology during the Inspection on 3.11.2008.

- Wherein “specifically advised to retain the panel board in the same place by providing necessary protective measures” No provision is found in the estimate.
- Similarly the Commissioner of Archaeology advised that “the electrical lights are not much required and should be minimized with the consultation of the Technical Consultant” is also not followed. Estimate was prepared by obstructing the view by providing lot of electrical posts at the front yard using various brands & quality lights at Natakasalai which are not economical and also not only recurring expenditure but also not possible to replace while fuse.
- Against the required quantity of 6 Nos. of Exhaust fans, the estimate items 10 to 13 shows 12 Nos. of various sizes.
- Light post around the Statue is not recommended.
- 5Amps. Plug points are not recommended to the Natakasalai.
- By giving L.S. provisions 5.0Mx 5.0M x 10’-0” proposed for the power room. The size of the room may be restricted to 3.0M x 3.0M.
- Place of work proposed is not mentioned in the Specification of works and thus item 14, 17,18,20,21, 33, 34 & 36 are to be clarified.
- Provision for the advertisement charges shows on higher side.

Corrections not made as directed and hence decided to inspect the site with the concerned Electrical Engineers to communicate the requirements to revise the same according to the archaeological aspects and to avoid recurring expenditure in future. The site was jointly inspected by the Assistant Executive Engineer (M) of this department along with the Electrical Engineers from the PWD on 28 01.2009 and notes of inspection for correcting the estimate was given directly and asked to expedite the action to correct the same to finalize the estimate for the countersignature.. Accordingly, corrected estimate was received back for Rs 19.00 Lakhs vide letter dated 30.01.2009 from the Superintending Engineer, Electrical Circle, Public Works department, Madurai. Estimate received was placed before the Committee.

Apart from the above works, as advised by Dr. T.S. Sridhar IAS, Principal Secretary and Commissioner of Archaeology, an epigraphy gallery has been formed at 'Palliarai' as a separate additional wing in the Mahal, which shows the evolution of period wise Tamil script and the Language.

The Executive Engineer, PWD Buildings Maintenance Division, Madurai has submitted three estimates vide his letter dated 02.01.2009 for the restoration of mural paintings which is located on various places of Mahal, and to bring the bas-relief work as per the original status, I am this regard than request an additional fund for Rs. 27.75 Lakhs apart from the sanctioned amount of Rs 300.00 Lakhs under XII Finance Commission components; as follows:- (in Lakhs)

1. Conservation and restoration of Mural paintings in Harem corridor Vault and bas-relief work in Natakasalai, Harem, and Corridor vault Of T.N.Mahal - Rs. 9.75
2. Conservation and restoration of Mural Paintings and Bas-relief wok in Minister domes, Minor Domes, Swargavilasam in T.N. Mahal - Rs. 9.20
3. Conservation and restoration of Mural Paintings and bas-Relief work in Kalyana Mahal and open court yard of T.N.Mahal - Rs. 8.80

The report of the estimate stated that, “the above restoration works are not included in the sanctioned estimate due to inadequacy of funds. In order to bring the conservation work in complete shape, the matter was brought to the notice of the Commissioner of Archaeology and Commissioner of Tourism and Chairman of TTDC during the last inspection on 3.11.2008. They agreed the importance and need of restoring mural paintings and bas-relief work taken up at this stage, which saves time and additional cost of erecting and removing scaffolding to its height & also to avoid criticism”.

The Above proposal submitted by the Executive Engineer was scrutinized and found the following discrepancies.

It has been said that “the estimate has been prepared by observing the work” and hence no further provision of unforeseen item of work, P.S. & Contingencies required. Similarly already been certain amount has been allocated in the main estimate for provision of the documentation and Consultant charges. By deleting these items, proposal received from the Executive Engineer has been restricted to Rs 26.19 Lakhs and forwarded to the Government for getting approval of High Level Committee and allotment of additional funds vide this office letter dated 31.01.2009. As called for by the Government, availability of savings from other sanctioned works under XII Finance Commission was analyzed by this office and through the Chief Engineer (B) PWD. Chief Engineer (B) PWD has reported that a sum of Rs 22.42 Lakhs available as savings under the schemes implemented under Heritage Conservation recommended by the XII Finance Commission executed by Public Works Department. Based on the above recommendation, the Government have accepted the proposal and sanctioned Rs 26.19 Lakhs for restoration of Mural Paintings in Thirumalai Nayakkar Mahal, Madurai in Government Order No. 157 / Tourism and Culture (MA2) Department Dated 03.09.2009.

Estimate received from the Executive Engineer, Public Works department, Maintenance Division, Madurai has been corrected as per the proposal and Countersigned by this office on 25.09.2009 as follows:-

- Conservation and restoration of Mural paintings in Harem, corridor vault and bas-relief works in Natakasalai, Harem, Corridor --- Rs.9, 20,450

- Conservation and restoration of Mural paintings and bas-relief works in Minister's domes, Minor Domes, Swargavilasam ---- Rs 8, 70,100
- Conservation and restoration of Mural Paintings and bas-relief works in Kalyana Mahal and sopen court yard ----- Rs 8, 28,450

Grand Total ----Rs 26, 19, 000

During the execution of works inspection and meetings were conducted to speed up the works by the Secretaries to Government, Public Works Department and Tourism & Culture Department at Secretariat and the District Collector of Madurai on the spot. Periodical review was made by the Chief Secretary. During / on completion of works inspections were also made by the Hon'ble School Education Minister, Hon'ble Tourism Minister, Hon'ble Minister for the welfare of the Back ward class and Local MLA and Secretaries from the Tourism & Culture Department and Public Works Department with various officials / Engineers from the departments as follows:-

Hon'ble Thiru.M.K.Azhagiri, Central Minister for Chemical and Fertilizer

12.09. 2009.

Hon'ble Thiru. Thangam Thennarasu, Minister of School Education and Department of Archaeology.

06. 01.2008 and .12.09.2009.

Hon'ble Thiru.N.Suresh Rajan, Minister of Tourism and Registration Department
14.07.2009 and 12.09.2009.

Hon'ble Thiru.B.Tamilarasi , Minister of Backward class Welfare Department

12.09. 2009.

Thiru. N.Nanmaran, Member of Legislative Assembly, Madurai

23.06.2008.

Dr. R. Iraianbu, IAS, Secretary, Tourism and Culture Department

24.02.2008, 28.11.2008, 13.07.2009 & 14.07.2009.

Dr.R. Seetharam Gurumurthi, IAS, Principal Secretary and Commissioner of Archaeology Department

06.01.2008.

Thiru. Athiseshiah, Secretary to Government, Public works Department

18.05.2008.

Dr. T.S.Sridhar, IAS, Principal Secretary and Commissioner of Archaeology and Museum Department

13.02.2009, 15.05.2009, 13.07.2009, 14.07.2009, 12.09.2009, 18.12.2009.

Dr.Arulmozhi, IAS, Commissioner of Archaeology Department

06.01.2008.

Thiru. R.Rajaram, IAS, Commissioner of Tourism Department

17.05.2008, 16.07.2008, 03.11.2008, 02.02.2009, 15.02.2009, 22.03.2009.

Thiru. Mohandoss, IAS, Commissioner of Tourism Department

13.07.2009.

Mr. Jawahar, IAS, District Collector, Madurai

15.05.2007, 10.07.2007, 21.07.2007, 06.09.2007, 05.11.2007, 24.02.2008, 15.03.2008, 24.05.2008, 03.11.2008, 13.07.2009.

Thiru. Seetharaman, IAS, District Collector, Madurai

13.02.2009.

Mr.Mathivanan, IAS, District Collector, Madurai

13.07.2009, 29.07.2009, 10.08.2009.

Asian Development Bank Committee

26.11.2008.

Mr. Vijayakumar, General Manager, ITTC, Southern Region

04.07.2008, 11.08.2008, 22.10.2008.

Mr. Basha, Joint Secretary, Tourism Department

21.09.2009.

Mr.Daniel Premnath, Deputy Secretary, Culture Department

23.09.2008, 05.01.2009.

Thiru.Seetharaman, IAS, District Collector, Madurai

13.02.2009

Thiru. N.Mathivanan, IAS, District Collector, Madurai

13.07.2009.

Er. C.Muniasamy, Chief Engineer (B), Public Works Department

03.01.2009, 29.03.2009.

Thiru. M.G.Chellapillai, Technical Consultant for PWD Works

12.05.2007, 15.05.2007, 02.07.2007, 06.01.2008, 28.01.2008, 05.07.2008, 06.07.2008,
02.08.2008, 06.09.2008, 23.09.2008, 28.01.2009, 19.03.2009, 12.08.2009.

Apart from the spot inspection, periodical review was conducted by the Principal Secretary & Commissioner of Archaeology Department with CE(B) PWD to expedite the works as per the schedule.

WORKS CARRIED OUT UNDER XII FINANCE COMMISSION GRANTS AT T. N. MAHAL, MADURAI.

Conservation works for Minister's dome, Minor domes, Swargavilasam and Kalyana Mahal.

- 1 Cleaning the stucco, minute stucco and design works and de-plastering the damaged portion including re-plastering the same.
- 2 Filling the cracks found over the stucco with combination mortar slurry.
- 3 Finishing with fine grinded combination mortar (Nayam Theervai) by engaging skilled Sthapathy including all minute work such as floral design, kodi, thoranam etc.
- 4 Re-placing the rottened wood in vaults, Minister's dome and connecting points of pillars wherever required.
 - a. Re-plastering the dome ceiling and side wall surface using combination mortar.
 - b. Painting the stucco works with single colour by merging with the existing.

Conservation works for corridor Vault roof, Pooja room, Palliyarai, Harem and Natakasalai

- i. Cleaning the stucco, minute stucco and design works and de-plastering the damaged portion including re-plastering the same.
- ii. Finishing with fine grinded combination mortar (Nayam Theervai) by engaging skilled Sthapathy including all minute work such as floral design, kodi, thoranam etc.
- iii. Re-placing the rottened wood in vaults, Minister's dome and connecting points of pillars wherever required.
- iv. Re-plastering the dome ceiling and side wall surface using combination mortar.
- v. Painting the stucco works with single colour by merging with existing.

Providing granite flooring, Sculpture yard, weld mesh shutter, cleaning the site, white washing, colour washing and Painting wood & iron works.

- Roughening the flooring by chipping at the corridor and placing the unpolished granite stones of size 30x30x2.5 cm.
- Forming sculpture yard using the available sculptures by constructing the pedestals and approaches paved with PCC slabs.
- Providing teak wood framed weld mesh shutters.
- .Levelling the low lying areas and conveying the excess debris (part) to the outer city.

Miscellaneous.

- Polishing the granite pillars at the entrance.
- Cleaning the ashlar stone masonry frontage walls and applying the preservative coats.
- Providing wooden ramp for the handicapped person
- Provision for the compound gate.
- Provision for the caption boards to the sculptures and information boards.
- Repairing Tower clock.

ELECTRICAL WORKS

- Providing new 3 phase service connection.
- Providing street lights to the approach
- Providing focusing lights for face lifting
- Providing spot lights to the sculptures at Natakasalai with alternative switch control.
- providing lighting arrangements to showcases
- Providing voltage controlling unit

- Constructing power room
- Providing street lighting arrangements to sculpture yard

In the mean time the resurrected sound and light show executed by the India Tourism development Corporation at a cost of Rs 96.18 Lakhs involved making improvements in the text which throws light on the heritage – rich Madurai city and its unique festival besides Naicker's achievements, including his victory in the battle with the king of Mysore using digital Technology. The sound and light show which will run for 50 minutes is conducted both in Tamil and English language as two shows per day.

On completion of monument conservation and reintroduced Sound and light show with improved quality, The Mahal has been inaugurated by the Thiru. M.KAzhagiri, the Hon'ble union Minister for Chemicals and Fertilizer on 12.09.2009 in the presence of Thiru N Suresh Rajan, Hon'ble Minister for Tourism; Thiru. Thangam Thennarasu, Hon'ble Minister for School Education; Thirumathi B. Tamilarasi, Hon'ble Minister for Adi Dravidar Welfare; Government of Tamil Nadu.

Thus, the ancient treasure of Madurai city proves that the architecturally – rich Thirumalai Nayakkar Mahal stands in a gigantic manner with majestic pillars and images of the wonderful and curious workman ship, glowing brightly under the spot light. Thus, the ancient treasure of Madurai city intrigues with its rich architecture, heritage and history captivating the visitors with its aesthetic beauty.

GLOSSARY

Arretine - Ancient Roman pottery

Son-et-lumiere – Sound and Light

poocharam – Floral design

gandarvas – Angels

kodi – Creeper

kodi mangai – Lady with creeper

Pushpapothigai – Flower designed corbel

mugabadras – Projection / offset

natakasalai – Dancing hall

thoranas – Garland

Ashtangavimana – Octagon shaped vimanam

bas-relief - low relief

ashlar stone - Dressed on all faces

yali – Legendary animal figure

Palliyarai – Rest room

kalasam – Pot shaped vessel adorning crown of gopuram

Gothic – European

adishthanam – Foundation or base

Kabothagam – Roof

ASI – Archaeological Survey of India

vargapoochu – Plastering

nayam theervai – Nice mortar

bootha ganas – Divine persons

saracenic – Greek / Mughal

Dwarabalagas – Gate keepers of deity

Sengol – Mace (symbol of royalty)

Sthapathy – Head of sculptor

Knit – to join closely and firmly together

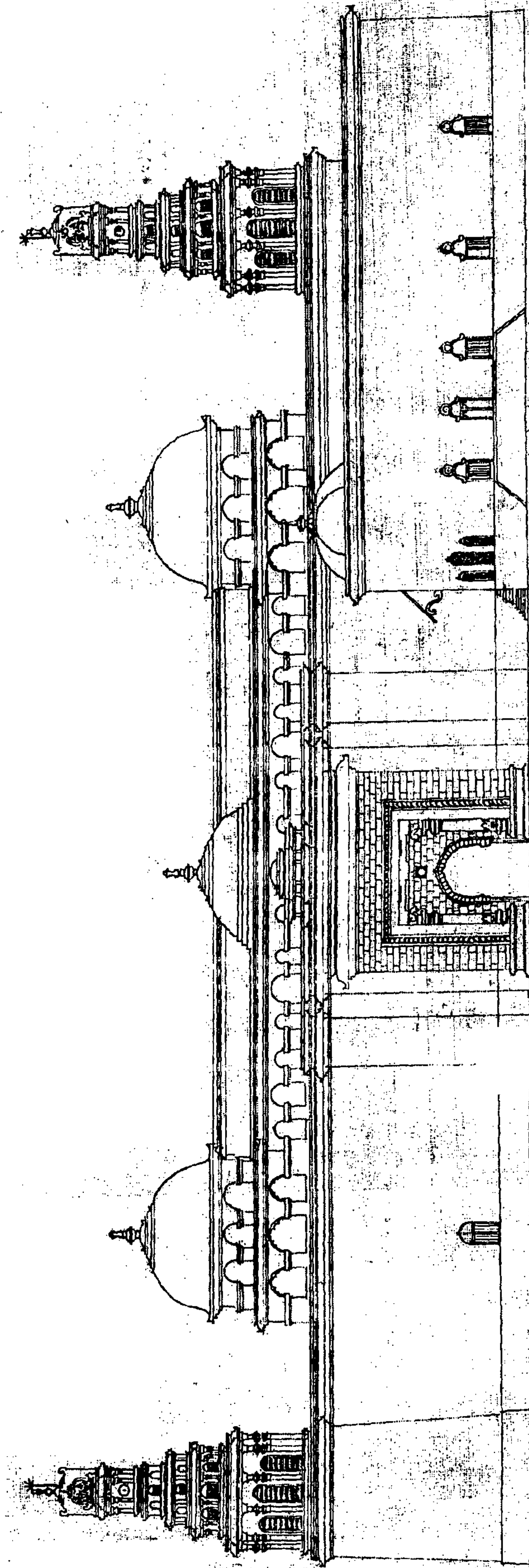
Frieze – any decorative band bearing lettering, sculpture etc.

Efflux – out ward flow

REFERENCES

- 1) Expert's Committee Report
- 2) Thirumalai Nayakkar Mahal –Guide
- 3) Government Orders
- 4) Structural study report - Thygaraja Engineering College, Madurai
- 5) Estimates
- 6) Report on Conservation of Monuments 2002-2005 – TNSDA

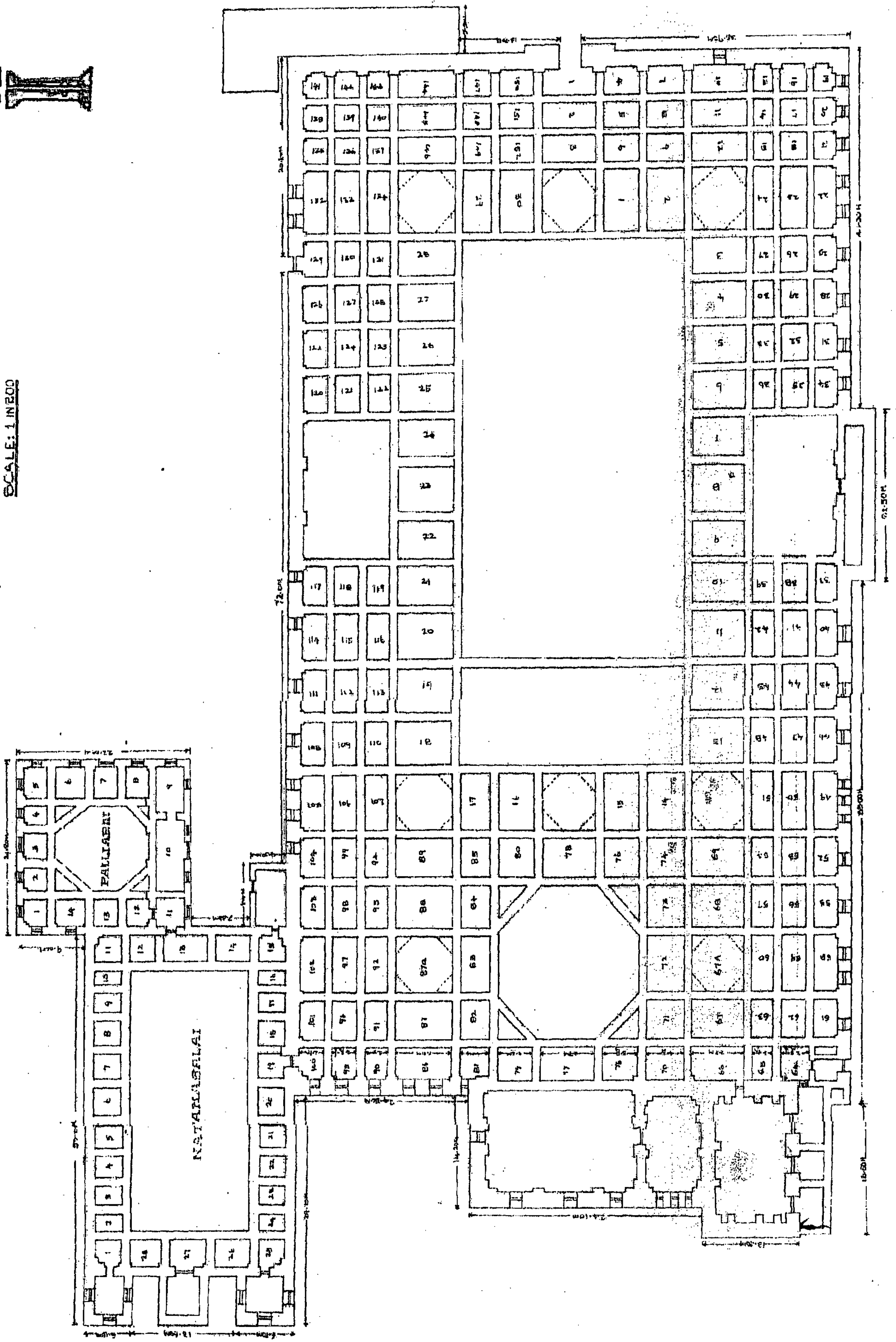
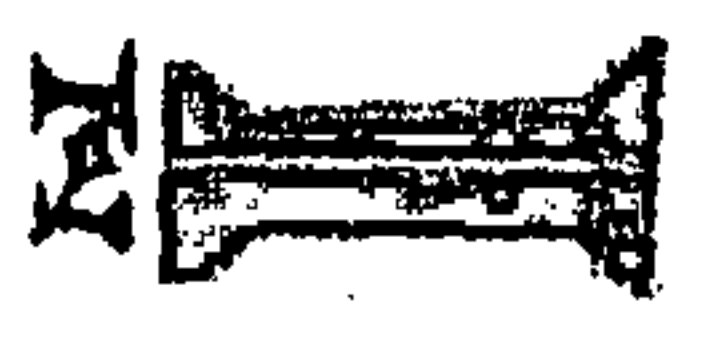
THIRUMALAI NAICKER PALACE - MADURAI
SCALE: 1 IN 100 (METER)



FRONT ELEVATION

TIRUMALAINAYAK PALACE MADURAI - CAPITAL LEVEL PLAN

SCALE: 1 IN = 200



TN MAHAL

NATAKASALAI



BEFORE



AFTER

TN MAHAL



Higher Official's Inspection on 13.7.09 during the work



Sound & Light Inaugural Function on 12.09.09

TN MAHAL



Higher Official's Inspection on 13.7.09 during the work

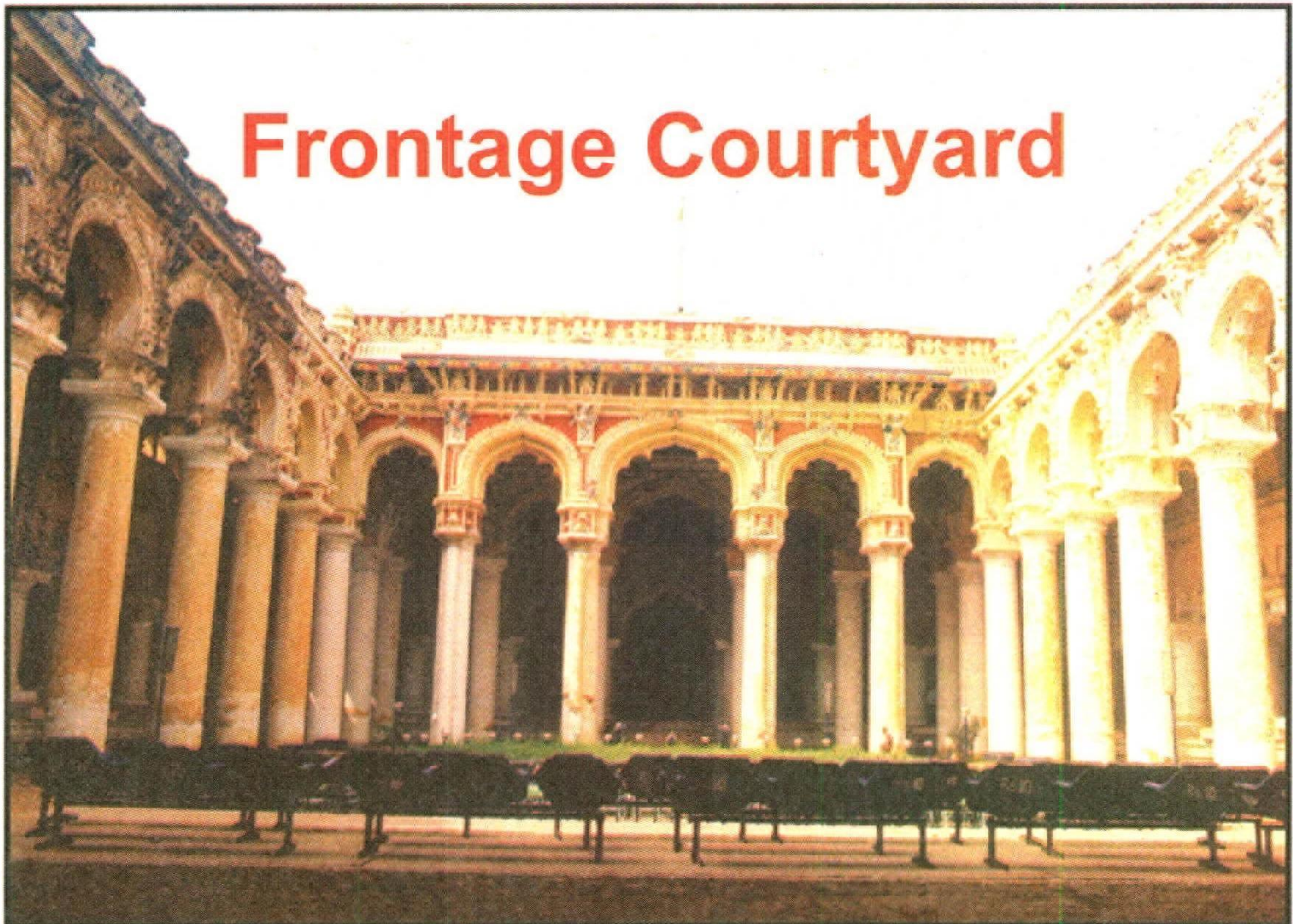


Sound & Light Inaugural Function on 12.09.09



ENTRANCE (1800 A.D)

TN MAHAL



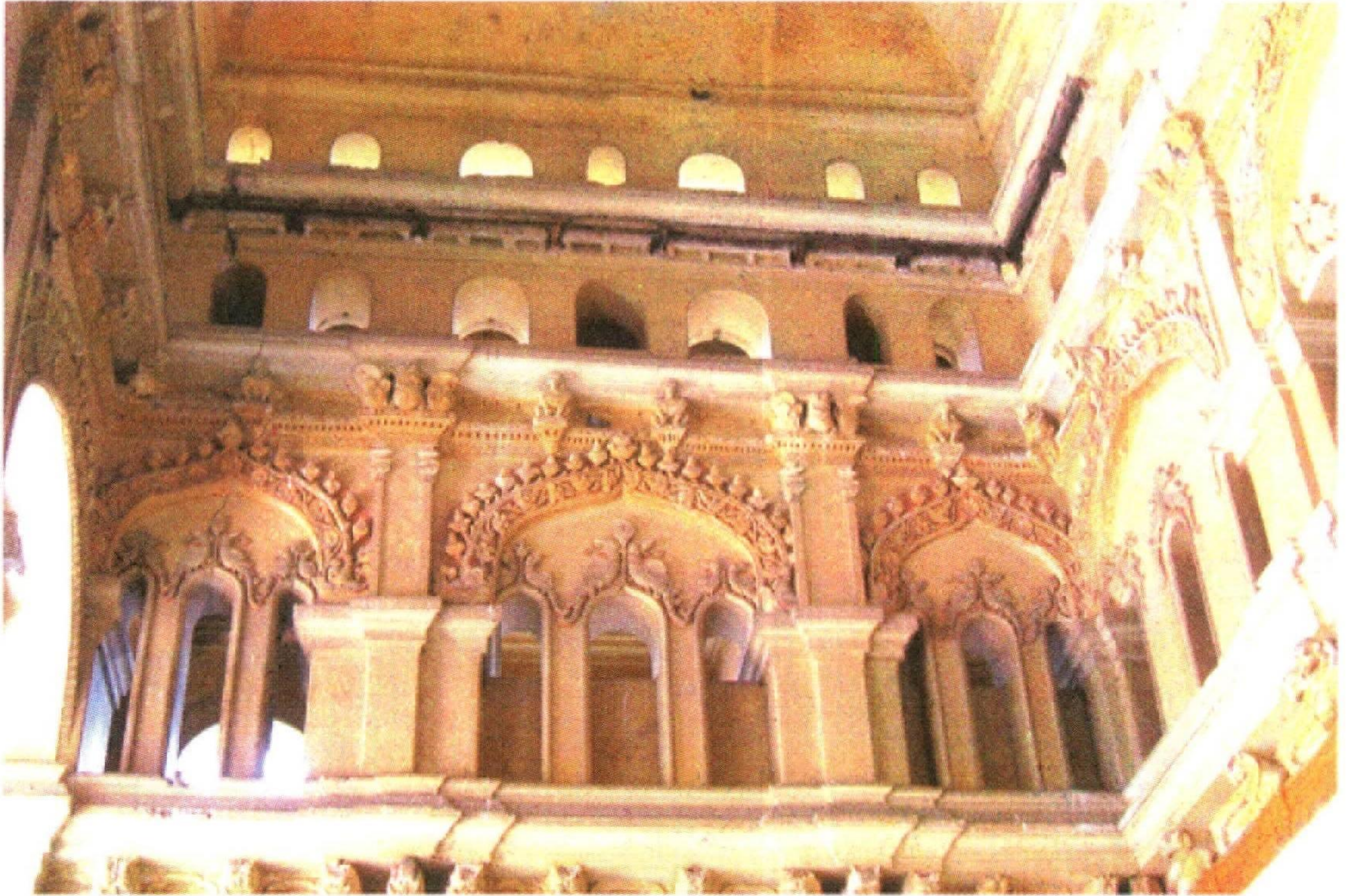
BEFORE



AFTER

TN MAHAL

MINISTER'S DOME



BEFORE



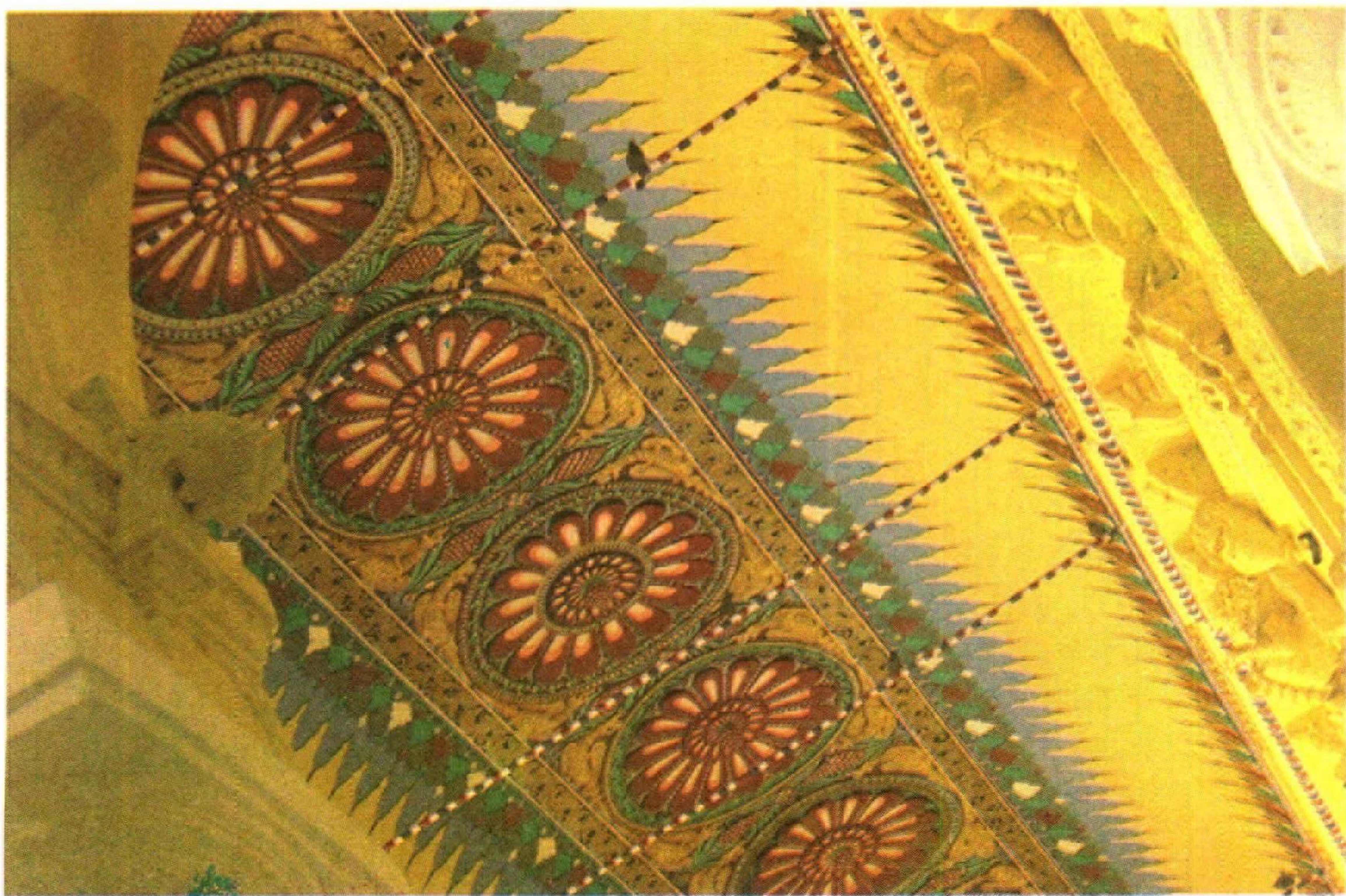
AFTER

TN MAHAL

KALYANA MAHAL PORTION



BEFORE



AFTER

TN MAHAL

SWARGAVILASAM DOME



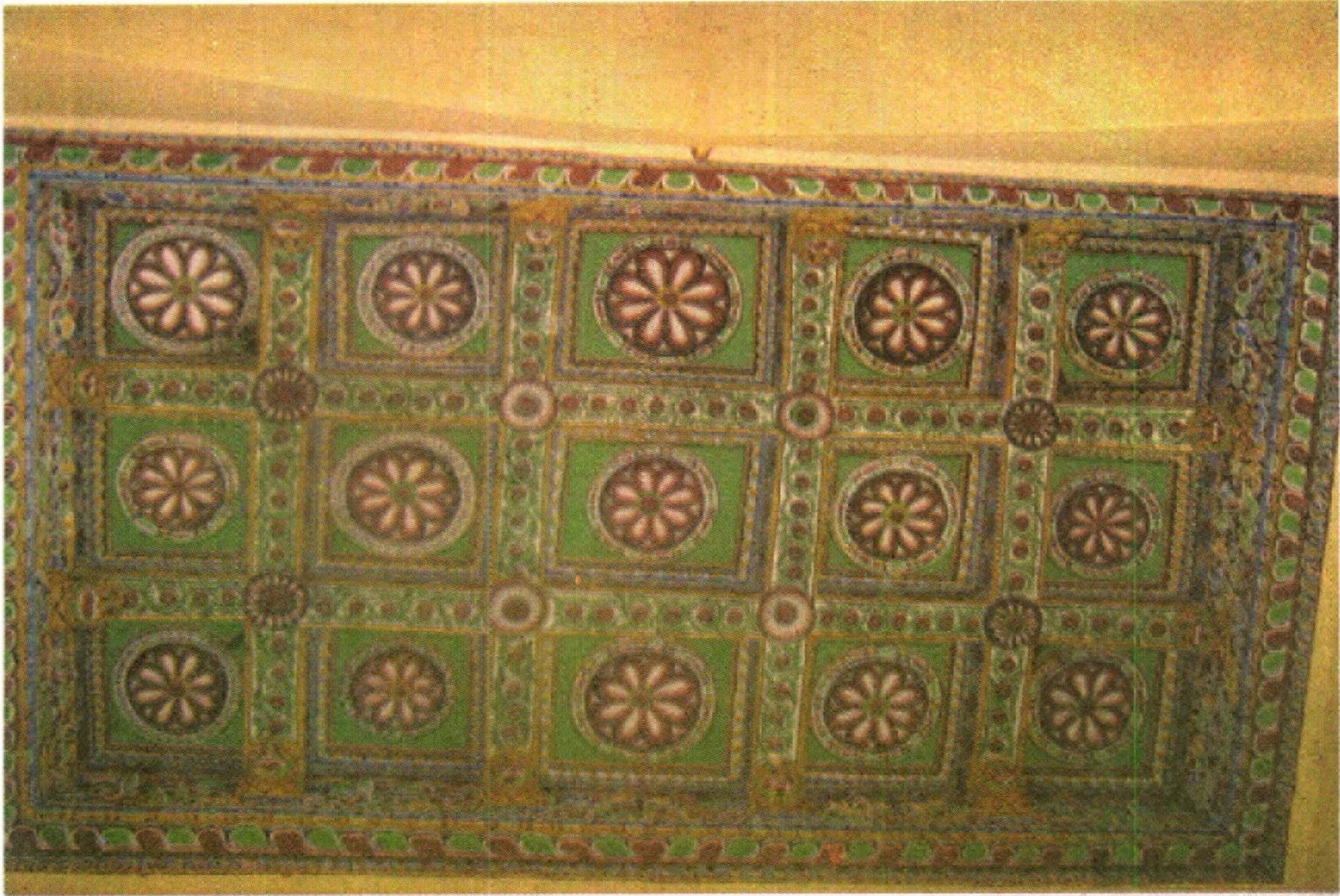
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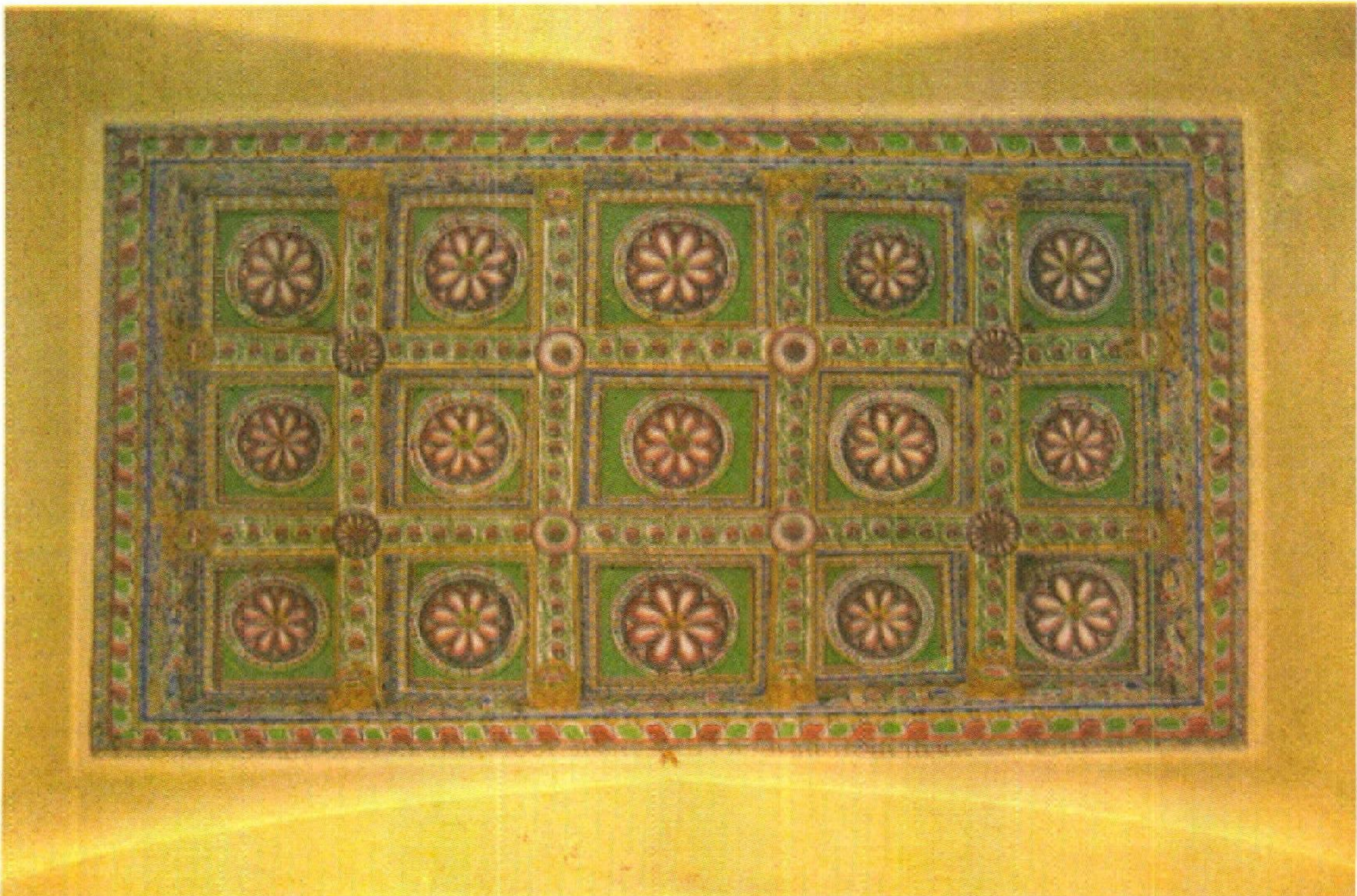
AFTER

TN MAHAL

CORRIDOR CEILING



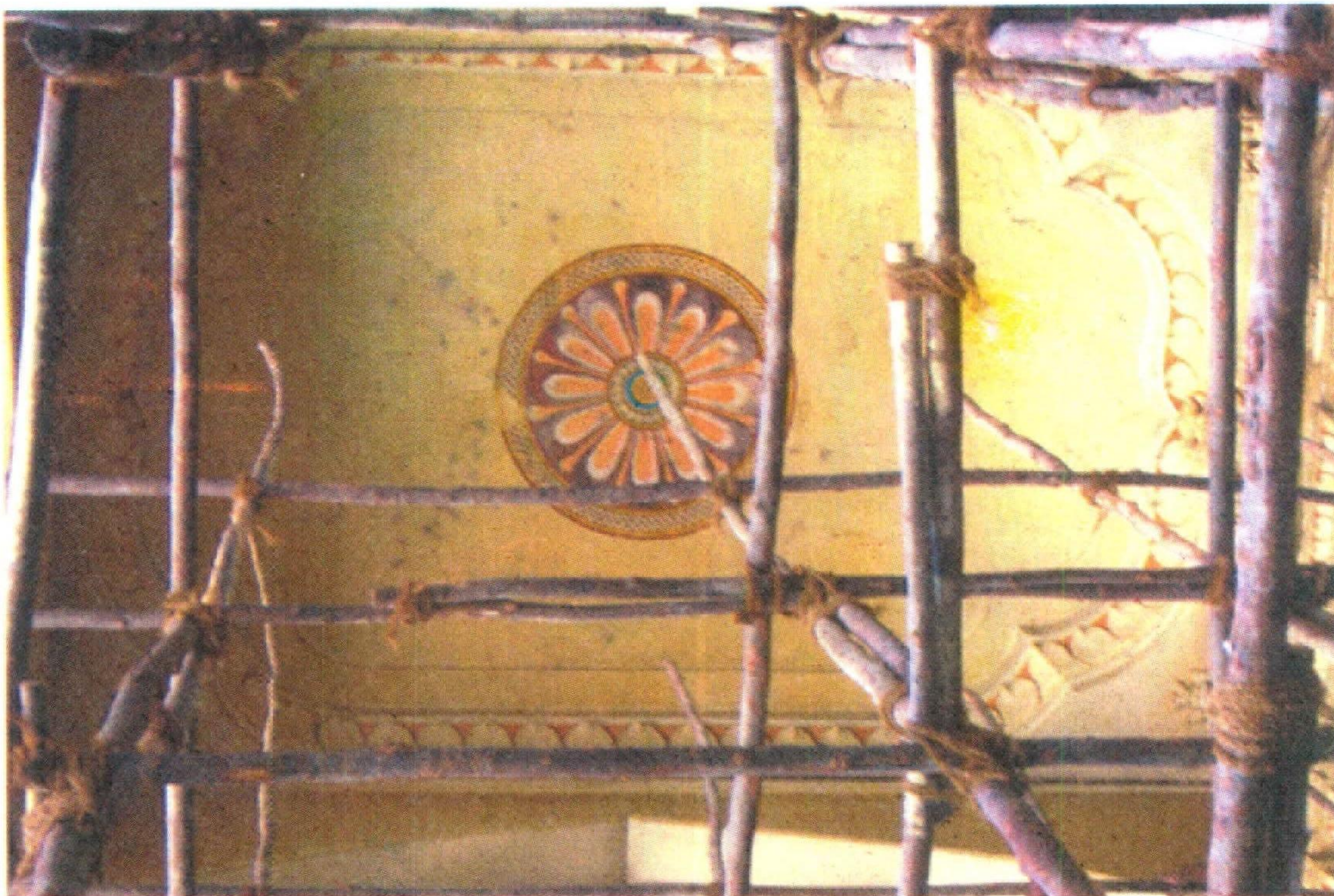
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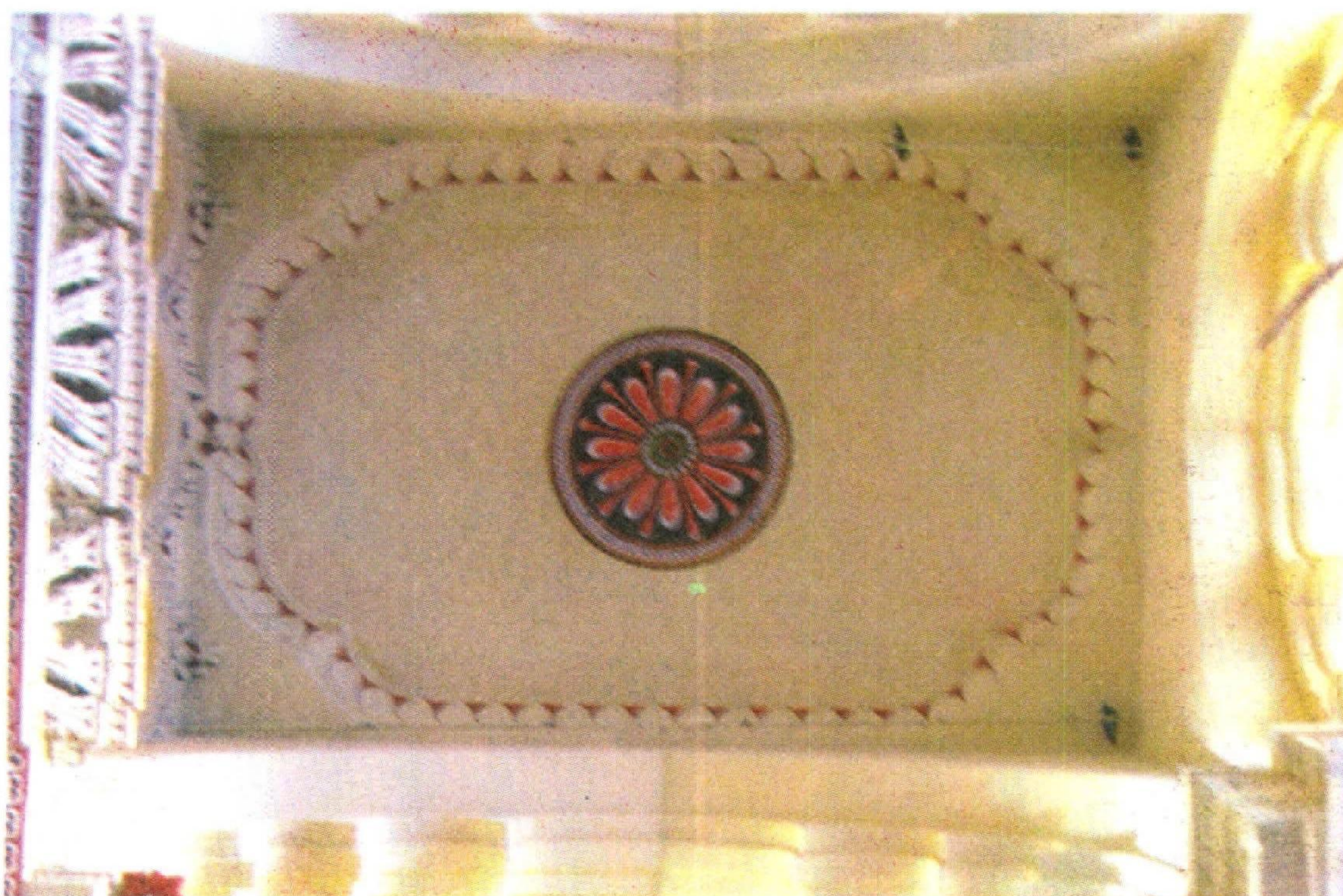
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CORRIDOR CEILING



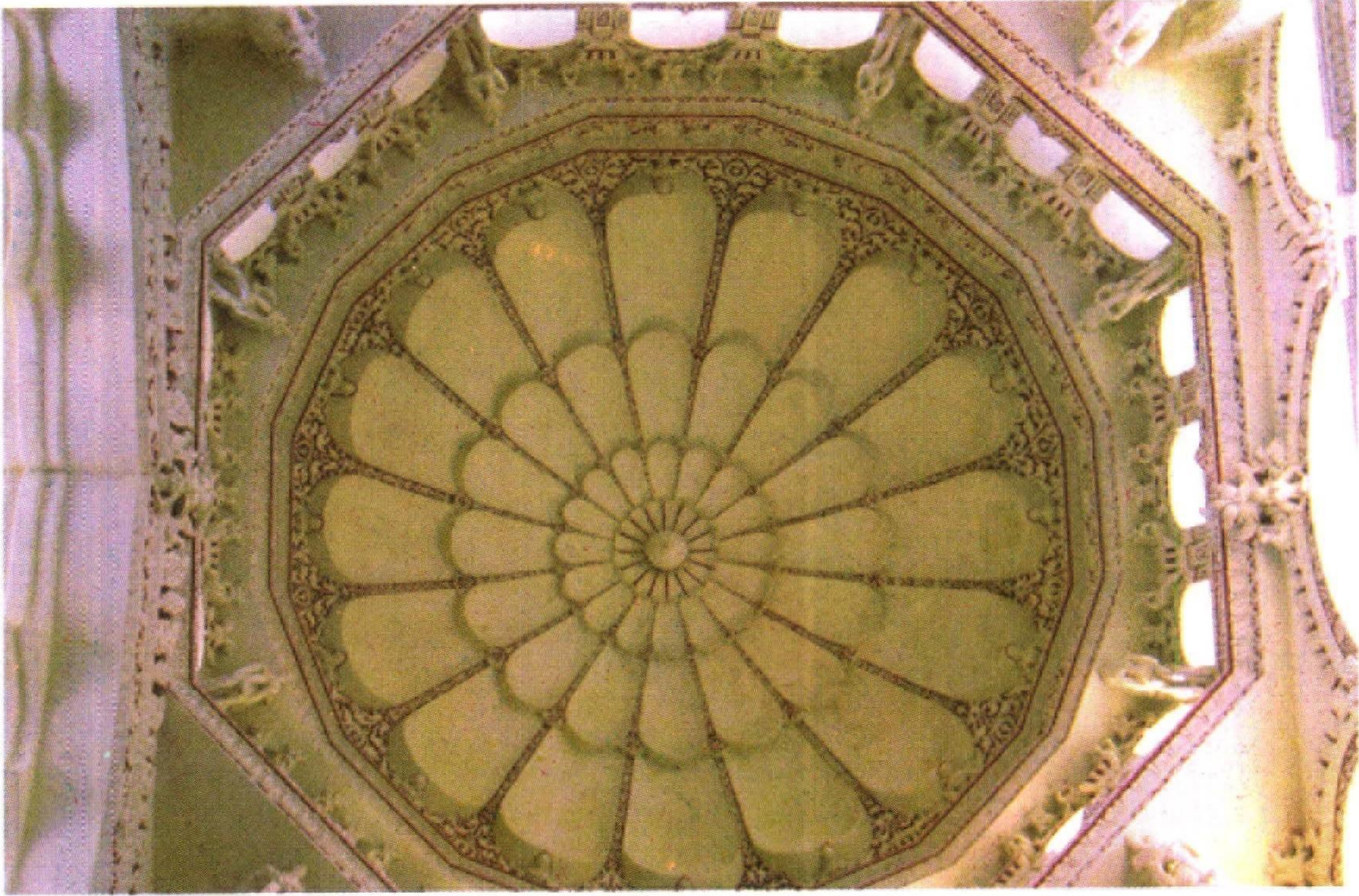
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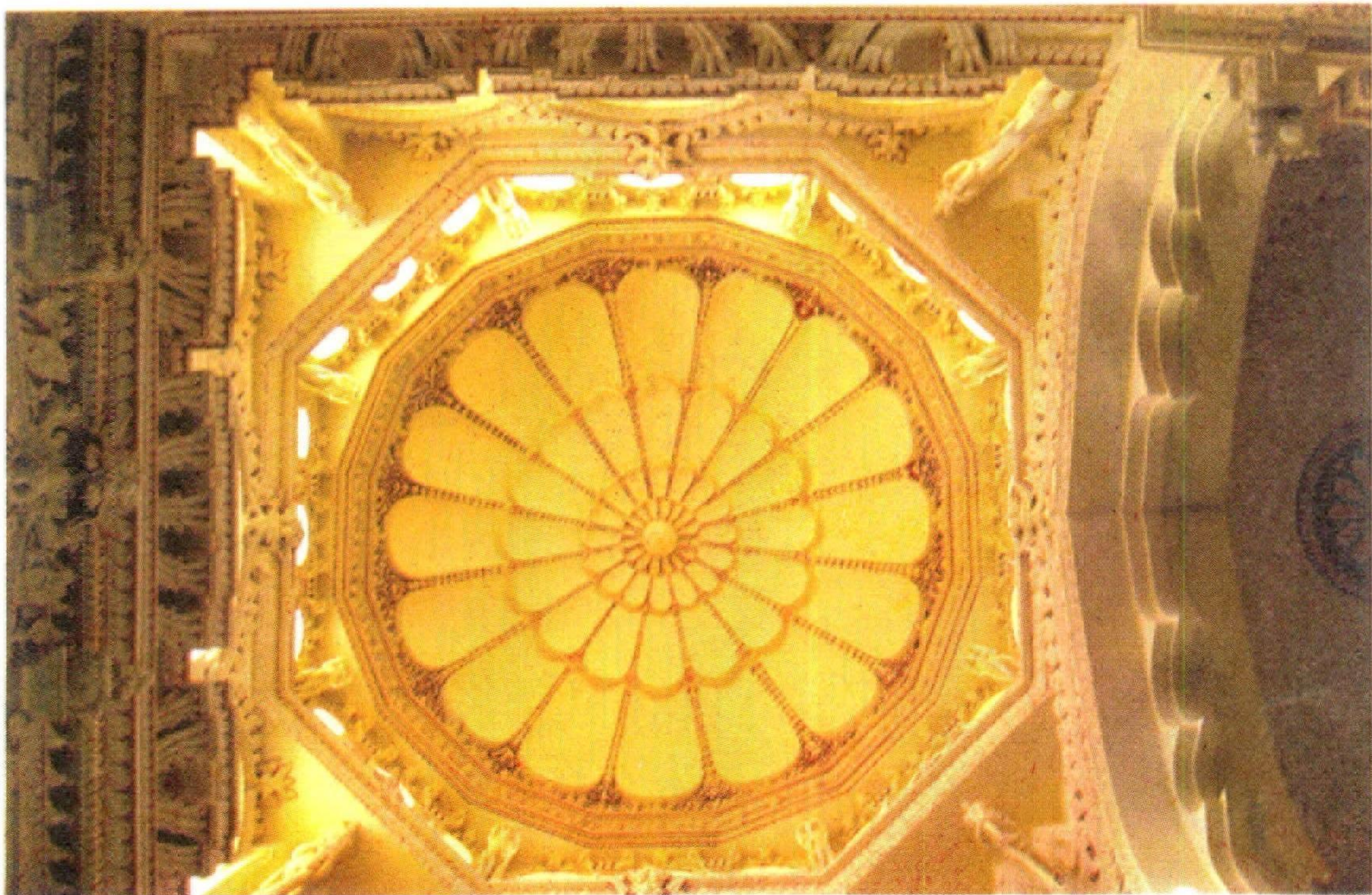
AFTER

TN MAHAL

CORRIDOR CEILING



BEFORE



AFTER