Conservation of the
Dharumavantha Raasegefanu Mosque, Male'
Republic of Maldives

Tej Singh
Atul Kumar Yadav

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National Research Laboratory for
Conservation of Cultural Property
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Preface

In early times, locally available coral stone and wood had been used for construction purposes in Maldives. As development took place, old houses and other establishments were demolished and reconstructed with new material. However, old mosques were not changed much other than occasional repairs and replacing of thatched roof by corrugated asbestos/metal sheets, and a number of old mosques exist even today in Maldives. Walls of important mosques are made of beautifully carved coral stone blocks, and wood has been used for pillars and multi-tier domed ceiling. In these structures, grooves and pinions in the coral stone blocks have been used to hold them together without any mortar. Most wooden parts are carved or turned and decorated with lac work, and the beams are painted with floral designs and verses from holy Quran.

Most of these mosques were in bad state of preservation, but their conservation based on standard practices being followed today had never been attempted before. In the year 1985, National Research Laboratory for Conservation of Cultural Property, Lucknow (NRLC), an institution of the Ministry of Culture, Government of India, stepped in the conservation of the coral stone mosques of Maldives. Problems of conservation of the coral stone and wood used in the mosques were studied and methods for their conservation treatment developed and standardized, and the most important mosque of Maldives, the Hukuru Mosque of Male, was conserved during 1986-1987. Subsequently, another very important mosque, the Friday Mosque of Fenfushi, was conserved during 2000-2001.

Following the success achieved by NRLC in the conservation of the above two mosques, the Government of Maldives made a request for the conservation of their oldest mosque, the Dharumavantha Raasegefanu

Mosque of Male, to the Hon'ble Prime Minister of India during his visit to Maldives in 2002. The Prime Minister of India gave an assurance to the Government of Maldives in this regard, and on initiation of the Ministry of External Affairs, Government of India and permission of the Ministry of Culture, Government of India, conservation of the Dharumavantha Raasegefanu Mosque of Male was undertaken by NRLC. The problems of conservation of the mosque were studied, and, accordingly, the conservation work was carried out systematically.

Participating Institutions

1. **The Ministry of External Affairs, Government of India** through Shri R.B. Lal, Under Secretary (BSM Division) initiated the project and coordinated its implementation.
2. **The Ministry of Culture, Government of India** through Shri S.K. Kapur, Under Secretary (Museums Division) permitted the National Research Laboratory for Conservation of Cultural Property, Lucknow to undertake the project.
3. **The High Commission of India, Male´** coordinated the project at Male.
4. **The National Research Laboratory for Conservation of Cultural Property, Ministry of Culture, Government of India** planned and executed the conservation of the mosque.
5. **The National Council of Linguistic and Historical Research, Male´ (NCLHR):** Mr. Abbas Ibrahim, Chairman, NCLHR initiated the conservation of the mosque from the Maldives side, and shouldered overall responsibilities of the project. Mr. Mohamed Waheed, Special Advisor, NCLHR and Mr. Mohamed Thoriq, Assistant Adviser, NCLHR coordinated the project from their side, and took

personal interest in its execution and the well being of the conservation team.

6. **The Supreme Council of Islamic affairs, Republic of Maldives** provided carpet, etc. for the interiors of the mosque, and developed the campus.

Expert Group

Dr. Tej Singh, M.Sc., Ph.D. (Chemistry) is Director Incharge, NRLC. The conservation of the mosque was carried out under his technical guidance.

Atul Kumar Yadav, M.Sc. (Chemistry) and trained in conservation at ICCROM, Rome is Junior Scientific Officer & Head of Conservation Division, NRLC. The conservation of the mosque was executed under his leadership.

Rajiv Khare, Master of Fine Arts is Senior Conservation Assistant, NRLC.

Karmbir Singh, Bachelor of Fine Arts and trained in conservation at ICCROM, Rome is Technical Restorer, NRLC.

Iliyas Ahmed, M.Sc. (Physics) is Technical Restorer, NRLC. Rajiv Khare, Karmbir Singh and Iliyas Ahmed were the main work force for execution of the conservation work, and

Suresh Ram, Repairer, NRLC assisted in the execution.

Anil Risal Singh, Member Royal Photographic Society is Senior Photographer & Head of Photo Division, NRLC. He was responsible for the photo-documentation of the mosque before and after the conservation.

Zameer Ahmed from NCLHR prepared part of the computer aided graphic documentation of the mosque.

Duration of the Project

Preliminary Examination of the Mosque:	February 2003
Execution of the Conservation Work:	May to November 2004

The mosque was examined by two experts from NRLC, Lucknow in February 2003, and, accordingly, a plan for its conservation was prepared. The conservation material, tools, etc. required for the project were procured in India and shipped to Male, and execution of the conservation of the mosque was started in May 2004 after the material sent from India was delivered at Male. Part of the material was procured at Male or provided by NCLHR. The conservation wprk was completed in seven months and the mosque was opened for prayer on 30th November 2004. Text of the speech delivered by Mr. Abbas Ibrahim, Chairman, National Council for Linguistic and Historical Research, Male at the opening function of the mosque is attached as Annexure - I.

The *Dharumavantha Rasgefaanu* Mosque

Introduction

Maldives is a group of islands extending nearly 750 km from North to South in the Indian Ocean in the S-W direction from India. People of Maldives embraced Islam in 1153 A.D., and immediately thereafter several mosques were built all over the archipelago. Today there are twenty-eight mosques in Male, the capital of Maldives, and Dharumavantha Rasgefaanu Mosque of Male is considered to be the oldest existing mosque in the Republic of Maldives. The Dharumavantha Rasgefaanu Mosque situated in a serene ensemble between the Sultan Park and the Muleeage can be attributed to Muhammed-ul-Adil (Dharumavantha Rasgefaanu), the first Sultan of the Maldives.

The Dharumavantha Rasgefaanu Mosque is a one-room structure measuring approx. 13 x 6.6 m with a 1.8 m wide covered verandah in the front, and there is a well inside the campus for drawing water for ablution, etc. The walls of the mosque are made of stone, which have been

Exterior of the Mosque

plastered and white washed in the past.

The ceiling of the mosque is made of wood, which is supported on wooden pillars. The ceiling has one central dome and four smaller domes; one on each corner of the central dome. Parts of the pillars and some other supports placed on the beams are turned and several other parts are carved. Most of the turned components except pillars are decorated with lac work, and the beams are painted with verses from holy Quran. The decorative wooden ceiling of the mosque is practically a false ceiling, and it has been assembled in such a way that it can be dismantled only from the top. As the structure has been assembled from base, each successive component has been fixed to the lower one with groove & pinion arrangement or wooden dowels. Nowhere nails have been used in the structure to fasten different components. Like other mosques of Maldives, this mosque also had originally a thatched roof as seen in a 1922 photograph of the mosque, which has now been replaced by corrugated iron sheets. It is natural that renovation of the mosque might have been done several times over the centuries. A metal plaque fixed on one of a beam at the entrance gives the date of a large-scale renovation

Interior of the Mosque

carried out in 1925. However, most of the original features of the interior of the mosque have been retained even after such renovations. As such, the mosque is very important to the people of Maldives.

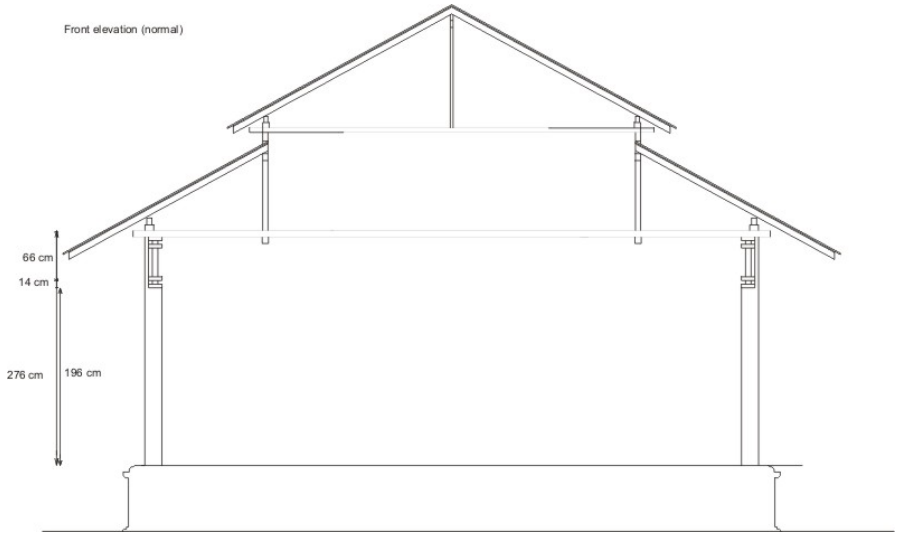
***Mosque* as seen in 1922**

Documentation of Last Intervention

Structural and Architectural Features

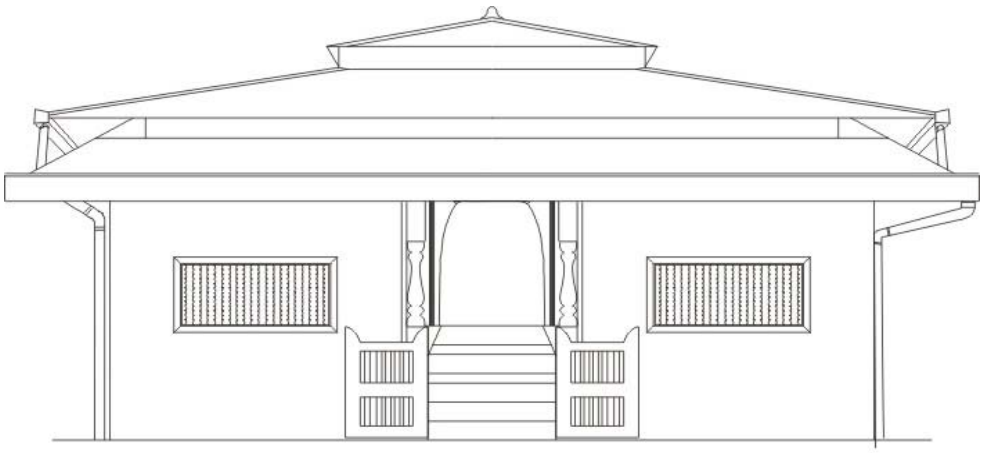
The floor of the *Dharumavantha Rasgefaanu* Mosque is about 1.20 metres above the ground. A transverse section of the mosque is

represented in. Entrance to the mosque is through the middle of the front verandah, which has been provided with a nearly 2 ft high small wooden gate. There is a wooden pillar decorated with floral designs in lacquer work on each side of the entrance.



The Transverse Section

Front Elevation & Pillars at Entrance



The Front Elevation

Four steps from the small wooden gate lead to the main hall of the mosque. It is reasonable to assume that the far end of the hall was separated from the main hall with a wall on whose top the frame of the painted panels was resting similar to what can be seen on the outer walls even today. It appears that during an intervention in the past the dilapidated wall was removed and the assembly of painted panels was supported on iron poles.

Iron Poles introduced during last Intervention

Main Entrance

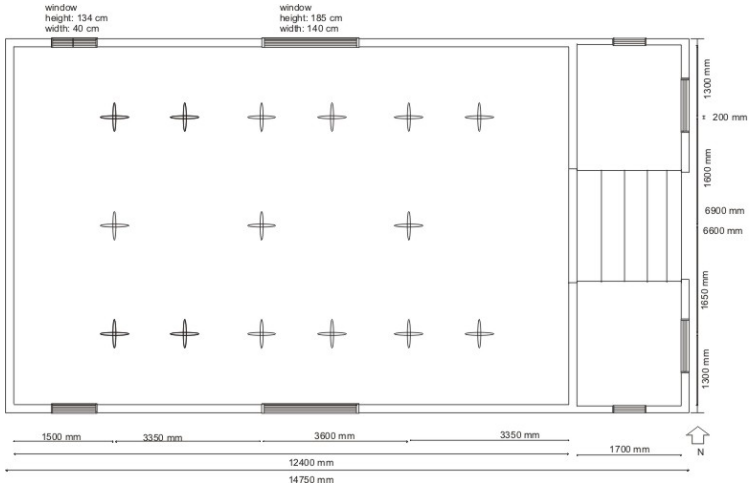
1.50 m wide and 1.80 m high main entrance to the mosque is made in a design peculiar to the Maldives. The arch shaped doorframe made of wood is exquisitely carved with intricate designs. The sliding doors originally provided in such gates are however missing.

Main Gate of the Mosque

Carvings at Main Gate of the Mosque

Pillars

The wooden ceiling of the mosque is supported on fifteen wooden pillars. Location of the pillars is shown in the floor plan of the mosque. The assembly of pillars is in three parts. The upper part of the pillars has been dressed to make a thin projection. This projection goes first inside the turned component and then inside the disc shaped component.

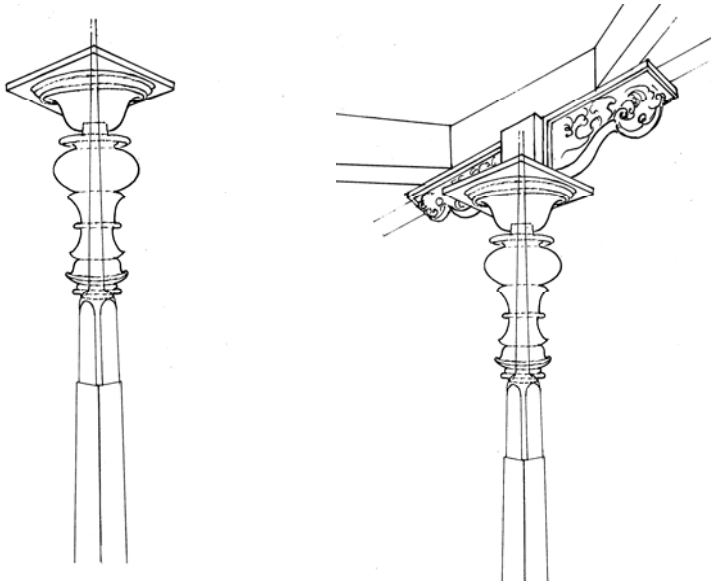


Floor Plan

Assembly of a Pillar

The top of the disc shaped component is flat, and another component, which supports beams, rests on it, and the thin projection of

the pillars goes through it up to nearly an inch inside the beam. The component that supports beam is carved with floral designs. The total assembly of a pillar is depicted below:

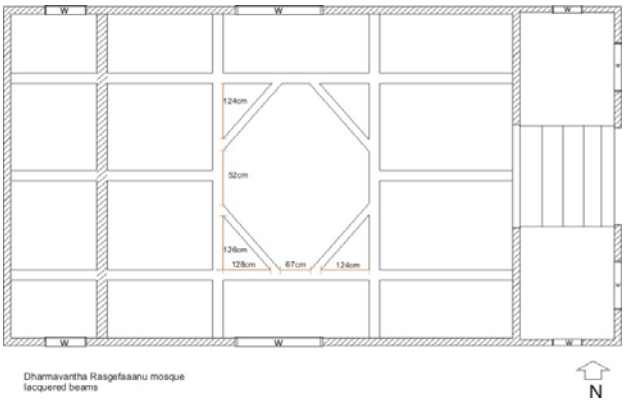


Total Assembly of a Pillar

Beams, Rafters and Planks

There are six main beams, and their thickness is 20 cm x 20 cm. Two of them run width-wise from wall to wall and the two run length-wise on either side of the hall from entrance wall to the far end frame of painted panels. These beams mark the base of the central dome in the middle of the hall. There are two other smaller beams on either side of the base of the dome placed along the length of the hall. One of them runs from the base of the dome to the entrance wall and the other from the base of the dome to the far end frame of painted panels. Three other small beams provided in the far end of the hall are put on the far end wall and the frame of painted panels. There are four other beams of thickness 15 cm x 15 cm and 2.10 m in length; each joining two adjacent bigger beams at the base of the dome on each corner. Wherever two main beams cross each other, each beam is cut up to the half in such a way that they fit in the notch of each other and the lower plane of all the beams is at one level. Height of the lower end of the beams from

the floor is 2.00 m. All the beams except the three small beams at the far end of the hall are painted with floral and geometric designs.



Location of the Beams

Painted Beams

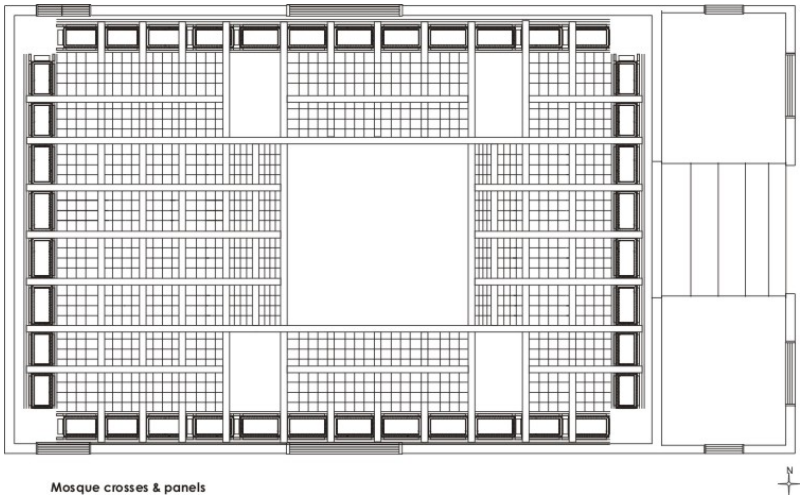
Similar to the assembly of pillars in miniature form, 40 cm high assemblies of three components kept on top of the beams have been used as legs to support the network of the rafters of thickness 15 cm x 8 cm. Gap between these rafters varies from 70 to 90

cm.

Assemblies of the components kept on top of the beams

The lower and upper ends of the assembly fit into the grooves made in the beams and the rafters respectively. The crossing rafters are fastened to each other with grooves made in both of them, and placed in such a way that their alternate joints are just above the beams. The supporting legs are placed on the beams below these intersections of the rafters. Another network of thinner rafters of thickness 6.5 x 8 cm has been made by making grooves at the points of their intersection in both of them and fitting to each other. Gap between these thinner rafters is 15 – 20 cm., and this network of thinner rafters is placed above the thicker rafters and fixed to them by grooves in the thinner rafters. On top of the rafters wooden planks of varying dimensions (thickness: 3 - 5 cm) are kept as the covering for the ceiling. A small opening through the rafters on the left side at the far end of the hall is provided to climb over the wooden structure of the ceiling.

The network of rafters



The Location of the Rafters

Domes

The ceiling of the middle of the hall is dome shaped, and total height of the dome is 4.80 m. The dome consists of several wooden components and its design is extremely intricate. Outer side of the dome can be seen in Fig. 18. The size of the base of the dome is 3.82 x 3.54 m, and is marked on each side by the big beams. The big beams are held in place firmly by four other beams (Length: 2.10 m; Width: 15 x 15 cm), which are fixed to the two adjacent big beams nearer to each corner. One 1.65 cm high pillar placed on each of these corner beams at the middle supports the dome from inside. There are four other smaller domes on each corner of the central dome.

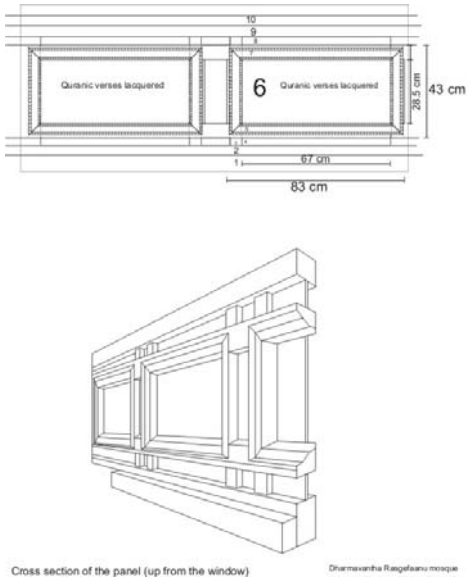
View of the Main Dome from outside & inside

View of a Small Dome from inside

Painted panels

Height of the wall is 2.00 m. Wooden panels fixed in sturdy wooden frames are provided on top of the wall. The panels are painted with verses from holy Quran.

The panels painted with verses from holy Quran



The drawing of the frame along with panel

State of Preservation before the Treatment

The main factor of deterioration of the mosque was insect attack. Most of the wooden members were badly eaten by insects from the inner side and only a thin outer layer was remaining there. Load bearing beams, which had become hollow, had got de-shaped and big cracks had formed on them.

Different State of Deterioration of the Beams

Some other components though appearing in sound condition from outside were found to be hollow after they were dismantled. Insects had generally not eaten the painted surfaces, however, paintings on some of the beams and panels were also damaged.

The Components appearing in sound condition from outside were found Hollow

State of Conservation of some Painted Components

Repeated application of oil had made the paintings obscure and the bare wood blackish. Practice of burning oil lamps for illumination inside the mosque might have also contributed to the darkening of the wood surface. Paintings on the beams nearer the window on the southern side had developed chalkiness on them and had suffered extensive deterioration of the paint layer.

Paintings Obscured due to Surface Deposits

The frame of the painted panels supposedly originally placed on the inner wall at the far end of the hall was now supported on iron poles painted green with modern paint. Due to replacement of wall by iron poles, downward force per unit area had become very

high which might lead to stress failure. At the same time, the material and its green colour were not in unison with the old structure of historical importance. Wooden window frames and grills and two pillars at the outer entrance were also painted similarly. Electric lines running on the wooden beams etc. were a potential fire hazard, and tube lights were fixed directly on the beams.

Conservation of the Mosque

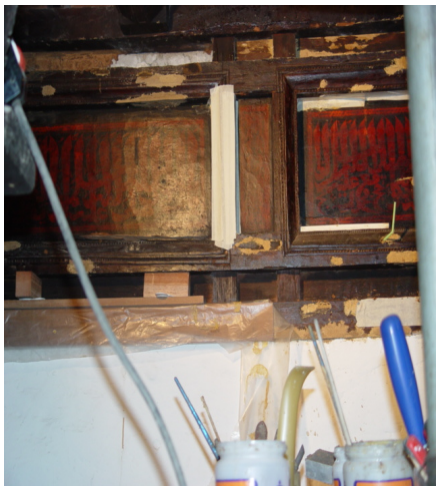
The main conservation work to be carried out on the mosque was to strengthen the structure and clean the painted areas and bare wood surfaces. Subsequently, the mosque was to be made presentable and fit for performing prayers. As was noticed, most of the wooden members were in very bad state of preservation. Therefore, at first the ceiling was firmly supported on several jacks, which were placed under the beams and some of the sturdy rafters. The structure was evenly supported by putting wooden planks between the jack head and beams or rafters as the case was. A sheet of felt was also put between the plank and beam/rafter so as to avoid any chance of jacks slipping from their positions or abrasion of painted surface. The electric wiring and fittings laid on wooden structure were removed.

Though no live insects were found, there had been intense insect activity in the wooden structure of the mosque in the past. Therefore, the wooden structure was thoroughly sprayed with a commercial insecticide, *termicide,* which is a 20% aqueous solution of cyclophyriphos. There was a lot of dust accumulated on the planks placed on top of the ceiling. The dust was vacuum cleaned and the planks were taken down, and kept aside. The structure was strengthened part by part and reassembled. The painted and other bare wooden members were cleaned and a protective coating was given. The floor was treated with insecticide and made even, and finally a carpet was laid. The treatment is detailed below:

Consolidation and Reinforcement

First of all, the painted panels, frames of the painted panels and rafters were consolidated with sawdust and PVA putty and final layer was that of PVA emulsion and whiting so that its texture matched with that of wood and it also received well the earth colours used for reintegration. The missing elements were reconstructed to make them to bear the load of the structure.

Consolidation of Horizontal Frames



Consolidation of Vertical Frames

Then the beams and other load bearing members were taken up for strengthening. The painted beam located on the right hand side at the far end of the hall was taken up first for strengthening, as the extent of damage was most serious in this beam. Insects had eaten the core of the beam, and, with the result, the beam was not having any load-bearing capacity. It was decided to reinforce the beam by providing a new core of new seasoned wood, and then place back in its original position. The work was carried out in the following steps:

1. A facing of cotton gauze was provided around the beam using *maida* paste, and it was allowed to dry for two days.

2. Thick rafters on both sides of the beam were further supported on additional jacks and lifted about an inch, and the assemblies of supporting legs placed on the beams were removed cautiously part by part and one by one. After removing the supporting legs, the jacks supporting the rafters were brought back to their original position.

3. The next step was to remove the pillar supporting the beam. The pillar was found to be embedded in the cemented floor, which was laid at a later date. The cemented floor around the pillar was dig to make the pillar free. The beam was raised by about 5 cm, and the lower end of the pillar was moved away from its position, and the pillar was taken out. The components at the top end of the pillar were then dismantled one by one.



4. The beam was further evenly supported by inserting a sturdy wooden plank between the beam and the jacks, and the beam was lifted up till it was free on both the sides. The beam was then tilted and taken down. The beam was found to be hollow. The top layer of the beam was cut along the cracks. The beam was cleaned of debris. The beam was consolidated from inside with sawdust and polyvinyl acetate (PVA) emulsion, and then the inner side was made even with angular grinder.


5. A new beam of locally available hard wood was made. The thickness of the new beam was such that it was just fitting the gap in the old beam and its length was bigger than the old beam. Slurry of PVA emulsion and sawdust was coated inside of the old beam, and PVA emulsion was applied on the new beam. While the PVA was still wet, the new beam was placed inside the old beam keeping the extra length of the new beam projecting equally on both the sides. The beam was clamped

hard from all the sides after putting polythene sheet, felt and planks on it, and left to dry. Excess PVA emulsion oozed out from the cracks and filled them.

6. After the PVA emulsion was semidry, the clamps were removed, and the excess PVA emulsion was cleaned from the surface after removing the gauze. The top layer of the old beam was then replaced using sawdust and PVA emulsion as adhesive. Care was taken that the top layer was exactly at the old level;

wherever required extra sawdust and PVA emulsion putty was used. After it was completely dry, grooves present in the upper layer to receive the legs on top of the beam were further deepened into the new beam. Any lacunae still present in the surface of the beam were filled with PVA emulsion and whiting, and general cleaning of the painted surface was done with alcohol and turpentine.

7. The grooves in the beams where the ends of the reinforced beam were to fit, were cleaned, consolidated and brought to proper shape and size.
8. The ends of the reinforced beam projecting outside the old beam were shaped as tenon to fit in the grooves of the receiving beams.
9. The components of the supporting legs to be placed on the reinforced beam were consolidated with sawdust and PVA putty as per their requirements. In most cases, the base of the legs had been eaten away by insect completely. New base to such legs, which exactly fit in the groove in the beam, was provided by inserting a conical shape wood piece while maintaining the length of the legs.
10. The pillars were mostly cracked and some parts had been eaten away by insects. The circular component placed at the top of the pillars in most cases had been eaten away by insects from inside, and some pillars were hollow at the base also. The gaps and cracks in the pillars were filled with sawdust and PVA putty, and where openings were restricted PVA emulsion was injected with hypodermic needle.
11. The supporting legs and the pillar were consolidated as above. The thicker rafters present above the beam were raised with jacks, and upper ends of the supporting legs were put into the place in the rafters. The pillar was placed in its position and the reinforced beam was lifted and placed in its original position. The rafters along with the supporting legs were then lowered so that all the components were in place as they were originally.

12. The beams and majority of pillars and supporting legs were treated one by one in the above manner as per their requirements. Nine segments of the main beams were thus reinforced, and one missing beam at the left far end was fabricated with seasoned wood.
13. The wall supporting the painted panels at the far end of the hall might have been decayed beyond repair, and three iron poles had been provided instead in the past to support the painted panels. The iron poles painted with modern green paint were not in unison with the monument of historical importance and the architecture of the interior of the mosque apart from the fact that downward force per unit area was also very high. Therefore, three pillars along with all their components similar to other pillars of the mosque were fabricated with seasoned wood and placed instead of iron poles.
14. The rafters were taken up next for conservation. Most of these were eaten by insects or were rotten, and many were missing. Deteriorated ones were cleaned and consolidated with sawdust and PVA putty and the missing ones were fabricated new.

Cleaning and Protective Coating

Several solvents / solvent mixtures were tested for their efficacy for cleaning. The painted areas were cleaned with 1:3 alcohol and turpentine mixture, and the bare wood was cleaned with 1:1 mixture of the same reagents. Wooden window grills and two pillars in the front corridor were painted with several layers of modern paint. Bulk of the paint was removed with a commercial paint stripper, and final layer was removed with 1:1 alcohol and turpentine mixture. The white patches of putty used for consolidation were reintegrated, and finally a protective coating of picture varnish was given.

The Mosque after the Treatment

Maintenance of the Mosque

As is the practice with the people of Maldives to keep the places of worship very neat and clean, the Dharumavantha Raasegefanu Mosque should also be maintained in the same manner. Regular and proper use and general cleaning of the mosque and its campus will go a long way in the preservation of the mosque. Taking into consideration the ethics of conservation of monuments and their preventive conservation needs, further suggestions are offered below for the attention of the concerned authorities:

1. Original character of the mosque should be maintained to the maximum extent possible.

2. Modern paint with bright colours, does not go well with the old monument. Refrain from using them on the wooden components, as has been the practice, even if the wood appears dirty.

3. 220 volts electric lines should not be laid on the wooden parts of the mosque.

4. Interiors of the mosque should be evenly illuminated with UV-free light. Normal fluorescent lamps presently used in the mosque emit high amounts of UV radiations.

5. Some oils may provide protection to bare wood against vagaries of the nature. However, they should not be applied on the painted wood, as they become dark on ageing and attract dirt and change appearance of the paintings. Unpainted wood in the mosque has been provided with a protective coating as a part of the conservation treatment and application of oils there also is unwanted.

6. Speed breaker to be provided on the road passing by the mosque so that particulate matter (Dust) in the surrounding air, and thus soiling of the mosque, is reduced.

7. A work force of motivated and dedicated individuals should be created to look after the old mosques and other cultural property of Maldives, and they should be trained well in the scientific conservation of cultural property.

8. Modern structures in the vicinity, which are taller than the old monuments, lessen the grandeur of the monuments. If possible, a cultural complex comprising of the Dharumavantha Raasegefanu Mosque, the Hukuru Mosque, the Old Palace and the Sultan Park should be developed as a window to the rich heritage of Maldives.

Annexure – I

Speech delivered by Mr. Abbas Ibrahim, Chairman, NCLHR at the opening of the Dharumavantha Rasgefaanu Mosque. Male on 30.11.2004.

It is with great pride and sincere appreciation that I stand here to witness the opening of the newly conserved Dharumavantha Rasgefaanu Mosque. Being one of the most significant icons of our heritage, the longevity of Dharumavantha Rasgefaanu Mosque is without doubt an important achievement and a deserving victory to the incessant efforts to manage and preserve the rich heritage of Maldives. Let me note here the immense social and historic significance inherent in one of the first mosques to be constructed in Maldives by Mohamed Bin Abdullah, the first Sultan to rule Maldives after the conversion to Islam in 1153 A.D. Although it has undergone some changes over the years its significance remain essentially unaltered. Thus its conservation becomes an important asset to Maldives.

Heritage management and conservation in Maldives is yet in its infancy. Much still needs to be done as a large part of Maldives heritage is yet unexplored and without conservation. However, the series of conservation projects is a catalyst to expanding the understanding of our long history and rich heritage. Starting with the Hukuru Miskii, the conservation programs have seen the restoration of three significant heritage sites including the Fenfushi Hukuru Miskii and the Dharumavantha Rasgefaanu Mosque. And it is important to highlight the fact that the three aforementioned projects were undertaken quite meticulously by the National Research Laboratory for Conservation of Cultural Property, Lucknow (NRLC) with the unwavering support of the Indian High Commission. The devotion and excellent workmanship they have shown in this conservation effort is without doubt praiseworthy. On behalf of the members of the NCLHR, I thank them whole-heartedly.

The present conservation project has taken almost seven months and remain the longest ever project undertaken by the National Research Laboratory for Conservation of Cultural Property in Maldives. It is also the most detailed and

meticulous of all the three endeavours. Unlike some of the earlier programs, the present effort has seen the mosque virtually dismantled and fully restored.

Three of the wooden pillars have been constructed on site by the conservation team. The wooden beams have been carefully replaced with more durable timber without any compromise on the aesthetic appearance of the mosque. Writings have been cleaned to reveal the Arabic inscriptions. While the condition of the mosque demanded prompt intervention to check the imminent deterioration, the care and professionalism to respect the core principle of conservation of doing as much as necessary but as little as possible, I believe, needs to be mentioned.

Being away from home for more than seven months is not a small sacrifice for the preservation of heritage of a foreign country. The conservation team has worked tirelessly day and night to ensure the longevity of the Dharumavantha Rasgefaanu Mosque. They have selflessly dedicated their time, skill and expertise in this regard. Thanking them is the least that I can do. Please do accept my kindest appreciation for all the hard and dedicated work you have accomplished. On behalf of the National Centre for Linguistic and Historic Research I thank each member of your conservation team especially Mr. Atul Kumar Yadav for leading this project and binging it to this deserving conclusion. I would also like to thank His Excellency Mr. Gavai for arranging the services of NRLC whenever we have asked for their expertise for until a time comes when we have trained local conservators. We are fortunate to be able to rely on the trained professionals of the National Research Laboratory for Conservation of Cultural Property, Lucknow.