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Conservation of Our Lady of Help Church, Ribandar, Goa

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Abstract

Many churches in Goa, which are heritage structures, have suffered tremendous deterioration over the years. One church at Ribandar, having a barrel arch over the main altar, has cracked in both the lateral directions. The main arch wall too had deep cracks originating from its junction at the roof up to the arch below. Investigations revealed that the roof purlins rested directly over this wall without any wall plate. So, the cracks generated, also propagated through the ribs of the grid arch. Also, the arch appeared to have sagged.

The study of the causes of the deterioration and the solutions offered forms part of this paper keeping in mind, the rules to be followed for restoration/repair/maintenance of heritage structures as per 'The Venice Charter 1964' i.e. The International Charter for Conservation and Restoration of Monuments and Sites'

1. Introduction

Goa state, an erstwhile colony of the Portuguese has many churches with Roman architecture, most of which are about 450 years old. Many of these heritage monuments have undergone tremendous deterioration. One such church structures at Ribandar, a load bearing masonary structure having its foundations on lateritic soil on the banks of Mandovi river, had developed cracks in its main arch and led to slipping of stone voussoir, from the barrel arch. Also, the NH4A ran within a distance of 1m from the church. A speed breaker was noticed adjacent to church, which was laid about ten years back.

2. Barrel Arch (Vault) Structure

The barrel arch over the altar, is 6.25 m by 7.2 m in plan and 3.5m high at the crown. This arch is created of series of stone arches spaced about a metre centre to centre with its cross section 200mm at the top and 150mm at the bottom and 400mm deep. Also, in

the longitudinal direction, similar stones having shape and character same as arch stones were placed, thus creating a grid structure at the bottom. The spaces between the grids thus formed, were then filled by laterite stones (called fillers) all over the barrel arch (vault). The arch-stones grid projected below the fillers in both the directions, downwards. These projecting stones were given ornamental effects and in each of the hollow portion of the grid block an ornamental icon was carved out at the centre. The barrel arch was supported on the two 1.7m walls at the sides, the 0.70m main altar wall at the back and the 1.3m grand arch-wall at the front.

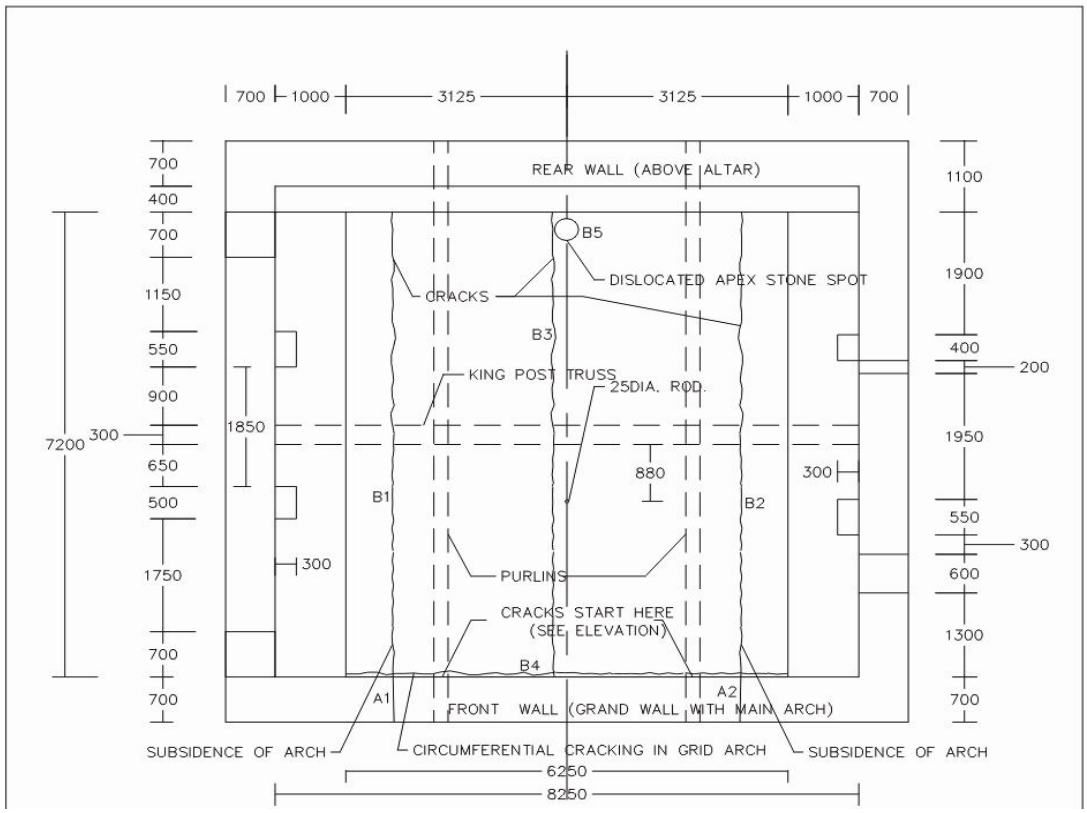

Figure 1: Plan of the Grid slab arch.

The church has a Mangalore tiled sloped roofing system supported over King Post trusses spanning at 3.6m centre to centre. The purlins running over the trusses, rest at one end directly over the laterite masonary grand arch-wall, without any wall plate and the other over the King Post truss. Two cracks originated from the loading points of these purlins on each side of the grand arch wall. These cracks running through and through in the whole 1.3m wall, were nearly vertical for about 2.3m and then for 400mm at about forty five degrees slope at the junction of the main arch wall and the barrel arch. The wall was thus split into three parts over the grand arch as a result of this massive cracking. Also the gold plated wooden ornamentals carvings had got loosened out. These two cracks propagated into the barrel grid arch; and traversed

longitudinally throughout the length of the barrel arch. Also, another crack was visible on the underside of the barrel arch, at the junction of the main arch wall and the arch circumference, which is at right angles to the other two cracks thus depicting the detaching of the barrel arch from the main grand arch wall.

A hole was seen in the barrel arch of about 25 millimeter diameter which had a 25 millimeter bar passing through it and carrying a pulley at its lower end. This pulley was being used for raising and lowering the cross during 'Good Friday'. The 25 millimeter diameter bar was secured to the tie member of the King Post Truss by means of bracket. The crack at the crown of the barrel arch was running throughout the depth. The cracking at the crown was due to the tight fitting of the bar and transfer of the stress on the crown during the lowering and lifting of the cross.

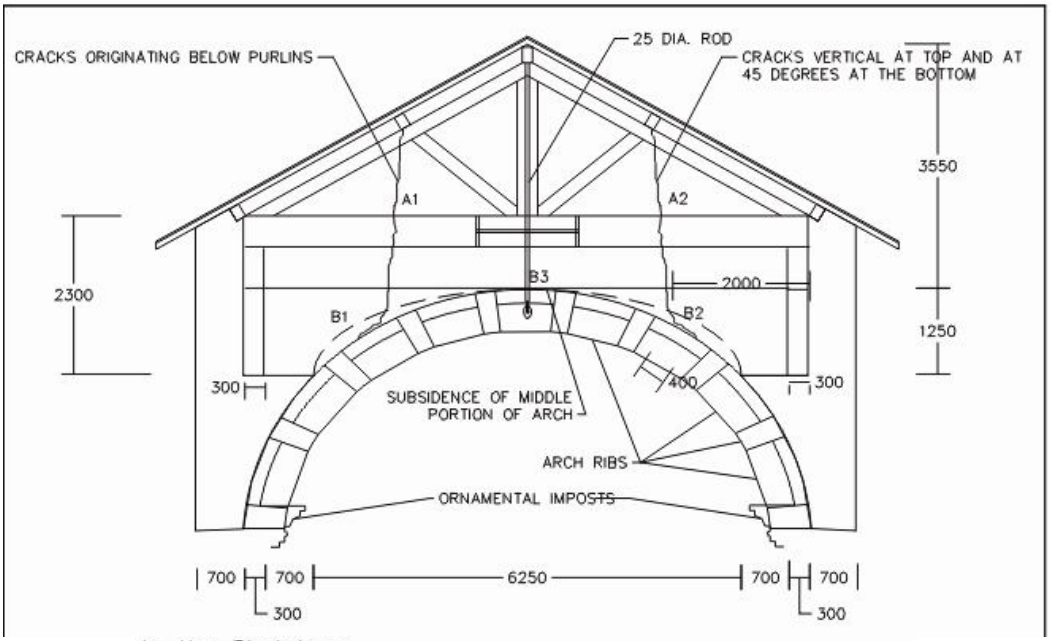

Figure 2: Elevation of rear wall (Above altar) from 25DIA ROD.

The portion of the barrel arch from the haunches on both the sides up to the crown appeared to have sagged out. The speed breaker outside the church laid about 10 years back added to the vibrations and the sagging of the arch due to heavy traffic. One of the walls on which the arch rests, was found to be slightly out of plumb. The slight movement of the wall and the vibrations had 'relaxed' the arch resulting in the arch-intrados at the crown to open up, thereby leaving a fissure and dislocation between the lateritic stone blocks, creating 'hinge effect'. A stone from the longitudinal rib of the

grid from the barrel arch located at the crown slipped from its position and crashed on the altar below.

3. The Proposed Methodology of Repairs was as Follows

All the precious ornamental work over the wooden members below the barrel arch, altar and those carrying gold plated motifs from the walls, ceiling of grand arch, wall facing the nave, etc, attached to the walls were detailed and numbered. A database of all such items was created in order to rectify/repair/replace the damaged ones and then place back at the appropriate places. Then they were detached carefully, removed and placed at secure locations. Since, masses were being celebrated at the church everyday, a plastic sheet secured the construction/renovation area from the church nave. Stable steel scaffolding and propping was carried out. The strutting was laid of wooden planks conforming to the shape of the barrel grid arch to support all members under renovation.

The barrel arch was scrapped with wire brush and the loose mortar between the laterite stones was dusted and removed. It was observed that the mortar between the stones was very loose. At some places, the mortar thus removed was so much that a hand could pass through and through and touch the wooden shuttering below. Overall, the depth of the loose mortar removed was larger than half the thickness of the barrel arch. Few laterite stones of similar character as the rest were procured from another heritage site in order to replace them with the damaged ones. The barrel arch stones were inspected for damage, crushing, loosening out. Most of the stones depicted good character and shape. Only a few stones in the barrel arch were found to be damaged and were replaced by the ones of good character and shape. The laterite stone which had slipped and fallen down on the altar below was replaced by a new one after dressing it to proper shape.

Stainless steel bars of Type SS316 were bent to the shape of a stitch. These were then used to stitch the laterite stones in the barrel arch. Mortar made-up of lime, sand and a particular fruit juice, which was normally used for structures in Goa during their construction, was mixed up to plastic consistency and placed within the crevices so created due to scrapping of mortar between the laterite stones to bind them. A screed of cement mortar was laid over the barrel arch and smooth finished in order to prevent any damage due to the leakage of water from the Mangalore tiled roof.

A steel wall plate running the full length of the wall was placed over the wall, below the purlins so as to distribute the load over a larger area. The main arch wall cracks were scrapped cleaned of debris and the cracks were filled with similar character laterite stones, with through stones at a regular spacing. The damaged stones were removed out and replaced with good ones. Similar to the process over the barrel arch, the stainless steel SS Type 316 bars stitching was carried out to the laterite stones at the cracked portion and the junction of the barrel arch and the main arch wall. Cement Grouting was carried out to the main wall and re-plastered.

In order to prevent any further lateral movement of any of the four walls supporting the arch, a bracing of tubular rectangular hollow steel sections was

fabricated and placed over the top of the barrel arch connecting the four walls rigidly to one another. The pulley bar was secured to this bracing to relieve the barrel arch crown.

Few years back, the road NH4A was shifted by about a kilometer and speed breaker was proposed to be removed which would reduce the vibrations on the barrel arch. The scaffolding at the bottom of the barrel arch was removed. The damaged wooden ornamental pieces were replaced by similar wood material after carving works matching with the original one carried out. The wooden members were placed back in position after carrying out anti-termite treatment.

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