

Sustainable Mosque

Sustainable Mosque: Bhong Mosque, Rahim Yar Khan, Pakistan

Saher Hasnain

ENVS 664-660

October 20, 2010

Sustainable Mosque

Location: The Bhong Mosque is part of the Bhong Mosque Complex, in Rahim Yar Khan Pakistan. The completed complex has the mosque as a central feature, with a smaller mosque for women (also functioning as a library), a madrassah (education center), dormitories for students and visitors and gardens. The construction was started in 1932 by the landlord of Bhong, Rais Ghazi Muhammad, and completed in 1982. The mosque was established as a central feature of the village, a center of learning, training and employment for the local people {{Veranda, 1986}}.

The area of Bhong is characterized by hot and dry summers and winters cool and dry with an average rainfall of about 100 millimeters {{Nicol, 1999}}. Therefore, most of the construction elements are geared to providing a cool and well ventilated interior.

Site Selection: The current mosque stands on the personal property of the landlord, near his palace and the main house {{Veranda,1986}}.

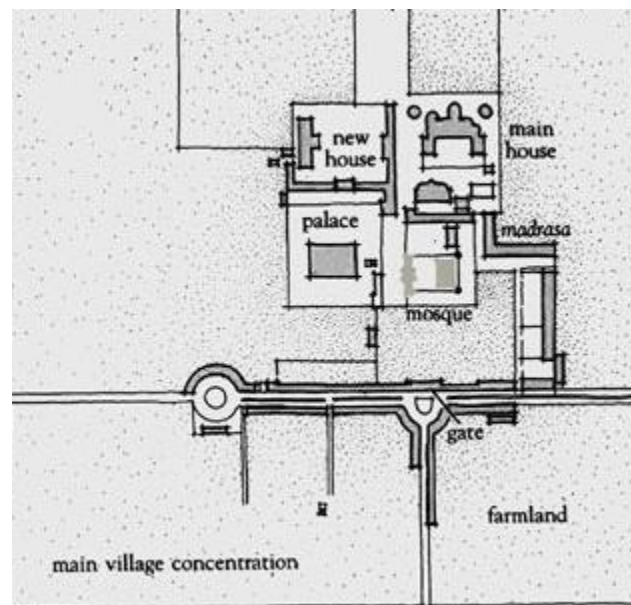


Figure 1 Location of Mosque in Bhong {{Veranda, 1986}}

Access: In the 1980s, the village and the mosque were connected only to the closest major city, Sadiqabad by a bus service run by the landlord's family {{Veranda,1986}}, and a train but

Sustainable Mosque

now local public transport including minivans, rickshaws, taxis and interconnecting bus services and the National Highway have linked it with rest of the country {{Mughal, 2009}}. The mosque itself has a central place in the city and is accessible by walking

Village Development: The village of Bhong was relatively small with a population of about 5,000 {{Veranda, 1986}} at the time of construction so the mosque development lead to a great deal of cultural development and increase in employment. The development of the mosque revived the traditional arts, with the master masons and craftsmen molding the existing building elements at the time with innovative ones to result in the rather creative design {{Serageldin, 1989}}. While the master masons, calligraphers and painters were brought from Rajasthan (now the part of India) and Karachi, the entirety of the stone carvers and labor were from the village itself. The labor were subsequently trained and retained to continue maintenance and development of the mosque complex. The entire complex, including the great mosque cost almost 10 million Pakistani rupees (almost US \$116,306).

The construction of the mosque was followed by extensive development of the local infrastructure, mainly to increase access to the building, provision of meals to the under-privileged and the students, and maintaining the traditional crafts industry {{Serageldin, 1989}}, as the locals can't really depend on agriculture because of the aridity and very low rainfall.

Materials: The bulk of the materials used in the building were locally acquired, but the decorative element, such as the Burmese teak and black marble, were shipped from Burma and Europe {{Serageldin,1989}}. The materials consisted of, bricks, teakwood, marble, onyx, colored glass, fresco, mirrors, ivory, paint wrought iron, terrazzo, colored cement tiles, mosaic tiles and chips and wood. Marble was brought from Peshawer and Quetta, paint, wood, tiles and mosaic from Multan and glass and mirrors from Karachi {{Serageldin, 1989}}.

Sustainable Mosque

The foundation and walls were established with locally made mud bricks and cement mortar, with the bricks having less embodied energy than contemporary fired bricks{{Reddy, 2004}} . The domes were attached separately as domed rooms on the roof{{Veranda, 1986}}.

The basic design is the traditional mosque style of the area with 8 minarets and 3 domes, although stylistic elements have been borrowed from Baghdad (the gateway), Lahore, Spain and Turkey {{Mughal, 2009}}.The mosque has been awarded the Aga Khan Award for Architecture in the cycle of 1986 {{AKDN, 1986}} because of its contemporary design, community development, landscaping and restoration, environmental effects and reuse {{AKDN, 2010}}

Energy Use: Following the traditional design aspects of mosques, the Bhong mosque is very airy and dependent on natural lighting and wind patterns. Wood shutters are present at windows to regulate direct light and the only electric cooling present is in the form of ceiling fans in the main prayer room, which use about 95 Watts, at 220 V of energy. Seeing as how there are less than 10 fans in the entire mosque, and few 60-100 Watt light bulbs inside, their energy use is less than that of a typical residential household in the city {{Veranda, 1986}}

Sustainable Mosque



Figure 2 Natural Lighting and ceiling fans, central prayer room {{Veranda, 1986}}



Figure 3 Front porch with extensive marble inlay{{Serageldin, 1989}}

Sustainable Mosque

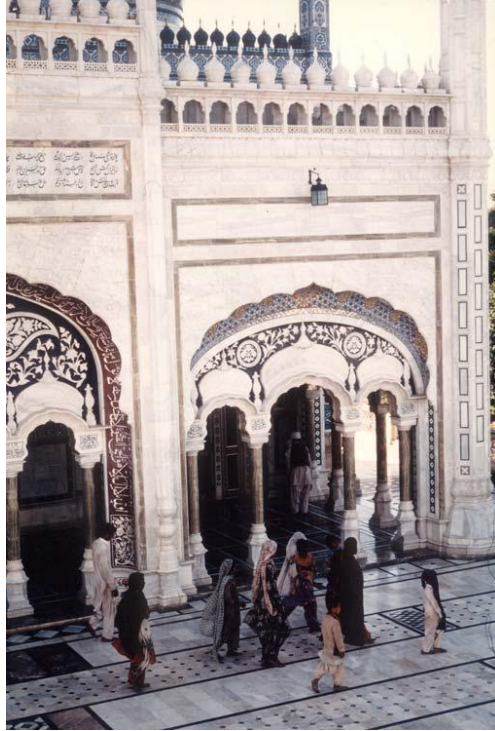


Figure 4 Outer Periphery {{Serageldin, 1989}}



Figure 5 Congregation in daytime {{Serageldin, 1989}}

Current Performance: Structurally speaking, the great mosque is sound for now, even following the recent flooding, only the courtyard, lower features of the complex and the village

Sustainable Mosque

were submerged {{Chaudhry, 2010}} as the complex was built on a three meter high, elevated platform{{48 Veranda, F. 1986}}. Aesthetically speaking, some of the tiles have started to flake off, but the village artisans are involved in a near constant maintenance and upkeep of the decorations{{Veranda, 1986}} as the walls, domes and pillars are still strong, having been made of lasting and good quality materials {{Serageldin, 1989}}. From the community development point of view, it is one of the only surviving structures in all of Bhong after the flood and will continue to provide for the people by tourism once the infrastructure is fully restored.

Points of Sustainability: In summary, there are many aspects of sustainability about the mosque. The site selection was a good idea even though it was technically a Greenfield because it devoted a great deal of personal property to the betterment of the community. Most of the materials used were indigenous and except for one person, all the man power was also locally acquired and trained, developing an employment base for the village. The indoor and outdoor air quality is excellent because of the very open quality of the mosque, lack of materials like carpets, curtains and drapery that harbor dust and other air fouling substances. The pools were kept dry before the floods to avoid fouling by trash dumping and to avoid sites for mosquito nesting. The formation of the mosque led to improved road linkages and transportation within and outside the city. The building design is inherently climate responsive because almost no temperature regulation is required. This is because of the height of the ceiling and the degree of ventilation. The design is unique to the area because of its utter grandiosity and color and stands out from all the other buildings because of its style. It can also be considered one of the most different mosques in Pakistan, because of the richness of decoration and calligraphy and every square meter of the building has some decoration or design on it {{Mughal 2009}}.

Sustainable Mosque

Possibilities of Greater Sustainability: Although the mosque has many aspects of sustainability, a number of efforts could have been taken to improve it:

Actual domes instead of attached domes, that would have greatly reduced the quantity of material used and increased the structural stability{{Anonymous 2010}}. It is possible that this was not done because of the number of domes used and of the continuously evolving design of the mosque {{Veranda, 1986}}

Only local materials could have been used to reduce the embodied energy of the materials, but this was done purely because the patron wanted nothing but the very best and the material which reflected aspects of the Islamic buildings he was inspired from

Disaster Preparedness would have definitely helped the building, especially in light of the 2010 flood, except when the mosque was made, they were still a considerable distance from the Indus river and there was no probability of over 1.2 million cusecs of water inundating the arid land {{Chaudhry, 2010}}. That said, the great mosque has still survived it, although the other features of the complex have been badly affected by the flood.

Insulation in the contemporary sense of putting in thermopore or making cavity walls was not part of the local building practice at all, as brick, mortar and plaster functions very well for the climate, as the materials are cool because of the pore spacing and maintain the internal temperatures very well. Therefore, many of the efforts not made were because of the aesthetic choices of the patron and because of the lack of those practices in the area.

Conclusion: The Bhong mosque is a perfect example of how a sustainable building can be aesthetically pleasing, representative of local culture and architecture tradition and still manage to be innovative in design and useful for the community for years to come. The mosque was a great contribution by one man to a village, has withstood the biggest disaster in the country's history and will continue to be a source of benefit to the people.

Sustainable Mosque

References

Anonymous. (2010). *Methods of dome construction*. Retrieved October 20, 2010, 2010, from

<http://www.civilengineergroup.com/methods-dome-construction.html>

Chaudhry, J. (2010, August 22, 2010). In southern punjab with no protocol. *Express Tribune*,

Kahera, A., Abdulmalik, L., Anz, C. (2009). *Design criteria for mosques and islamic centers* (1st ed.)
Garnet Publishing.

Mughal, O. (2009, July 27, 2009). Architecture pakistan: Bhong mosque. Message posted to

<http://pakistaniat.com/2009/07/27/architecture-pakistan-bhong-mosque/>

Reddy, B. V. V. (2004). Sustainable building technologies. *Current Science*, 87(7)

Serageldin, I. (1989). Bhong mosque. In *Space for freedom* (pp. 145) Retrieved from

http://archnet.org/library/documents/one-document.jsp?document_id=6169

Stegers, R. (2008). *Sacred buildings: A design manual* (J. Reisenberger Trans.). (1st ed.). Basel:
Birkhauser.

Veranda, F. (1986). *Bhong mosque* (Project BriefThe Aga Khan Award for Architecture).