

Construction of the Seventeenth Century Dzong in the Kingdom of Bhutan

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ABSTRACT: The Himalayan Kingdom of Bhutan, while protected by daunting geographical features, still found it necessary to develop a defensive fortress system during its feudal period. The first *dzong* (citadel) was built in the twelfth century and many of the finer examples we observe today are from the seventeenth century. It was during this latter period that the militaristic purpose was expanded to include district administrative functions and Buddhist monastic activities. These culturally significant examples of Bhutan's heritage still function today in the dzongs, much as they did in their original period. Simply built of stone and wood, but massive in scale, the dzong exemplifies craftsmanship and construction methods unique to this isolated country. Currently, Bhutan is transitioning to a constitutional monarchy, with a desire to join the world community. It now faces the imposing challenge of progress without sacrificing its architectural heritage and cultural values embodied in this building type.

Site Location of the Dzong

During the seventeenth century and onwards, military actions had shifted from external invasion, primarily from Tibet, and were concentrated toward competing neighboring *dzongkags* (districts). Additionally, the central governing body desired wider control of the populace and the dzong's role was expanded to include monasteries and district administration in one location. The great lama, *Shabdrung Namgyal*, commonly performed site selection for a new dzong during this period. His inspirations were personal visions and omens. To the western observer, these locations would be ideal for construction and defensive purposes. For example, Punaka Dzong (Figure 1) is located at the confluence of two rivers that allows distant observation and would have facilitated transportation of heavy timbers. However, local site selection embodies deep and complex Buddhist practices and principles that are not addressed in this paper.

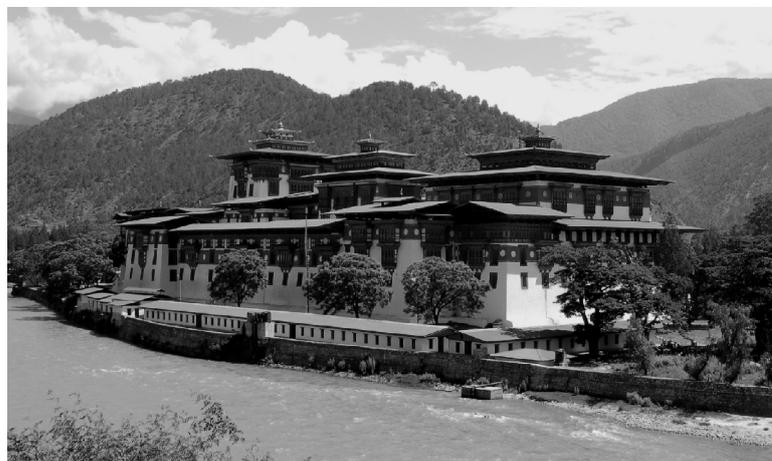


Figure 1: Punakha Dzong at Pho Chhu and Mo Chuu rivers

The Floor Plan and Elevations

The majority of dzongs are roughly rectangular in shape and are imposing in size. For example, the outside dimensions at the Punakha dzong are approximately 180 meters by 70 meters wide, with a central tower of over 18 meters high above its main floor. It should be noted that plans were never prepared for construction, as spiritual inspiration guided the evolving layout.

For defensive purposes the main floor is elevated above the ground plane by approximately 7 meters. To gain access, one must climb a steep wooden staircase. As in most dzongs, entry is through heavy doors prior to entering the first of usually two *dochey* (courtyard). This first *dochey* is defined by a central *ta dzong* (watchtower) at its far end and on the other three sides by multi-storied administrative offices (Figure 2). Often the *ta dzong* would function as a storehouse for munitions and other military purposes. The courtyard itself consisted of tight fitting stone flagging with periodic interlocking protrusions. This composition and a central drainage trough indicate a skilled masonry level. Progressing past the *ta dzong*, a second courtyard is defined by a freestanding *utse*, (multi-storied religious structure) containing monastic functions (Figure 3). At the exterior base of the *utse* is a walkway accessing numerous prayer wheels that are spun as one circumambulates the structure. An exterior monolithic stone staircase of the *utse* leads to an interior temple at the first level. Numerous fully decorated, heavy-timbered columns define the interior. In many *utse*s, this colonnade supports a mezzanine as well as several stories of chapels above. The walls are highly decorated with tantric Buddhist symbols and traditional artwork of extreme artistic talent and expression.



Figure 2: Dorchey arcade at Paro



Figure 3: Utse at Thimphu

A significant feature of the *dochey* is the monastic and administrative arcades located at the interior perimeter (Figure 2). The backside of these rooms is formed by the outside masonry wall of the dzong. Its exterior fenestration in the exterior wall increases in size at the higher levels, implying a decreased defensive requirement. The courtyard facing walls are half-timbered with a wattle and daub earthen infill. A clay render provides a surface for a highly decorated finish. In facing the inner courtyard, these rooms are either cantilevered, forming a covered walkway, or the overhang is column/beam supported forming an arcade. Occasionally the upper levels would be enclosed with brightly painted solid wood boards (Figure 4). The arcade columns are unique in that they support half span, tapered-end beams that in turn support continuous span beams. This structural method not only creates a larger rectangular beam cross section, but conveys a knowledge of wood shear and deflection. (Figure 5). The baluster composition is extremely decorated with carvings and surface paintings.



Figure 4: Dorchey rooms at Wangdichhoeling



Figure 5: Dorchey columns at Wangdue Dzong

Exterior Walls

The most striking feature of most dzongs is the massive whitewashed, inward sloping (battered) walls. Presenting an imposing front as a defensive citadel, they are immediately visible from great distances. Depending on the region and availability of materials they were either constructed of rammed earth or stone masonry. The earth version had slightly less of an inward incline and were set upon an exposed stone foundation. The compacted lifts were approximately 1 meter high and could exceed 2 meters in width (Figure 6). Wood was utilized for lintels over doorways and windows (Figure 7). In the ruins of today one can easily see log puts where the internal floor system was installed, which consisted of round wood beam cross sections. There does not appear to be organic additives such as straw or other binders to the earthen material.



Figure 6: Rammed earth walls at Drukyel Dzong



Figure 7: Rammed earth walls at Drukyel Dzong

Most exterior walls were however, constructed of stone masonry. Individual facing stones are approximately 60 cm wide by 25 cm high, but were not finely dressed. Earthen mortar joints are generally about 12 mm wide or less and occasionally contain stone filler and support wedges. This results in a rich, highly textured wall that is covered in a bright whitewash. It is however, susceptible to chalking. One could speculate that natural additives such as linseed oil or casein were not available in this isolated country.

Further up on the exterior wall and just below the roof eave is a bright red *khemar* (painted horizontal band). This wrapped around the entire structure and was proportioned to about one-fifth the height of the wall (Figure 1). Placed upon the *khemar* are round painted discs or brass plates, symbolizing the sun. The *khemar* indicates that the structure has a monastic function.

Roof Structure

A strong aesthetic feature of the dzong is the low sloped, thin-profiled and long overhanging roof. Of note is that the roof structure is constructed entirely of wood and without iron fasteners. (Figure 8). The eave is usually of a post and beam composition and it is not unusual that the overhang exceeds 4 meters beyond the wall face. This multi-leveled cantilevered support system is richly carved and is painted entirely with symbolic adornments. (Figure 9).



Figure 8: Four pin half-lap joint



Figure 9: Eave detail Wangdue Phodrang Dzong

Under the roof is an "open attic" level. This space was utilized for storage and provided protection for open air-drying of foodstuffs as well as general storage. Its floor is compacted earth to provide insulation for the space below.

The roof surface initially was covered with split wood shingles that were approximately 2 meters in length and were applied parallel to the slope of the roof. The pitch is relatively low at approximately 14 degrees. Again, metal fasteners were not used and a ballast system of large rocks lashed to lath was used to hold the shingles in place (Figure 10). Unfortunately, this system is rarely used and corrugated iron has replaced the traditional method.



Figure 10: Wood shingle roof ballast system (domestic)

CONCLUSION

As it changes its form of government to a constitutional monarchy, Bhutan is at the crossroads of examining its political, cultural and social structure. In joining the world community, the country knows that a new challenge presents itself; how to balance and preserve its rich, unique heritage with hopefully, positive outside influences. The dzong for centuries has embodied all facets of the Bhutanese society. While utilizing only three basic materials of wood, stone and earth, its composition and construction is truly symbolic of a unique architectural heritage. It now faces the task of preserving and promoting its construction traditions and methods with an opportunity to advance its modern objectives in a rapidly changing world.

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