

A General Appreciation of Conserving and Reusing Historic Timber Buildings – with a Case Example (Shigar Fort Palace) from the Northern Areas of Pakistan

Richard Hughes

Introduction

This paper reminds the conference delegates of the many fine qualities of wood and of its superb structural uses. This appreciation is based on practical experiences gained over the last three decades, conserving international quality historic buildings and archaeological remains. It then describes a case history, Shigar Fort Palace, where a severely decayed historic building located in the mountains and earthquake landscape of Baltistan has been brought back to life and is now a main heritage attraction. Its adaptation has also made it a very successful specialist hotel.

Part I: A Personal Appreciation of Structural Wood

A timber structure will take a high level of human ‘abuse’ and can be very ‘bashed’ by nature but will only collapse when there is no other way for it to stand up. Thus we in fact have a remarkable heritage of timber buildings, boats, and other wooden structures. Timber buildings convincingly prove that complex systems of ‘wooden-pieces’ work well and that our forebears fully understood many engineering principles, and were indeed exponents of sophisticated construction. So, the message is: ‘believe in the building and rather doubt calculations that show that it shouldn’t be there’!

Perhaps there is no better way to demonstrate the strength of wood construction than by referencing boats, not so much on our agenda in this conference. The great ‘men-o-wars’ were no more than a set of upside down curved and braced trusses supporting a cover of pegged-on wood planks. These vessels survived all that nature could throw at them and also were not bad as resisting cannon balls! As a previous account shows timber buildings have also proved resilient to attack, not being affected by ‘a seven-pounder’ in the Hunza military campaign of 1892 (Hughes 2000A). It is only in recent times that wood has been superseded by concrete, steel and polymers, and even still a wooden one can give the others a run for their money when it comes to quality and durability!

Wood is the only one of the common traditional building materials that consistently comes in long lengths – promoting its use for monolithic posts, plates, beams, braces, struts and planks. When shaped and jointed or glued the lengths together form frames and trusses.

The rediscovery of wood for modern buildings is a clear appreciation of its many fine qualities. In this ‘movement’, historic buildings bear testament of strong character and functional capabilities. One now sees more innovative designs than evidenced with stone, brick and soil. It is even copied in plastic! As well as architects variously creating and following fashion society takes great cognisance of cheapness, sustainability and minimal impact on the environment under good management. The ‘timber-mafia’ exploitation of trashing forests interestingly shows a scenario of demand exceeding supply, good in principle but usually causing major nasty effects to the landscape. For example, flooding and landslides in the Himalayas, are now of

epidemic scale. For the architect wood is an alternative to concrete and steel - thus, for example, acceptable within the earthquake building industry but not too commonly used as most engineers are not well versed in timber design.

Visual qualities that we appreciate

As we all know and appreciate, there are many types of historic buildings with forms and features well expressed by the creator. Wood buildings more so than stone, brick and soil illustrate 'variety', related to societal status, advancement and change. The architecture of timber buildings is a well trodden subject and many excellent books articles and academic papers bear testament to this. Some personal favourite books are referenced in this paper. In general terms the qualities of timber that we seem to value include:

- 1) Variety of types with distinguishing grain and colour.
- 2) Diversity of construction techniques.
- 3) Surface finishes, taking a shine and polish and with development of enhanced colours and textures – antique 'ness' giving character and financial gain.
- 4) Fashion seen in the architectural morphology and providing clues to relative dating.
- 5) Functional development as past of cultural advancement/decay and migratory exchange.
- 6) Material recycling following redundancy.

The manipulation of timber is also relevant to interesting topics including the development of tools, agricultural and woodland management, mining, railways. It has had a myriad of unusual small scale structural uses, including for carriages, cars aircraft and most importantly for beer/wine barrels.

Excellent and good building engineering qualities of wood

The properties of wood means that it is used in significantly different ways from the traditional use of stone, soil and brick, and thus different sets of design and construction skills are used. In retrospect these are obvious, appreciated by us in our historic structures, but skewomorphism in historic stone and cast iron structures bear testament to this as well, for example, as seen in vaults and bridges respectively.

To remind you of why there is such an value in wood, below is my own list of key aspects promoting excellent engineering uses:

- 1) Has great strength to weight relationship.
- 2) Has enormous versatility.
- 3) Has relatively good compression, tension, bending and torsion strengths.
- 4) Can provide long spans with single pieces or can be built up with systems of bits.
- 5) Can provide a total structural mechanism or can be part of a combined system.
- 6) Is relatively easy to mend or add to the structure.

- 7) Has had a sophisticated joint technology developed with a complexity approaching that of three-dimensional jigsaw puzzles.
- 8) Can be manipulated with precision cutting for structure and ornamentation.
- 9) There is absolute datability with dendrochronology and reasonably precise dating with C14.
- 10) Can be driven into the ground for displacement and skin friction piles.
- 11) Can be nailed into and together for a variety of reasons.
- 12) Elements can be glued together for a variety of reasons.
- 13) Can provide great flexibility in a construction programme, where a structural frame allows several structural tasks to occur at the same time
- 14) It considerably dampens the effects of impacts, vibrations and noises and does not easily chip and small scale denting can be 'ironed-out'.
- 15) It has a longevity comparable with stone and brick and generally better than soil.

There are however some concerns to the building conservator regarding the behaviour of timber, generally indicative of inadequate design, construction and maintenance:

- 1) Slowly or rapidly occurring distortions and splitting, especially across the grain at knots.
- 2) Volume change responding to climatic conditions, change of local moisture regime and natural seasoning.
- 3) Decay by one or a combination of microbiological vectors.
- 4) Insect infestation.
- 5) Burning.

Not so apparent in other building types is 'structural drift', where many performance factors commonly work in combination:

- 1) Eccentricity of form and load paths.
- 2) Lack of bracing or shear wall.
- 3) Looseness in a set of joints.
- 4) Decay of a group of structural components/joints.
- 5) Differential settlement or heave.
- 6) Large-scale alterations and significant changes of use.
- 7) Repetitive live or dynamic loads.

Normally, the drifting takes place over a long time and it is remarkable just how much distortion can occur yet still permitting the building to adequately function – the 'Central 1/3' rule just does not apply here and severe tilting being just one facet of valued character and charm.

While large-scale structural drifting or local distortion is fairly recognisable the location of their cause may not be. The visual manifestation of a defect can be considerably translated elsewhere by cantilevering or bending in the timber. This phenomenon is far more apparent than in other building types, where defect cause and defect location are usually coincident.

Earthquake Performance

The relatively good performance of wooden buildings and timber components in earthquakes is a common understanding based on an appreciation of the strength and structural use of timber and on anecdotal evidence and ad hoc observations (Hughes 2000A. Hughes 2000B). Secure and systematic evidence is limited. However, one is reminded of the seminal work is now some 25 years old (Ambraseys and Jackson 1981), regarding earthquake hazards and vulnerability in the Eastern Mediterranean. The study was for an area covering most of Turkey and Greece and examined large shallow and intermediate depth earthquakes over the period 1902 to 1981 and where population density and building types considerably varied, and had changed much during the study period. The quality of data varied, especially in regard of structural types and where using different materials. The building materials, determining the character of the buildings, included: (R) rubble masonry, (A) adobe soil blocks, (s) reinforced rubble and adobe, (S) stone masonry, (T) Timber frame, and (B) brick. The paper provides details on typical construction and where they are predominantly found. In respect of timber building types the authors defined these as:

‘Usually two the three storeys high, built with braced timber frames of hand-hewn logs or sawed lumber, which carry all the structural loads. Walls consist of light, plastered laths, timber, adobe bricks, a mixture of mud and straw, cobbles or stones. Pitched roofs over the timber rafters are covered with tiles or more rarely with planks. On steep slopes, one side of the house may be one storey high while on the other side may be two or three storeys high. On flat ground wooden stilts are driven into the ground and the ground floor is built above street level or on stonework to dado height.’

A catalogue in the article shows for each earthquake data on the location and extent, magnitude and epicentral intensity, population density, building types and total damage, and fatalities and injuries. Through mathematical manipulation the data is then examined to evaluate damage-epicentral intensity relationships and damage-magnitude relationships.

For this Istanbul ICOMOS conference, the great importance of the article is in the ability of the authors to convincingly show that timber (T) and brick (B) type buildings suffer significantly less damage than other traditional building types (Figure 1). This graph also shows that rubble masonry is the most vulnerable building type, more so than even adobe!

Part II The Structural Conservation and Reuse of Shigar Palace

Introduction

In Turkey it is often the timber ‘hatils’ that made traditional timber buildings so resilient to earthquakes (Hughes 2000B). The same applies to timber ‘cator’

construction in Northern Areas of Pakistan (Hughes 2000A) and Part II now describes the conservation and adaptation of a historic building there, Shigar Fort Palace.

Shigar Fort Palace project has just been honoured with the top UNESCO 'Award of Excellence' for the Asia – Pacific Region 2006. The citation states:

“The restoration of the 400-year old Shigar Fort Palace has transformed one of the historic landmarks of Baltistan into a museum and exclusive heritage guest house, setting a high-profile precedent for a sustainable modern reuse of heritage structures in Pakistan. By retaining the structure and its fine decorative elements, while making careful modern insertions into the building, the project team has revived the palace’s unique spirit of place. The project has strategically capitalized on the complex’s authentic local architecture and dramatic setting in the Karakoram mountains to create a unique destination for visitors. Through a holistic community development approach, multiplier effects from the project have benefited the local villagers in form of job creation, upgrade of shared infrastructure and water supply, and renewed pride in the area’s rich crafts and intangible heritage traditions. At the highest levels of national policy, the restoration has called attention to the need for reassessing heritage legislation to safeguard a broader spectrum of heritage. The project is positioned to redefine the approach to both heritage conservation and cultural tourism in the region, by demonstrating that conserving the authenticity of heritage assets is the critical first step for the sustainable development of communities, by integrating buildings, people and their cultural and natural environment.”

Shigar Fort Palace is one of a handful of major sized historic buildings of Baltistan, belonging to the former Rajas’ of the Shigar Valley. This is one of the most rugged mountain landscapes in the world and the palace lies on the main jeep route leading to the foot of K2 and other great mountains of the Karakoram (Figure 2). It is distinguished by its location, set atop of a gigantic boulder, the external appearance, made up of massive stones and structural timbers, and its original internal detailing with fine carvings.

Shigar Fort Palace, or *Fong Khar* (in Balti, the ‘palace on the rock’), is situated at the foot of a 100m high precipice, with a much older ruined fort (*Khar-e-Dong*) sitting on top and perhaps dating back to the eleventh century (Figure 3). The boulder upon which the palace is built is but a small stone that fell off the cliff in some recent geological time and the horrendously wide rock joints in the face suggests more could fall in a light breeze - never mind with just a little earthquake shaking! The palace itself has a first phase construction dating to the 16th century and its form and quality indicate less of a military aspect. However, while set on the edge of fields, gently descending an outwash fan and surrounded by ornamental gardens, the palace maintained a powerful influence, not just because of size and quality, as just to the south is a cascading *nullah* (stream) with the building so positioned to control water flowing down to the fields and village and a route up into the mountains.

The conservation and adaptation of Shigar Palace, is the latest of the Aga Khan Cultural Services, projects in Pakistan to be completed. This is a multi-dimensional programme started in the 1980s and progressively going from strength to strength. Previous conservation projects have included Baltit Fort, Ganesh Village, Amburiq mosque and the *astana* of Sayyed Mohammad - all having been awarded international heritage awards. Shigar Palace was completed in 2005 and celebrates most essential

aspects of conserving and reusing a wooden structure of national importance. Many thanks are due to Masood Khan the distinguished architect who took the conserved structure and adapted it for its new hotel and museum uses.

Project background

When Shigar Palace was first inspected in 2000 it was immediately identified as a most spectacular monument, a far more important building than, for example, the old fortified mansions at Kiris and Rhondu, east and west of Skardu respectively. It was obviously architecturally complex, more like Baltit Fort, with numerous phases of development all contributing to its exposed heritage features, historic engineering and archaeological value.

The prime objectives of the project quickly became:

- 1) Immediate stabilisation to stop further degradation.
- 2) Conservation of the structure and fabrics achieved to the highest of standards.
- 3) Showing off the marvellous structure so visitors can 'read' and appreciate the building.
- 4) Adapting the building for new sympathetic sustainable uses that promote appropriate tourism and providing an income supporting maintenance, other projects and the rediscovery of Baltistan's important but somewhat forgotten cultural heritage.
- 5) Providing a use that is different from the other assets within the heritage Aga Khan portfolio.
- 6) Conserving and developing the immediate historic landscape.
- 7) Using the historic assets as catalysts for local rural improvement and development.

Description of Shigar Palace

Inside, the palace was found to be highly decayed, considerably more so than any of the monuments so far conserved by the team, therefore technically and logistically a real challenge (Figure 4). Many of the upper storey rooms were absent or half there, with evidence of rain induced decay everywhere and fire damage at the south end. Many of the ground floor rooms were being used as animal byres so these beasts, especially one old cantankerous ram, were damaging the walls making the place very smelly. Their urine was causing wood decay and insect infestation. The rooms were basically bare of furnishings but stored in one were old gigantic wooden storage chests (traditionally once holding grain taxes forcibly collected off the villagers) and generally there were odd bits of pots, broken lights, bits of wire, paper, and cars - all partly buried in dust and rubbish and rat droppings. Another room was being occasional camped in – serving as a grubby soot infested guardroom. Basically, the building was a ruin, abandoned for habitation – one predicting its full demise within but a few more years.

The engineering inspection showed that the building consisted of a “base platform” built of gigantic stones, placed vertically with great precision and reinforced with massive "cator" beams (Figure 5). From the outside this was of superb quality and looking to be in a nearly pristine condition. This structure had rapped around the

absolutely massive boulder, which as noted had fallen off the cliff immediately to the east. The approach path ramped up the side of the boulder to the main entrance, but, clearly a modern insertion allowing the farm animals entry without ascending stairs. Upon the base platform were then found three ranges of rooms, each “Module” stacked up and replaceable - all looking like the structural arrangement found on an offshore oil platform.

The oldest and most important module, Module 1, is on the east side, this using the boulder as the foundation and incorporating an original Kashmiri styled mansion, cantilevering off the boulder and highly ornate – later to be archaeologically analysed as a square building with a grid of rooms and with first floor cantilevered beam ends and mud-stops, all highly and individually carved. Carbon 14 dating of the timber has provided construction is dated some 450 years ago. The external carving predicted the most wonderfully ornate pillars and capitols found within the main room - only half the room surviving, with archaeological evidence for the other half (Figure 6). The modernised rooms above had been converted to become the semi-modern bedroom of the present Raja's father. Here also some ground floor roofs served as a patio with a traditional suite of rooms set behind.

Module 2, on the south side of the palace, was found to survive in parts to three storeys high and with a most interesting spiral wooden staircase entrance mounting up to the first floor (Figure 7). Within several rooms were carved wood columns and with ornate ceiling panelling. Several rooms had been especially for pregnant women and the better sized and finished rooms were retained for the Raja's private winter and summer uses. Significant engineering problems were found in Module 2, resulting from third floor fire damage and the way the second floor rooms had been rearranged several times and with new large windows, thus dispensing with the cator timbers that had provided the structural continuity (Figure 8). Here, several walls were found significantly leaning and bulging and roof structures found with high levels of decay.

On the west side of the base platform, Module 3, comprised the small personal mosque of the Raja and accurately orientated to Mecca, so skew to the west façade. This was followed by a row of terraced single storey rooms - the servant quarters. A simple room on the northwest corner served as the palace's sole kitchen – rather a crude facility given the quality of rooms in Module 1 and 2. Quickly were discovered several rooms sunk into the base platform - spaces for accumulation of the lavatory wastes and one suspects for keeping prisoners! This is where most wood decay would be found as the more recent animal byres were just above.

Overall, the monument is best described as a fortified mansion, ‘Type 4’ in a study of fortifications in the Northern Areas and Baltistan (Hughes 2005) and therefore with not much protection and with not much room for keeping troops. At times of attack the older and rough fortifications on the crest of cliffs, elements of which can be seen at all the surviving Raja residences of Baltistan, would have been reoccupied and have been magnificently defensible.

Key Aspects of Shigar Palace to celebrate in the project

In summary, the conservation and reuse strategies took into account:

- 1) Monumental elegance and uniqueness and with a spectacular location built off a boulder (mother stone) with associated Mogul garden and country rock cliff backcloth.

- 2) Variety of woods used for the structural components.
- 3) The base platform of timber reinforced cyclopaedia stone boulders.
- 4) A three-module arrangement of rooms.
- 5) Cantilevered Module 1 rooms set over the 'mother' stone boulder.
- 6) Cator and cribbage construction derived from traditions found to the west and east and externally illustrating the internal structural arrangement.
- 7) Carved columns, capitols, ceiling architraves and external mud-stops of Kashmiri style found to the east.
- 8) Exciting and complex room arrangement with many ascribable functions, given the memories of the Raja and his family and his retinue.
- 9) Plaster, soot and tar residues proving elements of a strong original character.

The conservation ethics applied to the project

The following principles were applied to the conservation programme following the initial inspection and used for deriving the adaptation strategy:

- 1) Maximum retention of the original artefact - with priority ranking according to age function and contribution to the story (heritage value).
- 2) Minimal intervention for elements of high and moderate value.
- 3) Design for access to the valued 'artefact'.
- 4) Sound engineering and continuity of elegant structural solutions (added new values) (Figure 9).
- 5) Sensitive blending of new and old materials.
- 6) The use of methods that would help in controlling future decay processes.
- 7) Having a sustainable and manageable reuse thus reducing a risk that change of use will adversely affect the authenticity of the artefact.
- 8) Local employment and encouragement of traditional craft skills.
- 9) Having results that would be a catalyst for other conservation and community based projects.

Practical intervention rules applied for conservation and structural upgrading

As a consequence of the inspections, investigation and documentation a set of rules was established to guide the conservation and reuse works:

- 1) Importance and adequacy of original design function.
- 2) As found performance.
- 3) Presence of decay/distress mechanism(s) and relationship to local micro-environmental conditions.
- 4) Percentage of general decay across the section of timbers.
- 5) Severity of local decay/defect.
- 6) Rate of decay/defect activity.
- 7) Maintenance or change of function in part and fully completed project.

- 8) Potential for decay in completed project - previous and new mechanisms.
- 9) Prediction of sudden impacts - earthquake, fire, flood wind.
- 10) Ease of access to remote location.
- 11) Skills and materials required for specialist conservation and reuse.

These conservation rules conformed to international expectations and strategies, those followed at Baltit Fort, taking account that: the building would be more restored; the building would have very high quality hotel facilities and thus including all the elements of modern infrastructure; that the rooms would have modern functions and intensive use; and overall there would be a high level of safety for the building and visitors.

Earthquake concerns

When considering the reuse objectives for Shigar Palace the following technical aspects were taken into account. These had to bear in mind the building being old and in an earthquake territory but with no evidence of past damage, and that it was going to be open to the public and having insurance related to the new functions:

Related to Engineering Performance

- 1) Connection of the structure to the foundations related to the potential for sliding, toppling, bouncing and differential foundation effects.
- 2) Structural continuity of the main walls and internal walls.
- 3) Similar stiffness of the walls in the main axial directions.
- 4) Regularity and bracing of the frame.
- 5) Ties between wall tops and roof.
- 6) Use of floors and roof as a plate for resisting lateral and torsional loads.
- 7) Continuity of frames around openings.
- 8) Security of joints at each level.
- 9) Decay at remote locations.
- 10) Effects of inserting new infrastructure particularly vertical ducts systems.

Related to the Management of the Monument

- 1) Emergency existing.
- 2) Locations where damage could have less consequences to the historic value

The Interventions

All of this meant that the engineering the conservation works had to take account of how the three building modules had, and would have to, structurally work – especially of interrelated movements caused by seasonal effects and more particularly resulting from live and dynamic loads. For example, tiled bathroom walls and shower glass door panels would be incredible sensitive to all small-strains.

The first task was to prove that the base platform was as sound as it appeared - obviously so from the outside but less certain inside where it could not be seen below internal ground floors. However, investigations showed that the effective foundations

to the three building modules were adequate for the foreseeable future. Most of the stone infill was soundly held in 'cells' created by all the foundation walls of the original Kashmiri mansion.

Above, the three modules were conserved in turn, starting off with Module 3, providing training and experiments on less important elements - predicting the later and more substantial conservation and adaptive works on Module 2 and then 1.

As with Baltit Fort, the engineering strategy was to leave non-tied structural units of different ages and functions, the three modules, structurally separate, and structurally working as they had successfully done for several hundred years. This was an especially important principle for each individually coping with earthquakes motions – bumping into each other can result in knock-on damage. However, it was also necessary to make the three modules work as robust structural units, each with its own modern facilities. Some key actions included cutting out of significant timber decay and making the catwalks fully work ring beams. This meant tying the many structural component into a 'system' where structural performance is more predictable and also could be illustrated in the restored fabric. In Module 2 some leaning walls were pulled back into more of a vertical position but still illustrating past leaning deformation. In Modules 2 and 1 the roofs were rebuilt as they were absent or totally decayed. The roofs were also engineered for rain drainage. Originally, water was left to its own devices, but now this could not be permitted. The gradient to the rain-spouts was made so not too severe so soil erosion occurred and not too gentle that some or all rain soaked in. Throughout the palace the odd snake and infestations of rodents were encouraged to depart, this followed up by grouting up and re-rendering the wall surfaces.

From a heritage 'reinstatement' objective the entrance ramp was successfully removed and the original door replaced in its original location, set in the east tower and this structure was reengineered to be again the main entrance to the palace. The new stair traverses by the mother boulder then ascends where features of the northeast corner of the Kashmir mansion can be observed close too, even though the carved features are deeply blanketed in tarry fire residues.

A more challenging and exciting engineering problem was the stabilization of the traditional lavatory tower attached to the north end of Module 1 (Figures 10 and 11). This was found to be in a most precarious condition – one more puff of wind and over it would go! Immediately, it was supported off a cross needle beam propped off two posts. It was only then possible to safely carryout a survey and later restore it, with some of the catwalk distortions left to show its age and character. However, this was one location where the lean-too structure had to be thoroughly tied into the rest of Module 1, with ring beams extending back through the module at several levels. The tower at the top was designed to be an enlarged bathroom but having to lie astride an original structural junction.

Some modern interventions were also necessary. The most significant was the rebuilding of the missing half of the main Kashmiri grand reception room. There was sufficient evidence for this including for the recreation of size, the special flat-faced stonework and moulded shapes edging the main timber roof beams. The conservation also required foundation cantilever beams (over the mother boulder) to be replaced and bolted down. The central column with cruciform capital, found off-set by nearly 1.5m was also repositioned to the room's accurately located centre and where taking considerable loads from above.

Other obvious new additions are two staircases within the palace. These have wooden structural elements with metal fixtures, clearly identified as modern but placed not affect conserved walls - they can also be removed if in future alternatives routes are promoted.

An important intervention, related to the new uses of the rooms, was the sensitive insertion of ducting chambers up through the rooms, for containing lots of pipes for fresh water, foul water, ventilation and electrical cabling. Concrete slabs were inserted to support, floors, new showers, lavatories and tiled floors – the timber beams and mud floors not being good for such fixtures and stopping sway and seasonal movements. These new modern small floors were engineered to be separate from the original structural system so they would not affect how the whole building would respond to an earthquake motion and allowing for damage to be controlled and localised. In most rooms fine wooden floors were added, essential for stopping the old soil floors from dusting, making them more durable and far more practical for staying visitors (Figures 12 and 13).

The adaptation meant that all the rooms in the palace were fitted out with modern facilities thus required major mechanical, electrical and water treatment plants and waste disposal units. These facilities are sited well away from the building and hopefully not too visible within the wonderful historic landscape. This presented a problem of how to engineer the connections into to the palace – technically it would have been difficult to thread them in through the base platform as this would have disturbed the well-preserved and authentic stonework. The final solution was to raise them up together on the external wall surface but hidden in a cribbage styled wooden duct chamber set behind a new and essential emergency staircase, in a location not so important for viewing the whole monument. In one basement under Module 3 the geysers were placed with the hot water continuously cycling through the pipes. The cold water has been cleaned to achieve World Health Organisation quality for drinking.

Now throughout the palace are high quality bedrooms each with an individual character and unique charm – reflecting the key historic uses and original architectural features. The exposed structural components are supplemented by modern furnishings with styles and materials drawn from the local traditions. The infrastructure also predicts potential natural hazards and future requirements. There are, for example, integrated fire alarms and cables for connecting computers to satellite communication systems. Having these put in place now means that there will be no ongoing disturbances of the high quality and lovingly preserved authentic finishes.

A finishing touch was provided by sophisticated but unobtrusive lighting, for the rooms and internal walls and externally for the spectacular facades, particularly the timber-stone base platform. The lighting is an important way to show off the historic textures and the superb engineering. This lighting is very subtle, erring on being dim and definitely not bright, overall providing interesting highlights and shadows and creating a most wonderful atmosphere.

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