With Best Wishes
Richard Hughes

BALTIT FORT

A STRATEGY FOR CONSERVATION

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INTERNATIONAL KARAKORAM PROJECT

CONTENTS

1.0 INTRODUCTION

1980 marked the 150th anniversary of the Royal Geographical Society. To celebrate this occasion the Society, in conjunction with the governments of Pakistan and China, sponsored a scientific research expedition to the Karakoram Mountains of Northern Pakistan.

The expedition included five earth science projects and a multi-disciplinary team researching into the awareness and response of the inhabitants to physical hazards and socio-economic conditions. Within this project, three participants including the author, were supported by the Science Research Council to survey and test traditional buildings - particularly in respect of their potential to resist earthquakes. The research consisted of material and structural analysis, recording decay mechanisms, interpretation of local geology and geomorphology, and the measurement of building response to induced shaking.

During field work carried out in and around the village of Ganesh, in the Hunza Valley approximately 89 km north east of Gilgit, the fort of Baltit was visited. It was clear from a cursory inspection that this was an important historic building, and this was confirmed by Professor Karl Jettmar. Since the fort was found to have withstood many earthquakes its construction techniques were of great relevance to the aims of the team.

The author, Director of the U.K. ICOMOS Soil Conservation research programme, also felt that this structure, now in a rapidly deteriorating condition, should be recorded with recommendations made for its preservation and possible future use.

2.0 LOCATION

Hunza is situated amongst a 'congress of great mountains'. The State of Hunza is little more than 160 km long and 50 km wide and it is commonly said that here more peaks rise above 6000m than over 3000m in the whole of the European alps.

Baltit Fort commands a dominating though exposed position on the north side of the River Hunza, set back 1.2 km from the Karakoram Highway and river gorge (see Figure 1). The river is at approximately 2100m O.D. and the valley side gradually rises up to the fort which is at approximately 2500m O.D. Behind the fort a steep gorge cutting into rock and scree slopes descends from a mountain peak of 7330m O.D. The upper portion of this gorge widens and is occupied by a glacier.

3.0 THE SITE

Baltit Fort is constructed on a glacial moraine hill that forms an aerete between two valley systems. Immediately to the north, a major gorge roughly 200m wide descends southwards out of the mountains and then swings east at the fort before making its way south-eastwards down to the Hunza River. With the fort positioned on the outside face of the bend, the gorge side is a near vertical cliff approximately 90m high.

To the south the fort is at the head of a broad dryish valley that gently descends southeastwards as a series of terraced and undulating slopes to the main Hunza River. (See Figure 2)

4.0 LAND USE

The slopes to the south and west of the fort are mostly terraced fields with a density often in excess of 50 per hectare, each supported by a dry stone wall 1 to 3m high and following the valley contours. Associated with the fields is a complex irrigation system with the water originating from the gorge behind the fort and delivered in channels often cut horizontally across cliff faces.

The main subsistence crops are wheat and maize. Steep slopes, often more than 1 in 3, have been left as pasture for producing summer hay and providing autumn-winter grazing. Amongst the fields are clusters of houses and these are often surrounded by trees (including apricot, apple, walnut, mulberry and tall poplars). The largest village, consisting of 1 and 2 storey flat roofed houses, hugs the contours around the foot of the fort.

5.0 CLIMATE

The valleys of the Karakoram Mountains experience an 'extreme' climate where 'physical processes' dominate weathering and material decay of mountains and buildings alike.

The Hunza Valley is semi arid. Very little climatic data is available; however, the total precipitation recorded at Gilgit from August 1979 to July 1980 which was only 255mm does not seem to be untypical. A maximum was recorded during the months of May, July and August when 43, 27 and 39mm of rain fell respectively. Despite the snow covered peaks little snow falls in the valley bottoms. Only 7mm precipitation is recorded for Gilgit from September 1979 to January 1980. It is generally reported that a maximum of 20mm of snow can accumulate for short periods.

5.0 cont'd

The deep valleys are a major influence on the severity of the heat in summer with mean maximum monthly temperatures being recorded during the months of May to September and typical temperatures are 35°C. Maximum daily temperatures can reach over 48°C and at night fall to 13°C. During winter, mean monthly temperatures fall to around freezing point with 'severely' low (-6°C) daily temperatures occurring in January.

6.0 GEOLOGY AND GEOMORPHOLOGY

The Baltit section of the Hunza Valley is situated on the old Eurasian continent with the 'Northern Megashear' outcropping at Chalt some 30 km to the south east. The stresses and temperatures implicit in the Indian-Asian plate collision and the creation of a subduction structure have resulted in the production of a highly metamporphic zone and very rugged mountains. This zone starts at Chalt, passes through Baltit and extends as far north as Pasu. The stratigraphy within this zone generally dips steeply to the north east with a strike parallel to the subduction boundary. It is movement along the subduction boundary and other major faults that causes regular earthquakes in the areas.

At Baltit, below superficial deposits, lies a sequence of garnet mica schist, garnet amphibolites, coarsely crystalline marbles and micaceous quartzites. These gradually change eastwards along the Hunza Valley and northwards into the mountains above Baltit into the Karakoram granodiorite, a strong, coarse, quartz-biotite granitic rock. This rock, however, is very susceptible to physical breakdown into sands and gravels. It is also the rock which has provided most of the river deposited material.

6.0 cont'd

The Hunza is a glaciated 'U' shaped valley with the bottom filled with more than 200m of extensive river and lake sediments. Mixed with these are mudflow, scree and glacial debris. Fragments of 'terraces' survive on the valley side and are evidence of former land uplift. The main river has cut up to 100m into the superficial deposits leaving a broad river gorge. Lateral tributaries have in many places cut down to the solid rock surface with waterfalls indicating 'benches' left by different glacial phases and local outcrops indicating hard points not removed by glacial erosion. (See Figure 3)

Immediately north of the fort a tributary stream has cut a 100m gorge into superficial material. The major stratigraphic units suggest this material originates from the east with a secondary source from the mountains above which spreads out as a fan. At the fort, the superficial material is a highly variable pale grey 'boulder clay'. It is composed of variable proportions of coarse silts, sands, gravels, and boulders with quartz and biotite mica dominating both the 'flour' and the stone content. It is generally medium dense though it is cemented with soluble salts to produce a moderately strong soil capable of standing for considerable periods at a near vertical angle.

Aerial photographs indicate a rectangular fissure pattern in the superficial deposits and this may be the result of stress release near cliff faces, consolidation after deposition, and expansion - contraction during the annual climatic cycle.

6.0 cont'd

Both gulley erosion and the collapse of joint blocks are frequent occurrences in the Hunza Valley. Several abandoned settlements are to be noted on the edges of cliffs. At Baltit Fort the soil cliffs appear to have been relatively stable since the fort's construction. Stone revetments around the foot of the fort and down a gulley in the cliff just to the east have probably limited soil erosion and cliff collapse.

7.0 HISTORY

Traditionally, Hunza has been a war mongering state and despite its continuous participation in raiding, it has apparently been relatively free from full scale invasion. While planning the British 1891 Hunza-Nagar campaign, Durrand[4] confirmed that the spectacularly rugged terrain separating the state from the south made it very difficult to attack. Very little pressure could be brought to bear by cutting off routes to the south, since there were escape routes to the north on to the Pamirs. Also, it could get all the luxuries from Kashgar and Yarkand and had connections with China.

Positioned at the policingpoint between the Hunza and Nagar valley routes, the military importance of Baltit Fort is very evident. Built on top of a steep morainic hill it was difficult to attack, although it is recorded that direct assault was not a traditional military strategy, the normal being to lay siege. Hence the fort was built to protect the water supply, namely the headwaters of the main irrigation channel (the Dala). Control of the headwaters would centre power on the Mir (Prince) and deter internal opposition. In times of siege, food supply was also all important, hence the usual time of sieges was before harvests when grain stores were low. The fort's position

7.0 cont'd

dominating the fields would give some feeling of security.

The history of Baltit Fort is largely unknown, since the people of Hunza have not documented events. It is considered that traditional stories usually embelished by myths and with inadequate chronology are unreliable though important. In addition, in 1891 when the fort was captured by the Durrand expeditionary force, the wealth of the Hunza Mirs, accumulated over some 600 years, was looted and totally disappeared. Lorimer[7] refers to auctions at Gilgit and these may have included some written records in Chinese and Turkish.

It seems probable that Baltit Fort was built some 600 years ago when a Princess of Baltistan married the reigning Prince of Hunza. For centuries the two countries had been communicating with each other and only recently have routes been blocked by glaciers. Hunza at this time consisted of three villages; Altit and Ganesh on the river cliffs and Baltit high above. The Princess's father is reputed to have sent with the bride an army of Balti masons, carpenters and craftsmen who built the two forts of Altit and Baltit as part of the royal dowry. It will be shown later on in this report that the fort of Baltit shows many phases of construction, so precisely what was originally built is as yet unknown.

By the 19th century Hunza was divided into eight districts; Naraydass, Assanabad, Darkun, Hyderabad, Aliabad, Ganesh, Baltit and Altit. Each district had its own fort, each of sufficient size to give shelter to the district population. Biddulph[2] refers to their being built with sun dried bricks with walls 15 ft. (4.57m) high and with square towers at 20 yd. (18.28m) intervals. In 1892 Conway[3] described

7.0 cont'd

the walls of Ganesh as "like the walls of Constantinople on a small scale, but with towers relatively closer together, grouping picturesquely in the landscape".

After the British conquest of Hunza in 1891 the Mirs of Hunza continued to live in Baltit.Fort. By 1957 the Mir had built himself a new palace further down the valley side, but the old Queen (Rani) still lived in some of the rooms. Today the fort is still considered to be the seat of authority in Hunza. For example, when cutting the throat of an animal for food the people of Hunza turn towards the fort and not to Mecca.[8]

8.0 METHOD OF CONSTRUCTION AND INTERNAL ARRANGEMENT

The commitment of the author to the research team's Hunza Valley project unfortunately meant that only a limited time could be allocated to the survey of Baltit Fort and therefore the following sections of this report are somewhat superficial.

It has been mentioned previously that the fort was constructed in many phases. However, the building technique of varying quality appears to be similar throughout the whole structure. Figure 7 shows a drawing of the main structural element consisting of a pegged timber frame. Along the wall face on both the outside and inside are longitudinal squared timber tie beams. These are approximately 120mm square, up to 8m long and are at 0.4 to 0.9m vertical intervals. Where such a timber does not span the required length it is jointed, as shown in Figure 7, and this is designed to resist tensile strains only.

At corner points and where internal cross walls form a 'T' junction with the external wall, timber 'cribbage' work is found. Here, square timbers up to 0.75m long and 120mm square are built up to form columns up the the full height of the wall. As Figure 7 shows, very little space is left between the timbers for infilling. All these corner timbers are pegged together.

Where such a technique was once used for more domestic architecture and for mosques, the local inhabitants reported that the whole frame was constructed before proceeding to the next construction step. However, in such a tall structure the frame may have been raised in several 'lifts'. The inside of the timber frame is infilled with soil and small stone, poured in as a

8.0 cont'd

stiff slurry from a place higher up in the wall. In between the longitudinal timbers the external and inside wall faces are constructed in coursed random stonework or soil brickwork, both embedded in soil mortar. This may have been built during or after the soil-stone fill was placed.

The east and south walls are completed with a whitewashed soil render 20 to 70mm thick. The north and west walls are at present exposed timber and stone and may never have been rendered. Inside the fort all living rooms are soil rendered and most are painted. Basement dungeons and some storage rooms have been left as very rough unmortared random stonework.

The roof, or rather roofs, of the fort are all constructed in timber and soil. Each room has a roof constructed in the following manner. Across each room is one or more main square beams (up to 0.3m square) supporting a series of joists (0.1m square) at 0.4 to 0.5m intervals. These in turn support a covering of split branches. Each branch is 30 to 50mm in diameter and are placed at right angles to the joists or in alternating rows set at an angle of up to 45^{o} to the joists so as to produce a chevron effect. Above the split branches is a 50-100mm layer of brushwood, straw or leaves. In former times this would have been covered with strips of birch bark, but at the fort it is suspected that this layer is absent. (It has been noted by the author that elsewhere in the northern territories this birch bark is being replaced by sheets of polythene).

The roof structure is completed with a 60-150mm layer of soil. According to the local inhabitants this is placed in rammed layers up to 40mm thick. This conforms to good engineering practice as the soil is at the correct moisture content to ensure good compaction with the available equipment.

8.0 cont'd

Ramming may also help to reorientate mica flakes within the soil and so render it less permeable.

The steep slopes immediately around the base of the fort are protected by coursed drystone walls. These are up to 2m high and 1m wide. They are most dramatic on the north side where a series of six run for the full length of the fort and drop down as a series of steps at approximately a 60° angle before reaching a vertical soil cliff.

The method of construction noted above has proved to be earthquake resistant :-

> "On January sixth, just a week after Bapu's birthday, my morning dispensary was interrupted by a magnificant earthquake. A deep sub-terranean rumble sent all of us running out on the castle roof. Then came three hard shocks a minute apart, with continuous waves between. The old castle swayed and creaked. It was so flexible that it was practically earthquake-proof. As the earthquake stopped, the really spectacular scene began. Tremendous avalanches thundered down every nullah, and for five minutes we lived in a continuous rumble. The great snow-cloud from the avalanche in our nullah boiled our over the mouth and flanks. I timed it coming down on us at sixty miles per hour, a wild, tumbling mass of cold air and powdered snow two thousand feet high. When it struck, the castle shivered again, and we had to lie flat to avoid being blown off the roof. The clouds hung low, and the white snow-cloud rolled down out of the dark grey storm-clouds like swift death. What a magnificent place in which to live, with such spectacles every year!" (Clark, Ref. 1).

8.0 cont'd

The use of horizontal timber lacing with regular cross ties through the thickness of the wall is a common building technique throughout the Northern Territories. For example, members of the team observed timber lacing in many types of buildings in Chitral, Hunza, Yasin, Tangir and Patan. This is to form the subject of a study by the author. It is considered that the technique is used wherever there is or has been a plentiful supply of timber.

The more elaborate cribbage method discussed above, has been noted only in the Hunza Valley at the villages of Gulmit, Ganesh, Altit, Baltit, Nagir, Sumayar, Nitt, Chalt and Chaprot. It is possible that the technique did originate in Baltistan as suggested in Section 7.0 of this report.

While the previous account concentrates on the fort's importance from the constructional point of view, clearly the internal arrangement of rooms, their use, features and decoration within the rooms are essential elements of the fort's intrinsic value. Some of these features can be seen in the report photographs attached.

During 1950-1951 John Clark[1], used the fort as a base from which to do geological research. The following account describes his first impression of his temporary home :-

> "Overlooking us was the shear, blank west wall, its thick coat of whitewash flaking off in places. The main building was two stories high and with a smaller third storey set about in the middle. On the left, a large, semicircular bay window teetered precariously on weather-blackened poles. In all this vast pile there was

8.0 cont'd

only one narrow door, with a set of rough-hewn marble steps leading to it. As we went through the door, the Mir (Prince of Hunza) pointed up. 'Look', he grinned, 'my ancestors were prepared for unwelcome guests!' There in the gloom over our heads was a platform, with niches set in the walls. Here, when the castle was a fort, defenders could hide... We climbed a set of rickety old stairs, passed several passages that led off into black darkness, and reached a landing on the second storey. Here the sun-light streamed in from above, through the opening where the short upper stairway emerged on the roof. The banisters were weather-stained wooden poles, polished by generations of hands until they shone like glass. The Mir smiled when he saw me run my hand over them. 'Yes, he said, 'this castle is very old - about six hundred years. Look at those walls: do you see why this castle stands through earthquakes and storms' "

It is not suprising that this first impression of the fort matches those of the project team. Long will we remember the hot slow climb zig-zagging between patches of shade, the track-boot deep in mica dust, the 'Hunza Restaurant' waiting to refill our depleted bodies with endless cups of green tea, the simple repetitive box shaped houses stroon amongst the fields, the trail of laughing children selling garnets as rubies, and always the increasingly magnificent views around every corner. Yet while everything was a totally new experience, Baltit fort poised silently and majestically above, with its clean cliff-like white walls and regular patchwork facade, left one with nothing really to say and no reason to walk further. Later on when we did venture up the gorge behind the fort the views looking back were even more awe inspiring, as I hope the photographs show.

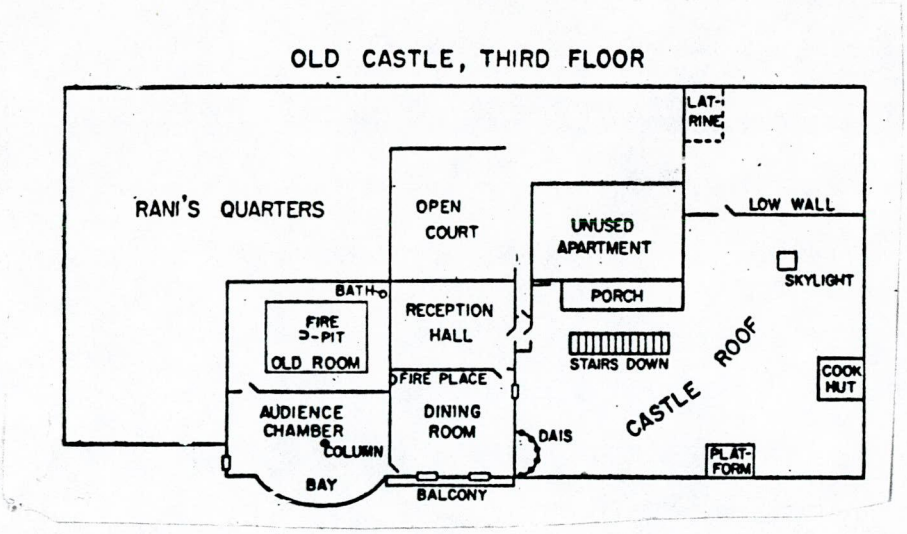
8.0 cont'd

John Clark proceeds to describe the interior of the fort and reading his book back in England recalls fond memories of our own personal explorations. Clearly, nothing had dramatically changed between his visit and ours in 1980.

> "We faced a one-storey superstructure that rose above the roof like a ship's bridge, topped by a sharp-pointed wooden steeple. We entered a tiny dark passage with two doors, one before us and another to our right. The Mir led us through the centre door into a large room, once the reception hall of his grandfather, Mir Nazim Khan. A gentle, tomb-like illumination filtered through dusty window-slots in the steeple overhead. The tan mud walls were inset with cabinets of darkened wood. A frieze of small, round shields, some beautifully inlaid brass and others of gaudily enamelled wood, glimmered through the undershadowed dimness as we stepped into the second room. Here was utilitarian ugliness with neither past nor dignity. The room was square, dull, and dingy. On the floor were goat-hair pads covered by cheap, brightly dyed cotton mats from Kashgar. The ceiling boasted a large chandelier with glass bangles. A rickety round table and single upright chair beside the mud fireplace made me decide that this would be our dining-room. A wall poster at least three feet long displayed an elegant picture of Queen Victoria, and the statement that Mellen's Baby Food was untouched by human hands.

We passed through another foor into the old audience chamber. This room was a bare as the last, but two fime Khotan rugs on the floor, a central wooden column supporting the ceiling, and bright light from the bay window which formed most of the west wall gave it an air of graciousness and freedom. A kitchen table and chair stood in one corner. Pictures of the Aga Khan and his family decorated the north wall, and for some unexplained reason a large blue Christmas-tree ball hung from the central column. It was only on second inspection that I noticed that the outside of the room sagged, that the walls were streaked from the leaking roof, and that the rugs were faded. 'This last room,' the Mir said as he led us through a final door 'was the real living quarters of our family, when I was young. It is old-style Hunza, but there's a drain in the corner where you can bathe. It's the warmest room of all, and you may want to sleep in here during the winter.'.... It was indeed old-style Hunza. A row of wooden uprights paralleled the four walls, separating a sort of raised peripheral gallery from the main central area. Light from a three-foot-square hole in the roof illuminated the centre of the room; there were no windows. Almost directly below the roof-hole was a small fire-pit. Two battered wooden chests occupied corners of the gallery, and several rectangular recesses were cut in the earthen walls.

The Mir completed arrangements as we stepped out again on to the castle roof. 'I'll have my men build you a small cook hut over there,' he said, pointing to the south edge of the roof, 'and you can use this place for a W.C.' He led me to a secluded corner of the roof, where a hole functioned as a slit trench into a closet on the floor below."



9.0 cont'd

Two NE Towers (cont'd)

(c) Stonework: Generally in a poor condition with most of the stonework loose and soil mortar missing. 1m diameter holes at the foot of both towers.

(d) Timber work: All longitudinal beam and corner 'box work' in good condition and in correct position.

(e) Internal filling: Observed in cavities to be soil-stone rubble in a loose condition but probably as constructed.

North Elevation

(a) Terracing: Generally in a reasonable condition and structurally sound. It is estimated that 150m of revetment have the top 0.3m in a ruinous state. There is a little collapse at the east end.

(b) Plaster render: None present.

(c) Stonework: Estimated 20% loose. Occasional patches missing. Soil mortar mostly missing.

(d) Timber work: Generally in reasonable condition. Ends of longitudinal beams and stubs of cross walls show ageing but not rotting. Outward structural movement observed roughly half way along the wall.

(e) Internal filling: It was not possible to assess this element of the structure.

9.0 PRESENT CONDITION

External inspection of the structure was aimed at an assessment of the fort's structural condition; decay and deformation being the prime considerations. Each side of the fort was examined in turn from ground level. It was impossible to make detailed accounts of the remote areas high up on the walls.

East Elevation

(a) Terracing: In reasonable condition. Structurally sound, tops of walls in need of rebuilding. Some collapse at the north end.

(b) Plaster render: Estimated 15% missing. Erosion at several points caused by water off roof producing vertical runnels. Estimated 30% loose from main wall structure.

(c) Stonework: Estimated 15% of surface skin is in loose condition. No deformation recorded. Estimate 10% soil mortar loose or missing.

(d) Timber work: All longitudinal beams in correct position. Ends of all visible timbers show ageing, but are not rotten.

(e) Internal filling: It was not possible to assess this element of the structure.

Two NE Towers

(a) Terracing: See North Elevation.

(b) Plaster render: None present. It is considered that they were never rendered.

9.0 cont'd

West Elevation and N.W. Tower

(a) Terracing: Structurally sound. Estimated 20m of revetment top surface in loose condition. Away from SW corner an estimated 80m length of 3m high soil slopes in eroded condition.

(b) Plaster work: None present.

(c) Stonework and adobe work: (Showing at least 6 phases of repair work). It is considered that 5% of the stone and brickwork is missing and that 40% of the stone is loose. All the soil bricks are in an advanced state of decay and may rapidly fall out of the timber frame. Some repointing of the soil mortar has occurred but 25% is missing. Window frames look distorted

(d) Timber work: Most of the timber frame is in good condition. Ends of beams show typical ageing but are not rotten. The N.W. tower shows severe horizontal movement and is structurally dangerous.

South Elevation

(a) Terracing: In a good condition and is structurally sound.

(b) Plaster work: It is considered to be in a good condition, but suggest that 25% is not properly attached to wall surface.

(c) Stonework: It was not possible to examine. No indications to suggest loose stonework or absent soil mortar.

9.0 cont'd

South Elevation (cont'd)

(d) Timber work: Only ends of cross wall longitudinal beams are visible. These show typical signs of ageing but are not rotten. The timber frame shows no sign of structural movement or weakness.

(e) Timber columns: Material in good condition. Appears to maintain position by the imposed load. There is no anchor mechanism at base nor lateral bracing.

(f) Main Entrance

Stairway: In good condition. Recently re-built or modified.

The Roof: This was surveyed as a separate entity and this is shown in Figure 5 . Holes and severe decay was recorded for 25% of the overall surface. It is predicted that another 15% of the roof will have hidden decay.

Internal Survey: Within the time available it was not possible to survey and schedule repairs for each room. Generally the rooms appeared to be in good order, apart from ceiling defects that are noted in the previous paragraph. In its present condition, it is estimated that 25% of the walls could do with being replastered. It is to be expected that substantially more replastering would be required after structural repairs to the external walls. Severe structural defects were noted in the S.W. corner of the building. (See Figure 6) .

10.0 PROPOSAL FOR DETAILED SURVEY OF BALTIT FORT

It is considered essential that the fort be properly recorded by a survey team of trained building conservators. Such a survey would include the production of measured drawings, a photogrammetrical survey, a building material analysis, and a record of construction methods.

It is estimated that a team of 4 people would do this survey over a one month period. The cost of this work, including subsistence and reports, but excluding flights, would be £7000 at 1981 prices.

11.0 SUMMARY COSTS FOR REPAIR WORK (see Appendix A)

A rapid attempt has been made to schedule works that need to be undertaken to make Baltit Fort structurally sound, watertight and safe for visitors. This analysis is presented in Appendix A and below is a summary of the costs of this work :-

1.	Temporary Works Material	= R 9,000
2.	Repair to East Wall	= R112,510
3.	Repair to 2 towers N.E. corner	= R 89,780
4.	Repair to North Wall	= R201,400
5.	Repair to West Wall	= R104,960
6.	Repair to 1 tower N.W. Corner	= R 43,980
7.	Repair to South Wall	= R100,120
8.	Re-roofing the whole structure	= R189,700
9.	Repair inside S.E. Tower	= R 19,800
10.	Inside replastering	= R 12,200

Total cost of repair work = R883,450

(@ 23 Rupees to 1 Pound = £ 38,411)

(@ 2 Rupees to 1 Franc = F 422,703)

It is recommended that a specialist building conservator be employed for 2½ years to design and supervise the above works; his salary would amount approximately £20,000, though this figure excludes hire of transport and general administration.

12.0 RECOMMENDATIONS AND CONCLUSIONS

It is clear from the preceeding sections of this report that Baltit Fort is a magnificant structure of great significance to the history of the Hunza Valley, Gilgit Agency to the Pakistani nation. It should be regarded as a national monument. Compared with monuments in Europe the fort is the equivalent to the Tower of London in England and the Palace of Versailles in France.

The fort is a complex structure in construction phases, building techniques, craftsmanship and materials used. Before further decay inevitably takes place Baltit Fort should be accurately surveyed and recorded. Such a survey would be an important document in its own right, be essential for designing a conservation scheme and provide the plan for accurate matching of the restoration work. It is considered essential that such a survey should be achieved by a team of building conservators or structural archaeologists.

It is evident from the very initial survey described in Sections 8 and 9 that the fort is in a rapidly deteriorating condition. Both structural movements and material decay are active processes. The foundations appear to be sound. Since decay processes are exponential it is predicted that the rate of decay will increase.

If the fort is to remain for the foreseeable future then there is no alternative but to carry out extensive structural repairs followed by regular mainenance. The survey shows that the most immediate work needs to be carried out on the roof and the N.W. Tower. However, this would only be effective for a 'limited period' if the walls as a whole are not repaired and stabilized.

12.0 cont'd

Section 10 and Appendix A provide an outline schedule of repairs for this essential work. It is recommended that these structurally important repairs be carried out as soon as funding can be found and allocated. It is estimated that the overall cost would be in the order of R1610,0000 (£ 70,000) (F 805,000).

Professor Karl Jettmar, of international fame for his anthropological studies in the Karakoram, has indicated that his Institute would be willing to provide financial aid towards conservation of Baltit Fort. Considering the fort's importance this building would be a suitable candidate for monetary support through the initiative proposed at the International Conference on Islamic Architectural Heritage held at Lahore in early 1980.

Local contractors should be employed to carry out the repair work supervised by a professional building conservator. The author has been reliably informed that the required skills for the restoration work still survive in the Hunza Valley. Such a proposal would provide spring to autumn employment and generally help social improvements presently being undertaken by the Pakistan Government and the Aga Khan, and also being recommended by the United Nations Development Programme.

It is recommended that in the immediate future the Mir of Hunza maintains the fort as an attraction for tourists who visit the area. Perhaps here it could be utilized as a museum for illustrating the history of the Mir's important ancestry and the development of the Hunza Valley.

12.0 cont'd.

However, it is considered by the author that the best way to keep the fort for future generations to admire would be to actively re-use it. Once re-occupied maintenance of the fabric becomes more feasible. The ideal re-use for Baltit Fort, under the patronage of the Mir of Hunza and the President of Pakistan, would be as the northern centre of the proposed Karakoram Research Institute.

This Institute would not only serve the scientific community but also act as the focal point for climbing expeditions and as a centre for school and college field excursions. It is essential that maximum local involvement be encouraged for both the day to day running of the institute and participation in projects.

The restoration of Baltit Fort will inevitably increase the tourist inflow to the Hunza Valley. While it is essential that road and hotel facilities be improved - a holting start has already been made at Baltit village - this could have both a beneficial and a detrimental impact on the way of life of the community. For example it would bring money into the area but could place cultural and religious values at risk. It is therefore suggested that the Mir of Hunza and the Pakistan Tourist Authority control the management of visitors.

The timber 'cribbage' building technique has at Baltit withstood the devastating effects of earthquakes. During the following few months the technique is to be scientifically tested. It is hoped that this old technique can be translated into modern materials and used in earthquake prone areas around the world.

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APPENDIX A - SCHEDULE OF REPAIRS

The following pages contain an initial attempt to schedule and cost structural repairs to Baltit Fort.

It is proposed that the work force consists of 10 workmen undertaking general duties, employed at R50 per day. These people would be supervised by three skilled craftsmen (mason, carpenter, and plasterer) paid at a rate of R80 per day.

The local climate would allow for repair work to be undertaken in spring, summer and autumn. The work would be undertaken during a 6 day working week with account taken of religious days and the annual Ramadan period.

It is estimated that temporary works material, such as timber for scaffolding would cost R9000. After completion of the works these items would be sold.

No estimation has been made for hire of transport and general administration costs.

Repair to East Wall

		Time (days)	Cost (R)	Material Cost (R)
1.	Erection of temporary works	10	5000	
2.	Removal of whole plaster surface	4	2000	
3.	Removal of surface stone and storing	10	5000	
5.	Removal of internal material	10	5000	
6.	Replace 5% wood frame	30	15,000	2400
7.	Patch internal wall material	20	10,000	
8.	Treat wood	5	2500	20,000
9.	Replace surface stone	20	10,000	
10.	Re-plaster surface			
	obtaining soil and mixing	3	1500	2400
	3 people plastering	5	750	
11.	Whitewash surface (4 people)	2	400	200
12.	Supervision		28,560	
		119	85,710	26,800

Total Cost = R.112,510

Repair to Two Towers N.E. Corner

		Time (days)	Cost (R)	Material Cost (R)
1.	Erection of temporary works	10	5000	
2.	Removal of all surface stone and store	12	6000	
3.	Remove loose internal soil and stone	10	5000	
4.	Replace 5% wood	20	10,000	3000
5.	Treat wood	5	2500	15,000
6.	Replace internal material	20	10,000	
7.	Replace surface stone	20	10,000	
8.	Supervision		23,280	
		97	71,780	18,000

Total cost = R.89,780

Repair to North Wall

		Time (days)	Cost (R)	Material Cost (R)
1.	Erection of temporary works	20	10,000	
2.	Removal of surface stone and store	20	10,000	
3.	Remove loose internal soil and stone	20	10,000	
4.	Replace 15% wood and reposition some beams	60	30,000	6000
5.	Patch internal material	40	20,000	
6.	Treat wood	10	5000	40,000
7.	Replace surface stone	40	20,000	
8.	Supervision		50,400	
		210	155,400	46,000

Total cost = R.201,400

Repair 1 Tower N.W. Corner

		Time (days)	Cost (R)	Material Cost (R)
1.	Temporary works erected previously	-	-	-
2.	Remove all soil and stone work	10	5000	
3.	Support tie beams	2	1000	
4.	Replace 20% wooden blocks and treat timber			3000 5000
5.	Rebuild corner of tower (5 people)	20	7500	
6.	Infill the wall	10	5000	
7.	Replace surface stone	10	5000	
8.	Supervision		12,480	
		52	35,980	8000

Total cost = R.43,980

Repairs to West Wall

		Time (days)	Cost (R)	Material Cost (R)
1.	Erection of temporary works	7	3500	
2.	Remove surface stone and soil bricks	10	5000	
3.	Replace 10% wood	30	15,000	3500
4.	Treat wood	5	2500	15,000
5.	Make new soil bricks (5 people)	14	3500	
	Soil stabilising agent			2000
6.	Replace surface stone and brick	15	7500	
7.	Supervision		24,960	
		84	84,460	20,500

Total cost = R.104,960

Repair to South Wall

		Time (days)	Cost (R)	Material Cost (R)
1.	Erection of temporary works	20	10,000	
2.	Removal of plaster surface	8	4000	
3.	10% replacement of surface stone or soil block	20	10,000	
4.	Treat wood	10	5000	40,000
5.	Transport of soil to site (4mm)	4	800	
6.	Mixing soil with stabilising agent and plastering by 3 men	12	1800	5000
7.	Whitewashing wall (4 people)	4	800	4000
8.	Supervision		18,720	
		78	51,120	49,000

Total cost = R.100,120

Repair to Inside S.E. Tower

		Time (days)	Cost (R)	Material Cost (R)
1.	Erection of temporary works	2	1000	
2.	Clean out fallen and loose material	3	1500	
3.	Reposition timber work and treat	5	2500	
4.	Treat wood			5000
5.	Replace internal soil and stone	5	2500	
6.	Replace surface stone work	5	2500	
7.	Supervise		4800	
		20	14,800	5000

Total cost = R.19,800

Repair to the Roof

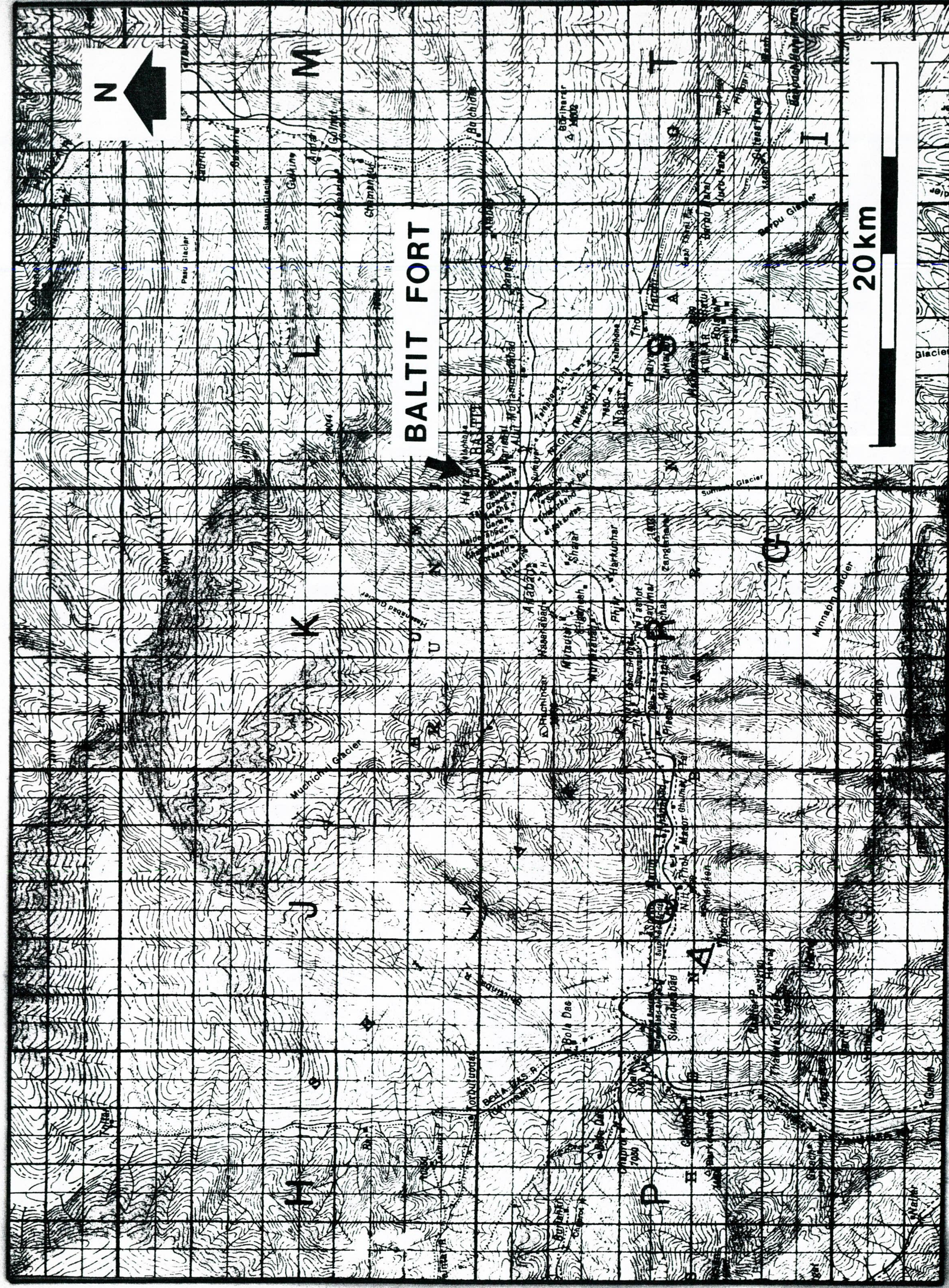
		Time (days)	Cost (R)	Material Cost (R)
1.	Strip 1100m² soil approx. 0.10m thick. Remove soil from site (4m² per person per day).	10	5000	
2.	Remove and store stone 1100m² x 0.20m	15	7500	
3.	Remove brushwood 1100m² throw away	6	3000	
4.	Remove and throw away 10% of roof timber assumed to be rotten.	4	2000	
5.	Treat remaining timber with wood preservative.	4	2000	20,000
6.	Replace main timbers estimated 100m x 0.4m x 0.4m (4m³) work for skilled workers 3 people at R.80 per day	30	7200	
7.	Replace split timber 10% of roof surface (5.5m³)	6 (cutting) 6 (laying)	6000	4400
8.	Re-laying brushwood matting	10	5000	-
9.	Re-laying stones	30	15,000	-
10.	Obtaining new soil (digging)	10	5000	-
11.	Stabiliser		4800	
12.	Mixing soil and stabiliser and laying on roof	30	15,000	
13.	Re-making narrow parapets and room division	10	5000	
14.	Temporary works timber and planking	10	5000	6400
15.	Transport (people & material) (cost of jeep hire)	10	4000	25,000
16.	Skilled supervision and design and construction of drainage system		42,480	
		177	133,980	55,800

Total cost = R.189,780

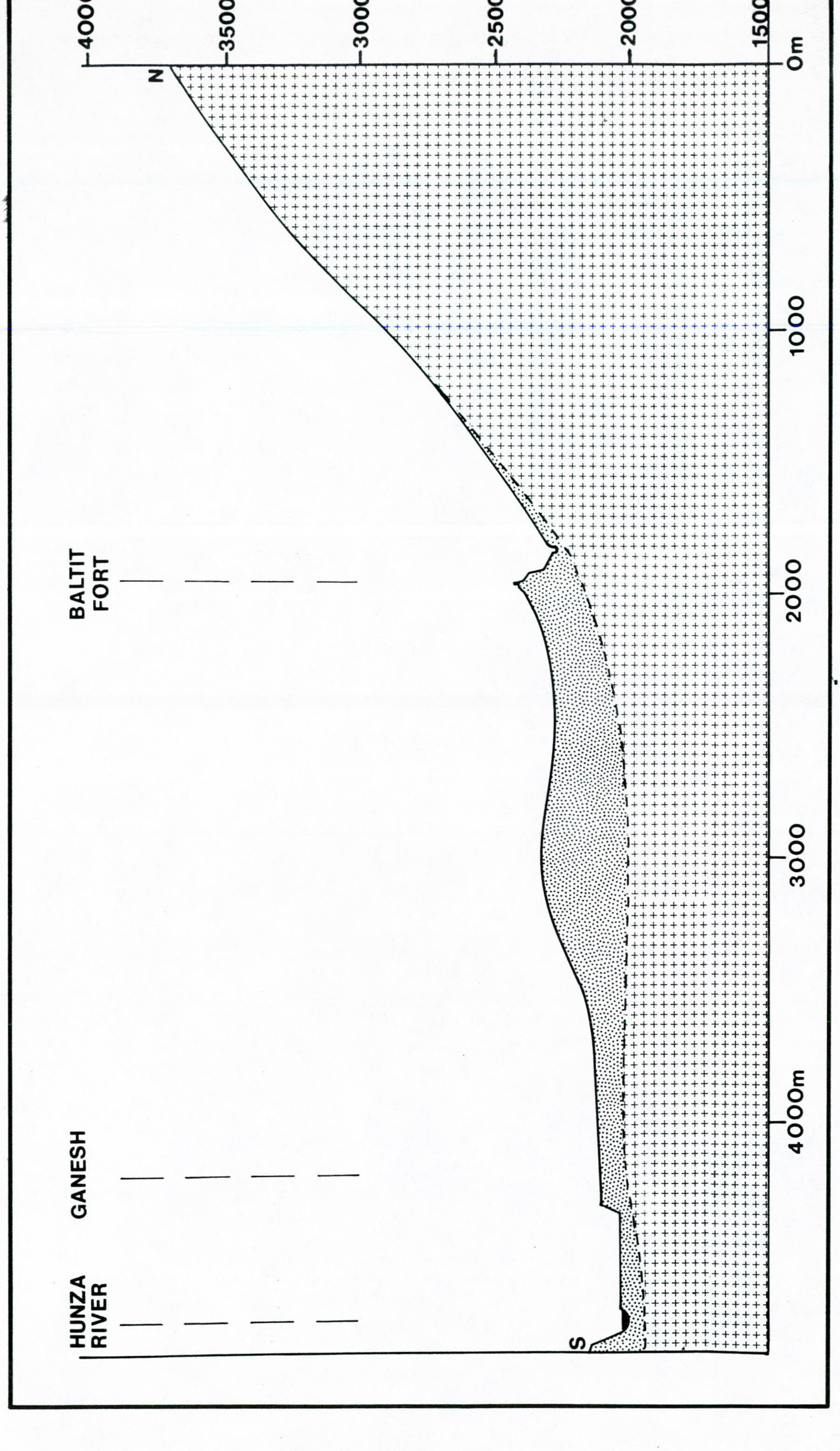
Inside Replastering

		Time (days)	Cost (R)	Material Cost (R)
1.	Removing loose and cracked render	10	5000	
2.	Transport of new soil to site	3	2400	
3.	Estimate the equivalent of 10 rooms' work at ½ room per day. 3 people at R.80	20	4800	
		33	12,200	-

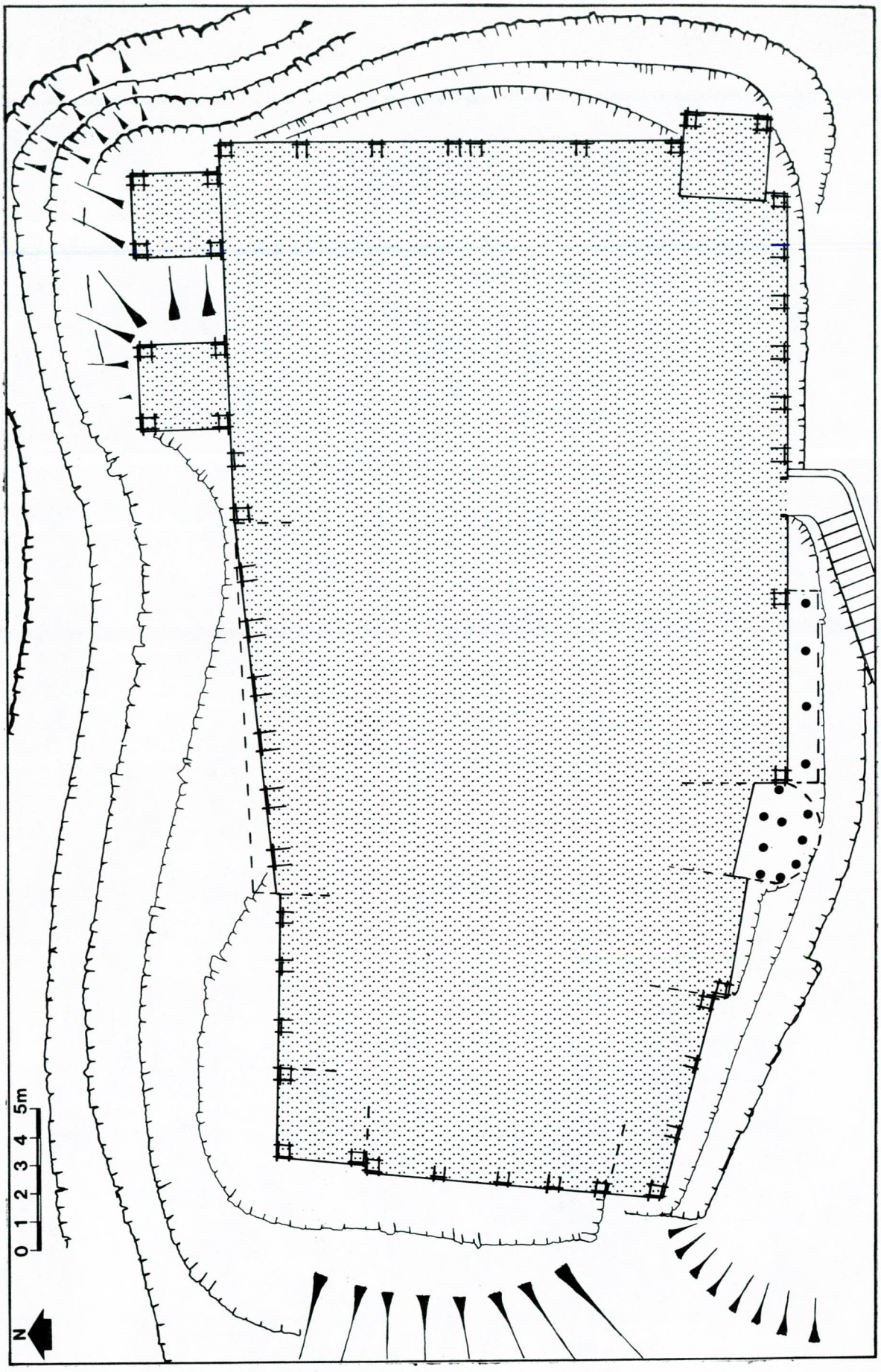
Total cost = R.12,200



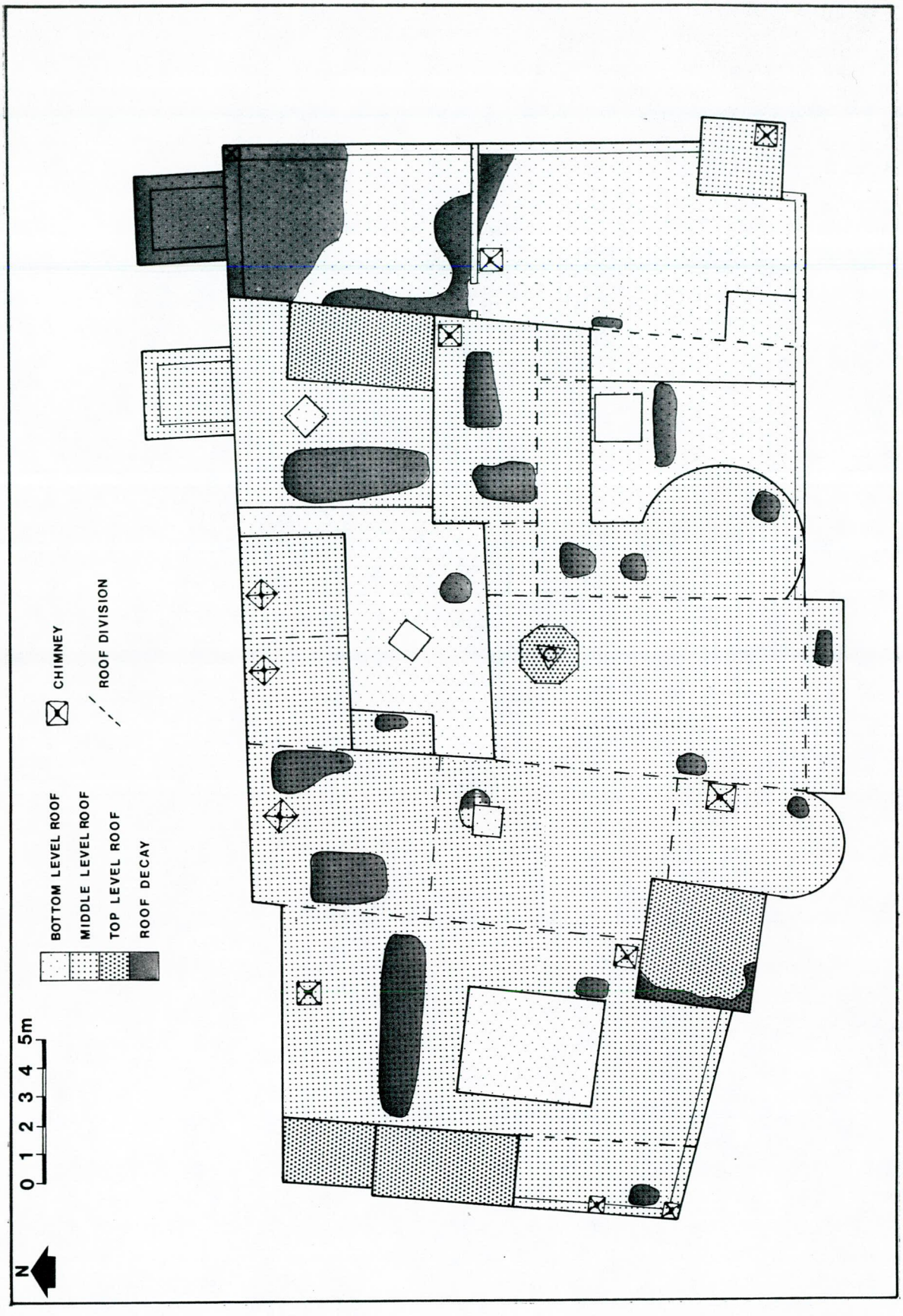
THE HUNZA VALLEY 1



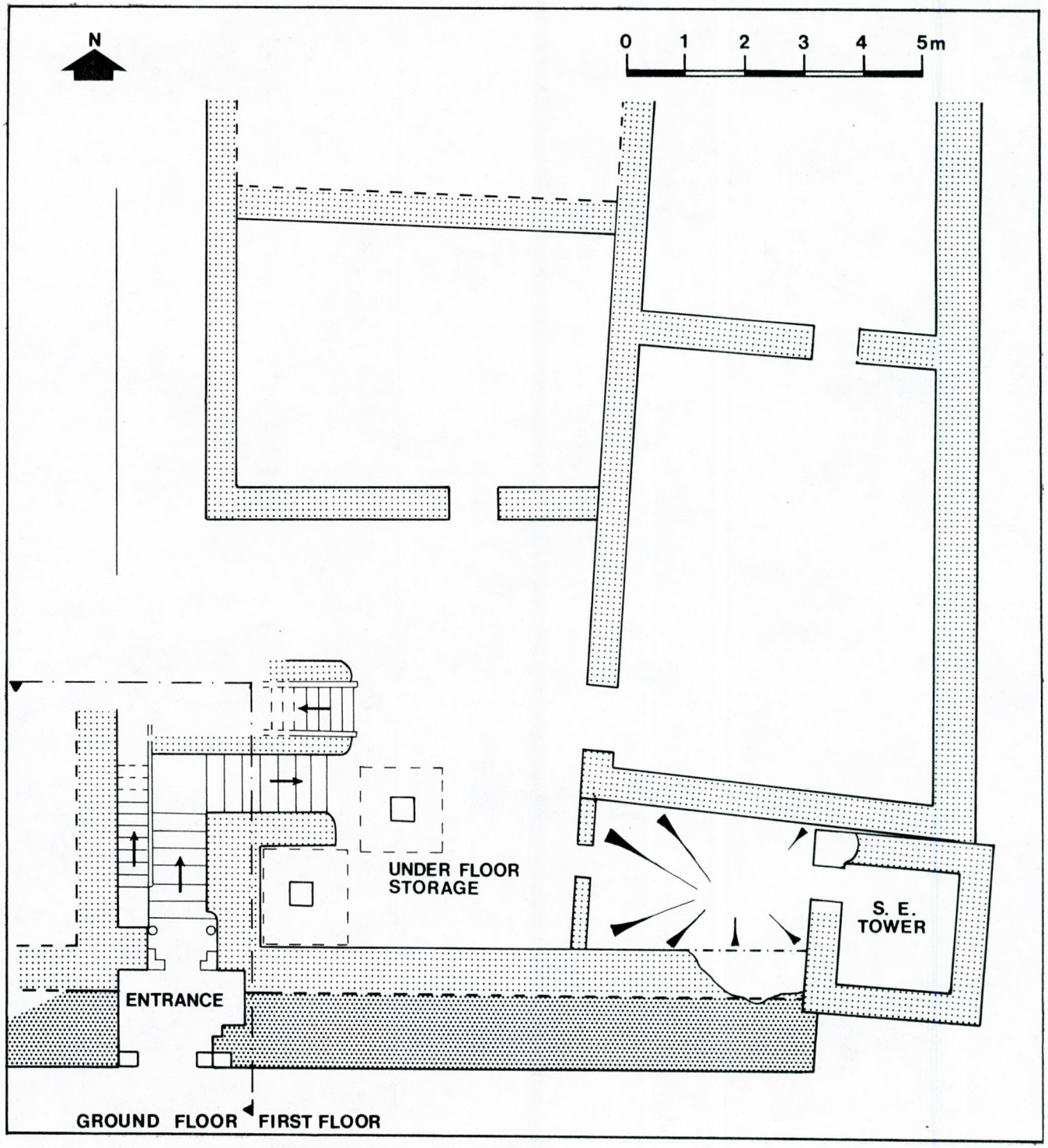
HUNZA VALLEY
SKETCH CROSS SECTION 3



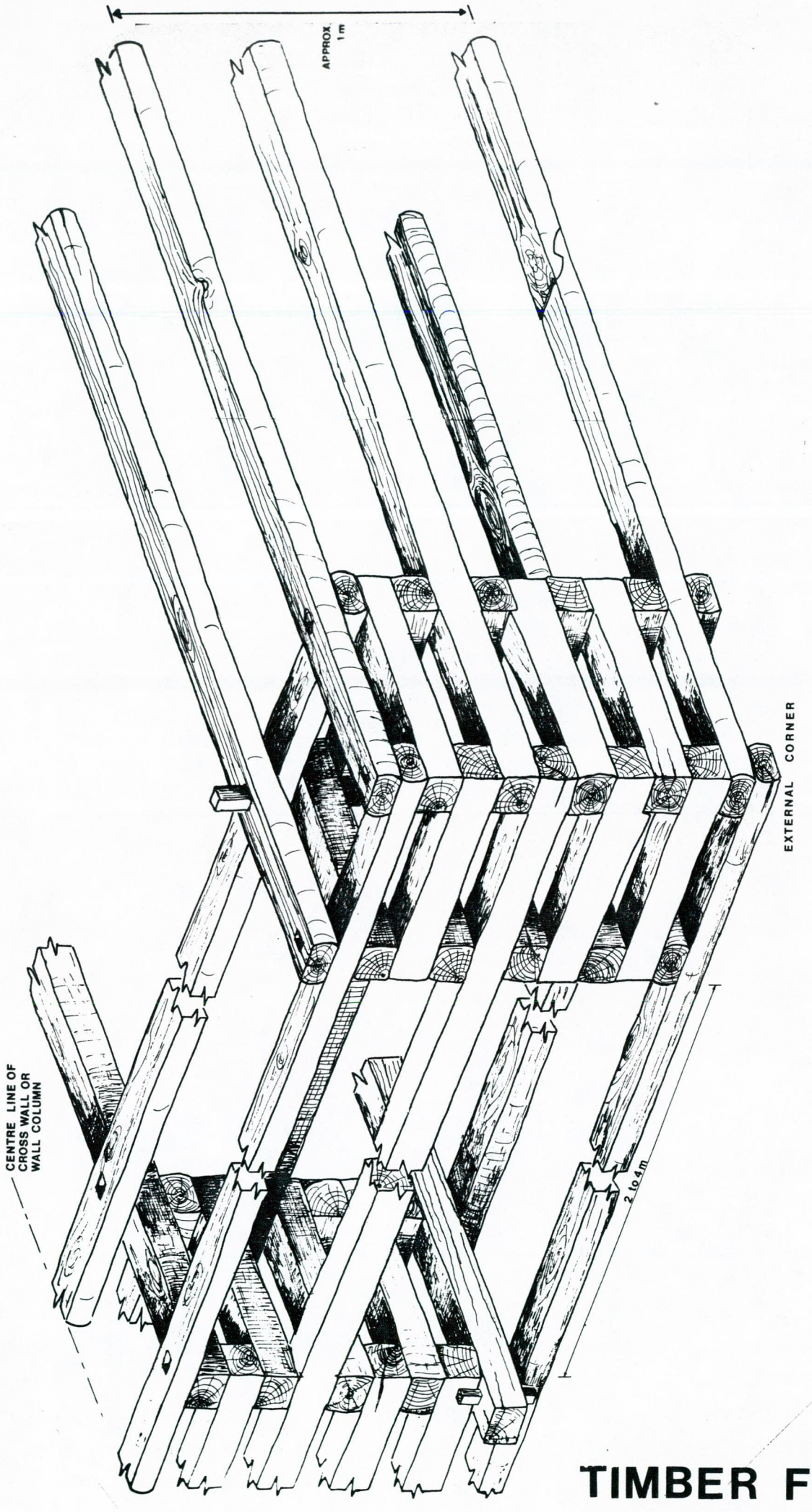
SKETCH EXTERNAL SURVEY 4



SKETCH ROOF PLAN 5



DETAIL S.E. CORNER 6



TIMBER FRAME CONSTRUCTION 7