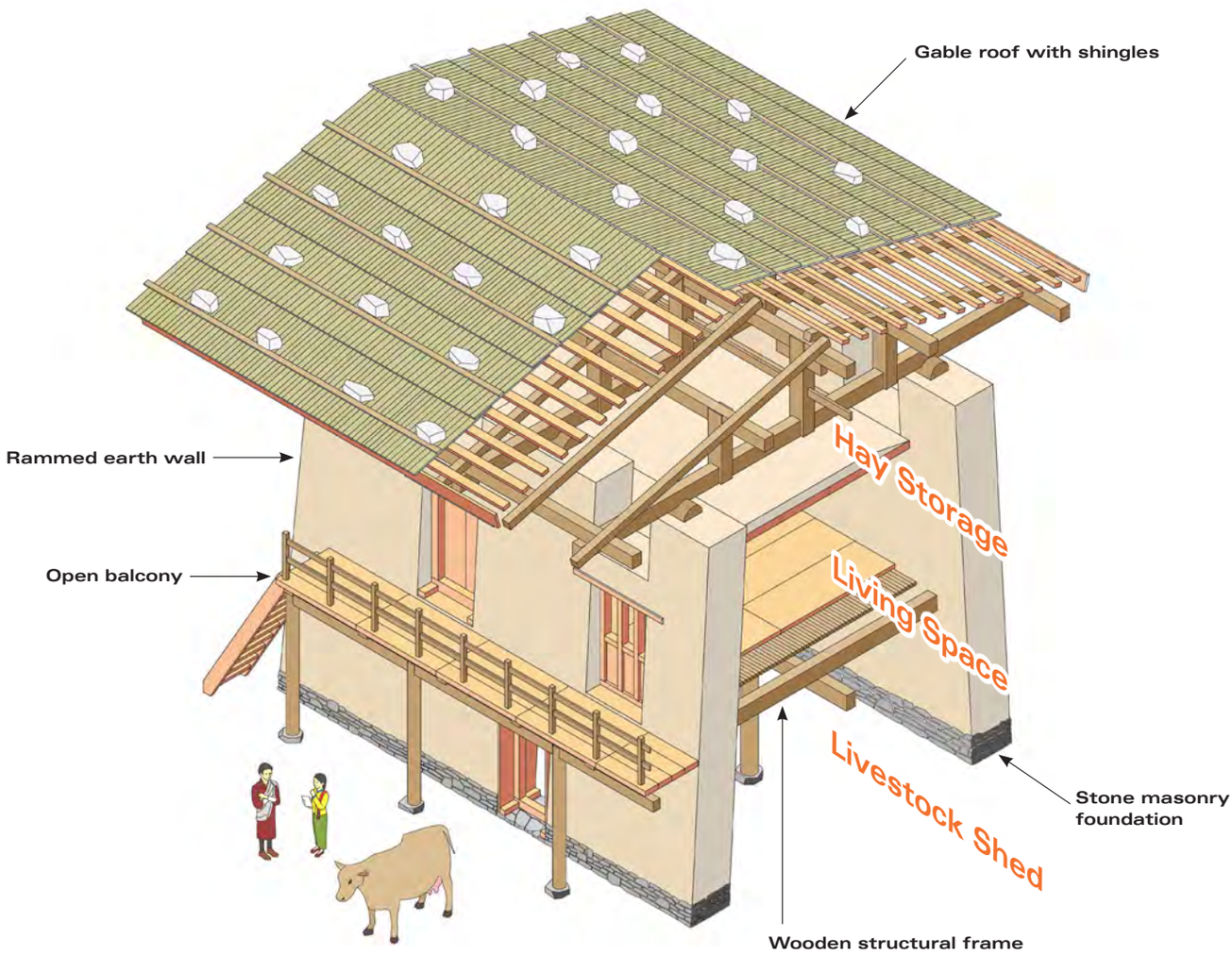
VERNACULAR HOUSES in Bhutan

Western Central Area

Thimphu, Punakha, Paro, Haa



Royal Government of Bhutan
Ministry of Home and Cultural Affairs
Department of Culture

Independent Administrative Institution
National Institute for Cultural Heritage
Tokyo National Research Institute for Cultural Properties

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FOREWORD

It gives me immense pleasure to inform everyone that the joint venture undertaken by the Department of Culture under the Ministry of Home and Cultural Affairs, Royal Government of Bhutan and Tokyo National Research Institute for Cultural Properties, Government of Japan has been successful, resulting in a comprehensive study on the traditional rammed earth structures in Bhutan.

Our collaboration started after September 2009 and September 2011 earthquakes, and since early 2012 the Department of Culture with support and guidance from the Japanese experts started an extensive survey and study of traditional structures in Bhutan. The study was broadly divided into architectural and structural studies. This publication on "Vernacular Houses in Bhutan Western Central Area, Thimphu, Punakha, Paro, Haa", an architectural study on the chronology and typology of rammed earth structure was carried with close collaboration with Tokyo National Research Institute for Cultural Properties.

The Cultural Heritage Bill, 2016 of Bhutan recognises Bhutan as a whole as unique cultural landscape. The tangible and intangible cultural heritage should be protected and safeguarded with the understanding of its association with natural settings and lives of the people of Bhutan in such a manner as to respect the cultural landscape. The traditional houses form the tangible and important fabric of the cultural landscape of the country. Owing to this significance, the publication not only provides insight about traditional houses in Bhutan but also advocate the importance of preserving traditional houses. The publication covers the survey methodology, chronology and typology, and the current situation of Bhutan in conservation of traditional rammed earth houses. It also includes examples of houses for practical preservation principles and prospects.

Tokyo National Research Institute for Cultural Properties has been the main advisor and consultative collaborator in Bhutan's effort in the field of conservation of traditional houses since 2012. On behalf of Royal Government of Bhutan, Ministry of Home and Cultural Affairs and Department of Culture, I would like to extend our deepest appreciation to Japanese experts for the continued support and assistance. For the next venture, the Department will collaborate with Tokyo National Research Institute for Cultural Properties to study the traditional structures in central and eastern region of the country, primarily focused on the stone masonry traditional structures.

Nagtsho Dorji
Director, Department of Culture
Ministry of Home and Cultural Affairs

EDITOR'S PREFACE

Bhutan, known as the Land of Happiness, is one of the outstanding countries that unfailingly cherishes and preserves its beautiful territory and rich cultural traditions. Its vernacular houses, which have developed unique forms through the nation's long history, represent an intangible tradition both in building techniques and the people's way of living, as well as being valuable tangible factors constituting the cultural landscape of the country.

Since 2012, the Tokyo National Research Institute for Cultural Properties has been continuing a cooperation project on the investigation and preservation of vernacular houses in Bhutan in close collaboration with the Department of Culture of the Royal Government. Technical assistance and cooperation for human resource development are currently promoted within the framework of the 'Project for the Conservation and Utilisation of Historic Buildings in Bhutan', commissioned by the Agency for Cultural Affairs of the Government of Japan. The project aims to firmly position the traditional architecture of vernacular houses as a cultural heritage within the legal protection system of the nation, and to facilitate its preservation and utilisation in an appropriate and sustainable manner, setting the following three pillars of activity: 1) establishment of methodology for the heritage value assessment, 2) study of conservation techniques, and 3) proposal of methodology for preservation and utilisation.

Keeping in mind the country's administration officers in cultural heritage protection, including staff members of the Department of Culture, and various other stakeholders involved in the preservation and utilisation of vernacular houses as cultural heritage, this book is intended to provide guidance for each party to accurately understand the value that vernacular houses have, to know how to determine the value of a building, and to consider how such value should be handed over to the future. It comprises, based on the outcome of multiple field surveys which the Institute and the Department have jointly conducted, a catalogue with explanations including the restoration studies of particularly significant and/or characteristic examples among traditional houses in the western central region of Bhutan as the main part, points of focus in the heritage value assessment, challenges in the preservation system, technical issues of conservation, and other topics which we have discussed in the workshops so far.

Even though it is a small nation, Bhutan is also characterised by regional diversity, and this is the case as well for its vernacular houses. Most of the contents in this book are based on the knowledge obtained from the study of a limited area of the western region, which is therefore insufficient to provide an overview of the whole picture of vernacular houses in Bhutan. Further investigations targeting other regions are required. We expect that this book will become an effective tool to widely share the necessary know-how to carry out such activities in an appropriate way, and to attract more and more people to join in actions for the protection of vernacular houses, recognising their significance.

Last but not least, on behalf of the Japanese team, I would like to sincerely express my renewed appreciation to every organisation supporting our cooperation project, the devoted participating members, and Madam Nagtsho Dorji and her colleagues at the Department of Culture, who always amicably helped us.

TOMODA Masahiko
Director of the Japan Centre for International Cooperation in Conservation,
Tokyo National Research Institute for Cultural Properties

Notes and Acknowledgements

Notes

1. This book is prepared as a part of the project entitled "Conservation and Utilisation of Historic Buildings in Bhutan" under "Networking Core Centres for International Cooperation on Conservation of Cultural Heritage Project" commissioned by Agency for Cultural Affairs, 2020 fiscal year.

2. The project is entrusted Tokyo National Research Institute for Cultural Properties (TOBUNKEN) and the implementation body is Japan Centre of International Cooperation in Conservation of the Institute. The counterpart in Bhutan is Department of Culture (DoC), Ministry of Home and Cultural Affairs (MoHCA) , Royal Government of Bhutan. The implementation body there is Division for Conservation of Heritage Sites in the Department (DCHS).

3. Book content summarises the result of the project entitled "Research on the Typology and Chronology of Rammed-earth Buildings in Bhutan" supported by JSPS KAKENHI Grant Number 16H05759. The project was conducted by TOBUNKEN from 2016 to 2018 fiscal year, in collaboration with relevant experts and professionals in this field.

4. The persons in charge of writing and editing this book are as follows. For Chapter 3, the name of the person in charge of writing is added at the end of each manuscript.

Chapter 1: Kanai Ken
Chapter 2: Mukai Junko (2-1, 2-2), Ezura Tsuguto (2-3), Unno Satoshi (2-4)
Chapter 3: Tomoda Masahiko, Martinez Alejandro, Ezura Tsuguto, Unno Satoshi, Maekawa Ayumi, Fukushima Hirohito, Pema Wangchuk and other DCHS staff members
Chapter 4: Yeshi Sumdrup and Pema Wangchuk (4-1), Tomoda Masahiko (4-2), Martinez Alejandro (4-3), Sugasawa Shigeru (4-4)
Chapter 5: Kanai Ken (5-1, 5-4), Nagtsho Dorji (5-2), Kamei Nobuo (5-3)
Editors: Tomoda Masahiko, Kanai Ken

Drawings were prepared by TOBUNKEN except for Am Bokom House (3-1-1), Phub Bidha House (3-2-1) and Woochu Nagtshang (3-2-5), which were prepared by DCHS.

Photographs were taken by the author or his/her field-survey-team members except as noted in each.

Acknowledgements

We take this opportunity to express our sincere appreciation to all persons who kindly contributed to our surveys and workshops in the project, especially to the residents and the owners who allowed us not only to conduct surveys on their own houses, but also cooperate with our interviews and questionnaires.

VERNACULAR
HOUSES in Bhutan

CHAPTER

1

OVERVIEW

Summary

This book aims to clarify, as well as visualise, the historical and cultural value of traditional house architecture in the Kingdom of Bhutan, and in so doing, to foster a shared understanding among the various stakeholders involved in preserving the value of traditional house architecture as cultural heritage.

Separated from one another by the high Himalayan mountain ranges, there is a large degree of cultural uniqueness among Bhutan's regions. As such, it is not particularly useful to group together the modalities of traditional housing at a national or all-encompassing level when comprehending the traits of traditional Bhutanese houses. This book focuses on vernacular houses in the country's western central region, one of the areas most open to the outside world, as a stepping stone to grasping historical Bhutanese house architecture as cultural heritage, with the primary purpose being to shed light on the physical features that form the basis for assessing the value of tangible cultural assets.

1-1 Background

Nestled in the southern foothills of the Himalayas, Bhutan has long-shuttered its gates to the outside world due to its geopolitical position, sandwiched between China (specifically Tibet) and India. Bhutan maintains a policy of unique international relations and allowing tourists into the country, citing concerns over foreign cultural influences. For this reason, despite having preserved its unique cultural traditions within the Buddhist cultural sphere, leaving out Tibetan to this day, with the adoption of information technology and the drift towards globalisation, Bhutan now faces a situation where rapid change is unavoidable. In the capital city of Thimphu, the influx of people from the countryside has accelerated in the past few years. Together with the expansion of urban zones, the construction of reinforced concrete (RC) mid-rise housing has rapidly advanced, and the cultural landscape—which has preserved harmony between human affairs and nature—continues to be lost. Moreover, social changes have made it difficult to pass on the craftsmanship and diverse community systems that have supported traditional architecture and construction. Against this background, the conservation of Bhutanese architecture, with its long history, is on the verge of crisis.

Emergency survey of traditional houses following the 2009 and 2011 earthquakes

The earthquake that struck eastern Bhutan in 2009 severely damaged traditional houses and other structures in the region, which prompted the Bhutanese government to begin discussing the nationwide adoption of building safety standards, led by the Ministry of Works and Human Settlement. In response, the Department of Culture (DoC) under the Ministry of Home and Cultural Affairs (MoHCA, which is responsible for matters of cultural heritage) perceived an increasing risk that the rising adoption of RC construction could lead to the decline of traditional architectural culture and the loss of cultural landscapes.

Another powerful earthquake struck along the India-Nepal border in 2011, this time damaging traditional buildings in Bhutan's western region. The Division for Conservation of Heritage Sites (DCHS), carried out a survey in the disaster zone to ascertain the extent of the damage, as well as to conduct foundational surveys on traditional construction methods and reinforcement techniques. The findings were compiled in the "Damage Assessment of Rammed Earth Buildings: After the September 18, 2011 Earthquake." At the same time, in response to a request from the Royal Government of Bhutan, the Japanese Agency for Cultural Affairs began to provide technical support for the conservation and restoration of traditional buildings. Starting the following year, 2012, until 2015, the Tokyo National Research Institute for Cultural Properties (TOBUNKEN) took the lead in administering surveys, with the DCHS as its Bhutanese counterpart, with two main areas of focus: analysis of the structural properties and durability of traditional rammed earth buildings, and pinpointing the characteristics of traditional construction techniques.

Architectural surveys concerning the assessment of the value of traditional houses as cultural heritage

Based on the findings of the emergency surveys resulting from the above earthquakes, the TOBUNKEN, in cooperation with the DCHS carried out a study between 2016 and 2018 on the typology and chronology of Bhutanese rammed earth buildings. At the beginning of 2016, the Bhutanese government began to consider the possibility of making traditional house architecture the subject of conservation as cultural heritage under the Cultural Heritage Bill. The assessment of architecture as cultural heritage in Bhutan has been primarily grounded in its spiritual and cultural value, with a focus on palatial and religious facilities. Thus, traditional houses have not been sufficiently valued. The study conducted between 2016 and 2018, drawing upon the architectural history research methodology in Japan, attempted to establish a method for the physical evaluation of traditional buildings as tangible cultural assets in Japan by combining techniques of stylistic classification and technical architectural considerations. The content of this book is based on the outcomes of that study.

1-2 The Topics and Goal of This Book

The topics of this book are traditional rammed earth farmhouse buildings spread across four districts—Thimphu, Punakha, Paro, and Haa—in the western central region of Bhutan. Today, relatively large traditional houses between two and four storeys are commonplace in the western central region. However, differences in region and period can be recognised from their outward appearance. Although there can be many aspects of a building's value as a cultural asset, it is vital to assess so that the building's age, remodelling, and extension processes are understood as accurately as possible. That being said, in Bhutan, the only buildings that can be dated from historical documents are monuments such as *dzongs* (fortress) and temples. Even if there is a tradition of conventional farmhouse construction, there is scant evidence to support it. Moreover, because organic patterns are carved into the pillars of *dzongs* and temple buildings, it is possible to infer their relative age based on art and archaeological remnants, yet this method cannot be applied to traditional house architecture, which contains few decorative elements. On the other hand, traditional house architecture has a closer relationship to society than that of *dzongs* or temples. Further, since the way in which they are constructed tends to reflect changes of the times in which they were built, by conducting thorough architectural surveys in a region that forms a unique cultural sphere, to obtain a bird's-eye view of shifts in the scale, layout, and techniques used in such buildings, it becomes possible to identify points of reference by which to estimate their relative age.

The concentration of the population in the capital and the depopulation of the countryside increased the number of vacant and elderly-only homes in rural areas; inadequately maintained housing is becoming noticeable. At the same time, the rebuilding of traditional house is accelerating due to a trend of modernisation and increased comfort. Many factors threaten the survival of traditional houses, such as the collapse of the traditional building construction system due to structural changes in society, and concerns over safety in the wake of earthquake damage. The Ministry of Works and Human Settlement has already been experimenting with the preservation of traditional houses from the perspective of national land development, but these efforts have undeniably lacked efficacy due to a lack of subsidies and incentives for repair costs. At the same time, there are cases where houses belonging to prominent families have been repaired using grants from the royal family and other funds from the standpoint of cultural heritage, although these endeavors have been based on assessments of value distinct from architecture as cultural heritage.

This book intends to clarify, from an architectural perspective, the physical characteristics in which the cultural and historical value of traditional Bhutanese houses reside, to provide an objective assessment criteria for policies that aim to conserve cultural heritage, as well as to help develop the architectural history research and its practical applications in Bhutan.

1-3 Research Framework

For three years, from the fiscal years of 2016 to 2018, a Japanese research team from the Japan Centre for International Cooperation in Conservation (JCICC), TOBUNKEN, was dispatched to implement the architectural surveys of the traditional houses in cooperation with DCHS under DoC, MoHCA. The workshop focusing on the conservation of rammed earth in Bhutan was held at Thimphu on the 13th March 2018.

Dispatched members from Japan (Affiliation and Position or Grade at that time)

Kamei Nobuo (Director General, TOBUNKEN)
Tomoda Masahiko (Head, Conservation Design Section, JCICC, TOBUNKEN)
Sato Katsura (2016 Associate Fellow, TOBUNKEN)
Martinez Alejandro (2017~2018 Associate Fellow, TOBUNKEN)
Ezura Tsuguto (Professor, Okayama University of Science)
Fukumoto Masami (Student, Okayama University of Science)
Tamada Takumi (Student, Okayama University of Science)
Unno Satoshi (Researcher, Nara National Research Institute for Cultural Properties)
Maekawa Ayumi (Researcher, Nara National Research Institute for Cultural Properties)
Fukushima Hirohito (Researcher, Nara National Research Institute for Cultural Properties)

Members from Bhutan (Affiliation and Position or Grade at that time)

Members from Department of Culture
Karma Weezir (Director General, DoC)
Nagtsho Dorji(Head, DCHS, DoC)
Yeshi Samdrup (Sr. Architect DCHS, DoC)
Pema Wangchuk (Architect DCHS, DoC)
Karma Tenzin (Sr. Architect DCHS, DoC)
Jamyang Singye Namgyel (Architect, DCHS, DoC)
Dendup Tshewang (Engineer, DCHS, DoC)
Jigme Choden (Engineer, DCHS, DoC)
Kunzang Tenzin (Engineer, DCHS, DoC)

Members from other agencies
Dorji Yangki (President, Bhutan Institute of Architects)
Wangchuk Bidha (Ministry of Education)
Rinzin Phurba (Cultural Officer, Dzongkhag Administration, Haa)
Nima Norbu (Dzongkhag Administration, Thimphu)
Dorji (Dzongkhag Administration, Thimphu)
Kuenga Tshernig (Cultural Officer, Dzongkhag Administration, Punakha)
Kuenchap Dhendup (Ministry of Works and Human Settlement)
Tshering Phuntsho (Department of Human Settlement, MoWHS)
Jamyang Dukjey (Department of Engineering Services, MoWHS)
Yangka, daughter of Lham Pelzom, Kabesa house owner
Dorji Tashi, owner of Babesa house (Major, Royal Bhutan Army)
Tshewang Norbu, (Department of Disaster Management, MoHCA)
Sonam Eden (GIS, MoWHS)
Thinley Choden (Bhutan Ecological Society)

Sonam Choden Tshering (Architect, private firm)
Sonam Lhaki (Architect, private firm)
Choni Lhamo (Architect, private firm)
Sonam Tashi (Engineer, private firm)
Rigzom Wangchuk (Private consultant)
Sonam Dorji (Association of Bhutan Tour Operators)
Sonam Pem (Media, Bhutan Broadcasting Services)
Yeshey Lhendup (Media, Bhutan Broadcasting Services)
Phurpa Lhamo (media, Kuensel)
Palden Khandu (Thimphu Thromde, City Corporation)
Sonam Wangchuk (Thimphu Thromde, City Corporation)
Khachi Wangmo (Royal Society for Protection of Nature)

Schedule for dispatching

2016 fiscal year

The First Mission: from the 28th August to the 5th September 2016
Kamei, Tomoda, Ezura and Unno
Yeshi

The Second Mission: from the 4th to the 16th March 2017
Kamei, Tomoda, Sato, Martinez, Ezura, Fukumoto, Unno, Maekawa and Fukushima
Pema, Sangay Wangdi (Intern Architect DCHS, DoC) and Krishna Kafley (Intern Architect DCHS, DoC)

2017 fiscal year

The Third Mission: from the 29th May to the 5th June 2017
Martinez, Unno, Maekawa and Fukushima
Yeshi and Pema

The Fourth Mission: from the 18th to the 27th August 2017
Kamei, Tomoda, Martinez, Ezura, Fukumoto and Tamada
Yeshi and Pema

The Fifth Mission (Workshop): from the 8th to the 15th March 2018
Kamei, Tomoda, Martinez, Ezura and Unno
Yeshi and Pema

2018 fiscal year

The Sixth Mission: from the 15th to the 25th July 2018
Tomoda, Martinez, Ezura, Fukumoto and Unno
Pema and Namgay Dorji (Engineer, DCHS, DoC)

The Seventh Mission: from the 13th to 19th January 2019
Tomoda and Martinez
Yeshi, Tashi Dorji (Intern Architect, DCHS, DoC) and Ugyen Pemo (Intern Architect, DCHS, DoC)

1-4 List of Surveyed Traditional Houses

	Dzongkhag	Gewog	Village	Resident
1	Thimphu	—	Kabesa	Lham Pelzom
2	Thimphu	—	Langjophaka	Am Bokom
3	Thimphu	Mewang	Kharji	Dechen Wangmo
4	Thimphu	Mewang	Wangsisina	Dechen Wangmo
5	Thimphu	Mewang	Namseling	Phub Bidha
6	Thimphu	Genye	Khoma	Wangmo
7	Punakha	Guma	Changyul	Galem
8	Punakha	Shengana	Garakha	Sangay Wangmo
9	Punakha	Dzomi	Changjokha	Tandin Zam
10	Punakha	Dzomi	Changjokha	Peldon
11	Punakha	Dzomi	Changjokha	Ugyen Choden
12	Punakha	Dzomi	Changjokha	Kinley (Apkimey)
13	Punakha	Shengana	Jazhinkha	Namgay
14	Punakha	Shengana	Jazhinkha	Dawa Zam
15	Punakha	Shengana	Tshosa	Namgay Wangmo
16	Punakha	Shengana	Tshosa	Namgay Bidha
17	Punakha	Talo	Nobgang	Non Formal Education Centre
18	Punakha	Talo	Nobgang	Sonam Choden
19	Punakha	Talo	Nobgang	Tshering Dema and Pema Lham
20	Paro	Lungnyi	Woochu	Woochu Nagtshang
21	Paro	Lungnyi	Woochu	Aum Baytum and Bakhum
22	Paro	Lungnyi	Woochu	Yang Zom
23	Paro	Doteng	Phusha	Sangay Om
24	Paro	Wangchang	Wangthangkha	Tshering Wangmo
25	Paro	Dogar	Tshephu	Gyem Pem
26	Haa	Kartsho	Ingo	Kinley Dema and Sherub Gyeltshen
27	Haa	Kartsho	Ingo	Dawa Tshering
28	Haa	Samar	Balamna	Norbu Tshering and Gyeltshen
29	Haa	Samar	Pudhana	Pema
30	Haa	Samar	Pudhana	Yonzo
31	Haa	Samar	Sharri	Pema Khandu
32	Haa	Samar	Sharri	Tshering Zam
33	Haa	Bji	Talung Toed	Phub Lham
34	Haa	Bji	Talung Toed	Lham Tshering
35	Haa	Bji	Talung	Chencho Pem
36	Haa	Bji	Talung	Rinchen
37	Haa	Bji	Hatay	Sangay Lham
38	Haa	Kartsho	Ahatam	Tshencho
39	Haa	Kartsho	Ahatam	Damcho Zam
40	Haa	Uesu	Domchug Cheka	Lhaden
41	Haa	Uesu	Domchug Cheka	Sangay Wangmo

Geodetic Coordinates (Latitude, Longitude)	Survey (Y.M.D)		Page
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27.3669, 89.5661	2017. 3. 4-16	2nd Mission	62
27.3523, 89.5710	2018. 3. 8-15	5th Mission	42
27.4031, 89.6122	2012.11. 23	Preliminary Mission	54
27.3040, 89.6064	2017. 3. 4-16	2nd Mission	186
27.5903, 89.8612	2017. 3. 4-16	2nd Mission	50
27.5986, 89.9173	2017. 3. 4-16	2nd Mission	58
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27.3920, 89.4270	2018. 7.15-25	6th Mission	150
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27.4255, 89.2500	2017. 8.18-27	4th Mission	94
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27.4194, 89.2190	2017. 8.18-27	4th Mission	134
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27.3943, 89.2883	2017. 8.18-27	4th Mission	154
27.3612, 89.2976	2017. 8.18-27	4th Mission	138
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VERNACULAR
HOUSES in Bhutan

CHAPTER

2

VILLAGES AND HOUSES

2-1 The Distribution and Structure of Traditional Villages

Climate and topography

Bhutan covers an area slightly smaller than the island of Kyushu in the Japanese archipelago, even though it differs greatly in elevation and is varied in climate. Close to its southern border touching India, the elevation is 200 metres, which increases as it moves northward. On Bhutan's northern border touching China's Tibet Autonomous Region, the elevation reaches some 5,000 metres at the Himalaya Ridge, peaking at over 7,000 metres. Since it is located at the same latitude as the main island of Okinawa, it has a subtropical climate in low-lying zones, but a cold, dry climate at high elevations. At 1,200 metres, evergreens predominate, conifers prevail at 2,000 metres and above, and the tree line is close to 4,000 metres. There are valleys where only running bamboo and shrubs will grow, which was possibly due to wind. According to the Constitution of the Kingdom of Bhutan 2008, more than 60% of the land is to be maintained as forests; the actual amount of forest cover is over 70%. Farmland makes up approximately 3% of the country, and 4% is pasture. Villages are distributed across a range of up to 3,500 metres, starting from low-latitude areas.

Bhutan has four water systems that flow from the Plains of India into the Brahmaputra river. Upstream is divided into 10 rivers flowing north to south, creating a steep, V-shaped valley. Villages are dispersed throughout this valley and located on river terraces, alluvial fans, and the alluvium of the valley floor.

Cultural distribution

The region corresponding to present-day Bhutan was once called *Lho* Mon or *Lho* Yul by Tibet, which means that it is the land of the southern Monpa people. In extremely broad terms, the Monpa were the natives and the caretakers of its evergreen forest culture. What is seen today in Bhutan may have derived from competition between those carrying on the high culture of Tibet's sophisticated Buddhist religious life and the society of its indigenous inhabitants.

In addition to the fact that two out of the 12 temples built by the Emperor of the Tibetan Empire in the 7th century are in Bhutan, and that 8th- and 9th-century Tibetan princes fled to Bhutan to escape political conflict and sired influential Bhutanese clans, there is much evidence that Bhutan has had a close relationship with Tibet since ancient times. Tibet's Buddhist culture likely began to have a major influence on Bhutan starting in the 12th century. Around this time, the new Sarma-pa Buddhist sects arose in Tibet and began to extend their power southward, competing primarily in an area stretching from present-day western to central Bhutan. The biography of a Tibetan high priest from that period tells the story of Buddhism expelling indigenous gods, but there are suggestions that an advanced Buddhist culture would still have accepted indigenous society while expanding its influence.

One of these sects that spread its power westward prevailed in numerous conflicts to eventually unify Bhutan in the 17th century, and established a theocratic government that lasted until the early 20th century. This government, the Drukpa-Kagyu, based its central government in Punakha and Thimphu in the west, and divided the country into three regions (west, east, south), each with its own appointed *Penlop* (Governor). The eastern region (Pele La, contemporary central-eastern Bhutan), despite being vast in size, had its governor seated in Trongsa at the westernmost end; the high culture found in the west probably had little influence on the far eastern end. The four rivers flowing north to south in the region to the east of Trongsa are all part of the Drangme (Manas) Chhu river system, carving out deep valleys. Going from east to west, it is necessary to cross several rugged canyons and passes, which would not have been very easy long ago, as the language used in each valley was different. On the other hand, easternmost Bhutan, bordering Arunachal Pradesh in India, was once busy with traffic, and includes places such as Tawang district, which seems to have much in common with the local Monpa people.

On the other hand, the south has a subtropical climate. Hence, very little reached it culturally from the central region. At the time, Bhutan effectively governed Duar in the south (part of India's former Province of Bengal and Assam), prior to the loss of part of its sovereign territory as a result of the Duar War against British forces from 1864 to 1865. Farmland in the south would have been cultivated around that time and later by Nepalese settlers. Thanks to the policy of

giving preferential treatment to the southern settlement of non-landowning citizens since modernisation, the present-day population in the south is now large.

So-called "typically Bhutanese" villages—which have the traditional houses that are the subject of this paper—were dominated by the high culture found primarily in the central-western area. However, despite their Buddhist trappings, Buddhism mixed with ancient animistic rituals and indigenous worship; the resulting religious practices differed in degree depending on the region. Further, some regions had strong remnants of the indigenous Monpa culture, such as farmland cultivated with slash-and-burn techniques, and villages with traditional raised-floor houses made of bamboo and wood. The form and distribution of each village should be considered in light of how much high culture was substantially transmitted.

The composition of the villages

In places where the valleys run deep, villages are seen in which fields are cultivated on sunny hillsides, with gentle slopes and traditional houses scattered about, or gathered on ridges with fields spreading outward around them. Alternatively, perhaps there are villages consisting of traditional houses numbering in the tens or fewer, amid stepped or terraced fields extending out on one side of a gentle valley. The sight is strikingly beautiful. Landscapes reach out to each other from either side of the valley, and villages where every inch of terraced soil is fully cultivated and houses are built huddle close together.

The people here earn a living according to the topography and the climate; they grow rice, engage in dry field farming, or raise livestock. Their livelihoods shape the character of each village and farmland. Fields of wheat and other crops cover land that depends on rainwater or that is often cold, or where water is drawn from rivers to grow rice. The terraces, built of masonry or soil, carve out lines on the slopes. The landscape—randomly dotted by one or several traditional houses in forest openings—might show signs of fields slashed and burned long ago (this farming method is now prohibited for the sake of forest conservation). Integrated land use is prominently seen in the east, wherein relatively large villages are built upon mountain ridges, fields are ploughed on sloped hills facing valleys, and terraces are carved out of low-lying land along mountain streams and rivers. Here, thin steep slopes are also used to cultivate corn and other crops.

In many cases, each household in a village does not have its own specific field, and the arrangements have a patchwork style, randomly scattered. This is further complicated by marriages and splits inheritances, but resources such as sunlight and water may have been

Traditional houses built clustered with terraces (Nabji, central Trongsa Dzongkhag)

Scattered terraces and small villages spreading along a river (Mo Chhu river, western Punakha Dzongkhag)

Fields ploughed on slopes, lower terraces, and terraces along mountain streams (eastern Trashigang Dzongkhag)

evenly split between households when they first collaborated in ploughing the fields. Many people in Bhutan move seasonally between high and low-lying villages. They walk for 1–2 days on mountain roads, taking advantage of the fact that the climate shifts depending on the elevation, which may be advantageous in terms of spreading the risk.

Most of the time, villages are found on slopes, and traditional houses are built facing valleys with mountains to their back. If the slopes are very gentle, then many of the homes might face the centre of the village. Openings are very rarely provided on back walls, which tend to bear the harsh brunt of nature.

Water is drawn from rivers or springs. It has long been believed that many villages have their own springs. There are stories of springs welling up thanks to the presence of small animals and birds, or the work of high priests. Thus, water sources may have been considered sacred and hence protected.

Within the villages are pagodas and shared temples, as well as shrines for worshiping indigenous deities. A small pagoda called *chorten* is often located in the central part of the residential area, however the locations of these temples do not appear to have been fixed. Further, in recent years, due to government-directed efforts, various facilities have been built in villages, such as work sheds for villagers to cooperate on making milk products, or classrooms for adults who have never had an opportunity to go to school.

Changes in cultivated land

The spread of village farmland is greatly influenced by the size of the population and the quality of the soil, in addition to topographical restrictions. Population determines the area that can be cultivated, and soil quality determines the yield per unit area, in other words, the population size that may be supported. However, this is not a closing balance. Labor fluidity through sharecropping is also important when considering village size. For example, in the case of Dopshari Village (located in a wide, fertile valley), they receive external labor at the time of rice planting and harvesting in exchange for a fixed amount of rice. Workers came over a mountain pass from the Haa region, where high elevation makes it impossible to cultivate rice. sharecropping is common everywhere, even today.

Recently, farming villages have been declining in population, and there has been an increase in abandoned fields. In farmlands with insufficient irrigation and in villages that have introduced agricultural machinery (such as power tillers), narrow fields where machines cannot enter and mountainside fields easily damaged by wildlife (such as wild boars) are no longer being cultivated and left to go wild. As such, there are many villages in which the farmland area is decreasing.

Changes in the number of households

People move to places where there is arable land to establish villages. Various factors will cause the farmland to either expand or shrink, thereby altering the landscape. Therefore, how does the number of households in a village change?

In many parts of Bhutan, farming is carried out by all members of a single large household. However, when families become very large, members will break off and build new homes. In many regions, next-generation households of large families are formed around daughters. In this case, sisters and their families will leave the original household to start a new one, it is sometimes expressed as "building a new *thap* (kitchen)".

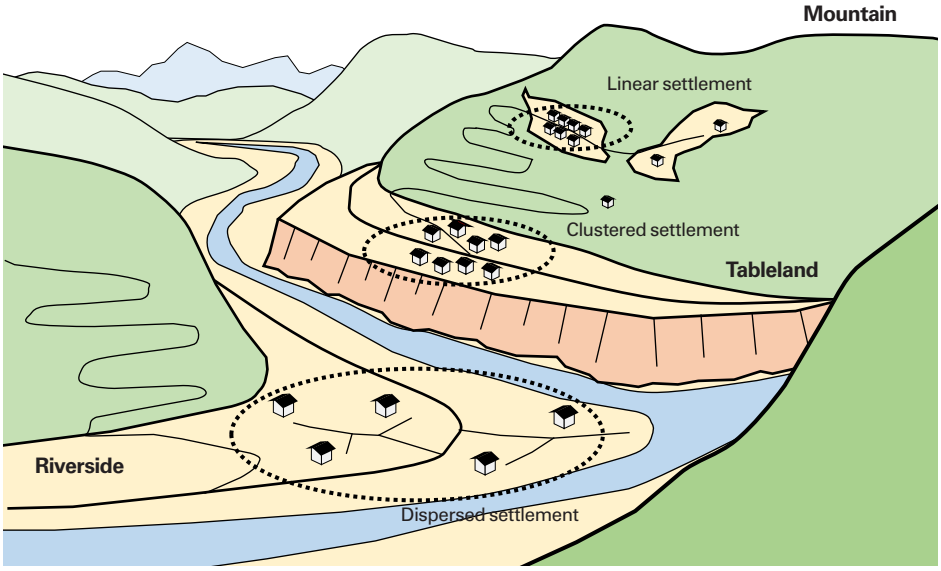
There are also cases where the number of households increases because of movement from other locations. For example, in the Phobjikha Valley—where there is a wide expanse of land suitable for the cultivation of potatoes (the main cash crop in the region)—the number of households has significantly expanded, not by family members breaking off to form new households, but by movement in search of highly productive farmland. There are also cases like that of Gantey and Korphu Village, where the number of households increased due to people simply moving there to serve in monasteries or convents. The first automobile-ready roads were paved in Bhutan in the 1960s. Around 1980, branches off of main trunk lines started to gradually open up. Presently, municipal offices in many Gewog administrative divisions may be reached by unpaved road. Hence, there are increasing cases of new villages being formed along roads. This is the result of houses being rebuilt in villages on land near roads, and high-priced land near roads being divided into residential

land and sold to people both inside and outside villages.

The rise in the number of households has become more prominent in modern times. Nabuji Village, which now consists of 40 households, only had four homes around 1960. Also, Kheng-Buli Village has seen a split in the seven homes that have existed for the past century into 80 households today. If it is felt that a village can only maintain as large a population as its farmland will support, then a higher number of households may first prompt increased farmland productivity. Factors include greater yield per unit area through government-led agricultural improvements, and expanded incomes through the introduction of cash crops.

Fluctuations in the number of households are thought to be greatly affected by social changes. A long time ago, in addition to the taxation of certain crops, lords and prominent individuals were burdened by government obligations to cultivate the land and turn over part of their harvests. Prior to the abolishment of tax payments under the Third King's Reign (1952–1972), some people abandoned villages to escape these obligations. The Third King's Reign also eliminated slavery, so families that had previously worked solely for others were now free to establish their own households. Additionally, according to the Land Act, it became a government policy to prohibit the ownership of excess land, and confiscated lands were given to families that did not have any. This decreased the number of large families, but possibly increased the number of households. Today, there are no dramatic population drops due to epidemics of smallpox or similar diseases.

Most recently, families have been resurging and growing again thanks to remittances sent home by members of offspring generations that have gone to the cities for work. Some are even returning home to their villages to start families after working in urban areas for a few years. However, the rural depopulation is continuing to increase; there is a larger number of homes with only elderly couples or school-aged children, as well as a rise in the number of empty homes. If the rural population keeps declining in this manner, then the number of households in rural villages—which previously grew rapidly thanks to post-modern population growth and the branching of families—may shrink in the future. Not only does this imply an increase in abandoned land, but village landscapes may be significantly altered by the abandonment of homes built through cooperation within the community. Since March 2020, tourists have been prohibited from entering the country to prevent the spread of COVID-19 infections. Tourism is Bhutan's main industry, generating a significant amount of employment. However, some workers who are no longer employed in tourism may take up farming to recover their incomes. Although this has no palpable impact on the rural population, it might change young Bhutanese citizens' perception of farming work.



Synoptic image of geological features and settlement locations

2-2 The Spatial Composition of Traditional House Sites

The distribution of types of houses

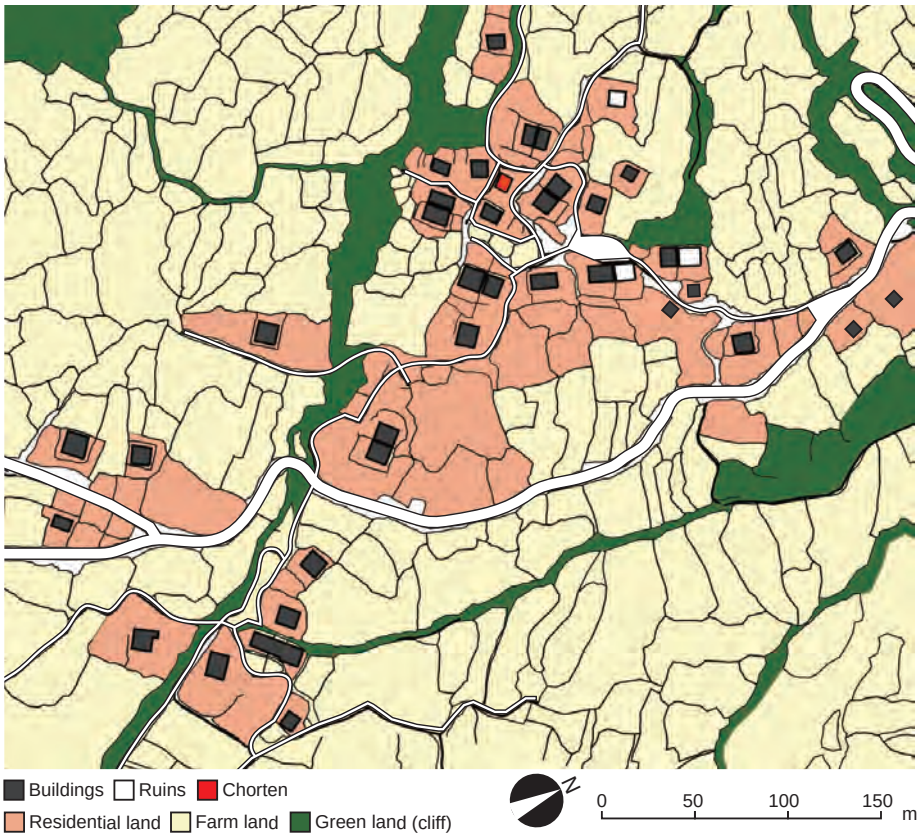
Villages, the subjects of this study, are in western Bhutan and falls within an elevation of 1,000–3,000 metres. The traditional houses in this village are made by combining timber frames with thick walls built of rammed earth. Based on interviews, it appears that some traditional houses were built hundreds of years ago; in this region, they have long been built with rammed earth walls. In one corner of the village, one often finds the old rammed earth walls of abandoned homes. Some of these ruins are venerated as holy places and are even feared by locals, giving a sense of their long history.

Traditional Bhutanese houses are mainly constructed with the following materials:

1. Traditional houses of rammed earth walls and timber frames, as seen in the survey area.
2. Traditional houses that are the same as type 1 in form, but use masonry instead of rammed earth walls.
3. Traditional houses made of organic materials.

Traditional houses with rammed earth walls are limited to the west to central-western area. Thick walls and timber frames are common in temple architecture and represent construction methods influenced by advanced cultivation found in Tibetan Buddhism as a kind of high culture. The topsoil in zones of high elevation is low in viscosity, an unfavorable quality for rammed earth. Thus, traditional houses must be built with two types of masonry.

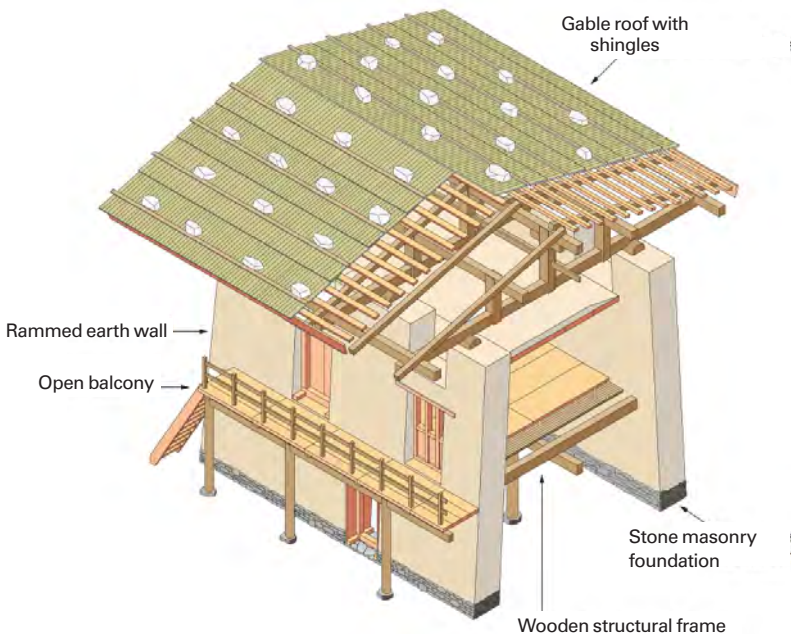
On the one hand, traditional houses in the east match type 2. Despite the soil quality being supposedly unsuitable for rammed earth walls, we cannot rule out the possibility that there were once traditional houses in the east that differed in form from western traditional houses. Few old houses in the region are over 100 years old (nor are there many old temples; most were built between 1960 and 1970). As mentioned previously, if we consider that, until recently, the western influence in this region has been limited, particularly among the common people, then it is probably unreasonable to assume that traditional houses would have been built the same way as those in the west long ago. It is more likely that they were influenced by the traditional houses found in Arunachal Pradesh on the eastern border, or native structures built out of organic



Typical layout pattern of a traditional village in the western central area (Talung Toed, Haa Dzongkhag)

materials and dating prior to the incursion of high culture. Traditional houses built of masonry in Merak and Sakten in easternmost Bhutan are closer to the traditional houses in Tawang District in Arunachal Pradesh than those in the west.

These three types of traditional houses mirror residences that were built by tying together bamboo and wood with rope or bamboo strips, and then had their roofs covered with leaves or shingles. The people living near the southwest border, known as the *Lhop*, reside in raised-floor homes of bamboo and wood. They believe in animism and maintain a unique lifestyle and culture, presumably due to remaining in a remote area without much contact with those around them. On the other hand, in low, central places such as Kengkhar and Zhemgang, there are people who live in bamboo and wooden homes, albeit they are few. However, their religious beliefs and cultural lifestyle are dissimilar from their neighbours, who live in homes made with masonry walls and timber frames. Across the entire eastern central area as well, traditional houses may have been widely built using organic materials prior to the more recent spread of western-style traditional houses.



Structural diagram of a traditional house in the western central area

Traditional house sites and surroundings

The traditional houses in the central-western area that are the subject of this paper are mixed structures of rammed earth walls and timber frames. More recent homes often have two stories, but old-fashioned houses generally have three (or even four) stories. The ground floor is used for raising livestock, while the first floor serves as a grain warehouse, and families live on the second and higher floors. Since these homes are often built on slopes, the back of the ground floor is buried in the ground at medium height; it also serves as a cool place during the summer.

The first floor and above serve as living spaces, and are entered via hinged doors provided on the front and sides of the first floor. An overhanging balcony sticks out outside the door, and is often descended from via stairs placed there. Sometimes, a wide shelf is provided at the front side of the building at the same level as the first-floor ground, so that the door opens onto it. This shelf is made of thick, packed soil, and is supported by joists between the fence of the rammed earth surrounding the dwelling unit and the support posts along its walls. The area underneath this shelf is used as a semi-outdoor space for tying up livestock, doing farm work, and storing equipment. The top of the shelf is an ideal place for spreading out unshelled rice or chili peppers to dry in the sun (an attic could also be used if a cool, shaded place were needed for drying). Thus, the shelf is very convenient for farm work, and may have been installed more frequently in traditional houses long ago.

A door is attached to the rammed earth fence surrounding the dwelling unit, and can be fastened shut. The shelf is often reached by climbing a ladder once getting through the fence, but sometimes direct access from outside the fence is possible. On the other hand, the fencing is not always that narrow, and sometimes contains vegetable gardens or a shed around the dwelling unit. Such fences prevent cows and other livestock from getting in, and are therefore low in height. To build them, stones removed from fields are piled up. Next, wooden boards are nailed to support posts and wound with barbed wire. However, it is common for there to be no enclosures of any kind. As such, how closed off a traditional house is differs depending on the region.

Small masonry structures called lukhang are often encountered in one corner of building sites. These are shrines for honoring creatures living on the land (exemplified by the snake) and are often painted with red stripes.

The vicinity of a traditional house has sheds for livestock or farming tools. While we have often heard that previously, tens of cows might be kept, nowadays most families have just a few. In the past, livestock would be kept on the ground floor of the dwelling unit, but due to health policies advising people to not keep livestock on lower levels, the ground floor is now used as an agricultural work shed. Nevertheless, even now, you might catch calves and heifers living on the ground floor. A simple covered stove is sometimes provided to boil rice bran or to slice vegetables to provide feed for milk cows. Bulls are employed in farm work such as ploughing and tilling, while milk cows are milked to make products such as butter and cheese. Deceased cows are dismembered, cut up into thin strips of meat, and then hung with rope to dry in the sun. In the past, many homes would keep pigs on-site, but this is not a frequent practice anymore. Presently, people can go to town to buy pork and lard, and they no longer need to slaughter pigs. Traditional houses do not contain only livestock sheds on either their premises or surroundings, but rather as many extensions as needed to include sheds for stacking a mixture of grass mulch and livestock waste, and sheds for farming equipment. These sheds have walls made of sun-dried brick (adobe) or loosely tamped rammed earth, use rammed earth walls from old ruins, and are roofed by installing sloped boards or corrugated galvanised iron (CGI) sheets. Firewood is usually stacked on top of the walls.

Large houses have toilets that are wooden boxes overhanging from the first or second floor, with a hole in the floorboards allowing for waste to be dropped down. Notwithstanding, since the number of people who can use this toilet is limited, it is common for residents to go outdoors and use whatever space is available. Today, it is common to have shed-enclosed toilets, a short distance from the dwelling unit, wherein holes are dug into the ground.

Changes resulting from modern development

Modern development in Bhutan started in 1961, causing village life to change dramatically. Electrification began in the 1960s, first with several villages benefiting from power supplied by small-scale hydroelectric power plants built on rivers, and then villages being given solar panels free of charge. The amount of power only provided electric lighting, but it was significant enough to change everyone's lives. In 1988, the Chukha Hydroelectric Power Plant was completed and began supplying electricity over the first power lines, although it took a long time for them to reach many villages. Thereafter, several more hydroelectric power stations were built, power lines spread everywhere, and most villages had electricity by the end of the Tenth Five-Year Plan, around 2013. Bhutanese residential areas are divided into urban and rural areas. Most homes are found in rural areas, where electricity

Traditional house with masonry walls and a timber frame
(Buli, Zhemgang Dzongkhag)

Traditional house built out of organic materials
(Ramtoe, Samtse Dzongkhag)

prices are significantly lower; thus, even residents with modest incomes can access power. For the first time, people (or their children working in urban areas) began purchasing television sets (TV broadcasts began reaching areas outside of urban centres in 1999), followed by kitchen appliances such as rice cookers, electric pans, and hot plates. This represented a great convenience given that previously, wood-burning stoves were used for something as simple as boiling water to make a cup of tea. However, voltage remained unstable, meaning that electric appliances often failed, and power outages were common, requiring the continued use of wood burning stoves.

The introduction of propane gas brought the use of stoves in homes to an end. A propane filling station was built in the capital of Thimphu in 1991, followed by another in Paro in 1998, and even more in other regions today. Empty canisters can be exchanged for filled ones at city filling stations. That said, if people do not have a car, or there are no available bus routes or even roads, they must carry the canisters for long distances over mountain roads, either on horseback or by themselves. Additionally, each household is only allowed to purchase a certain number of canisters, so it is impossible to stockpile much propane. The Indian government keeps inbound prices on propane gas imports low, but this is because of a supply cap. Hence, stoves have been fully eliminated from homes where it is possible to reliably carry and exchange canisters.

About sanitary facilities, let us look at the example of Dopshari Village in Paro Dzongkhag. Here, in 1989, the national government freely supplied villages with materials such as concrete cylinders, cement, and faucets; the inhabitants were able to draw water upstream on rivers, and built several common faucets for use by entire villages. While there are still villages that use these common faucets, some now get water from pipes reaching each household. In 1990, materials such as cement, urinals, and pipes were supplied to build toilets for each household, and engineers were dispatched from Dzongkhag to expand the number of households with toilets by building outhouses.

The old shingle roofs were rapidly replaced with CGI sheets starting around 1980. Logging has been placed under strict national management for the purpose of forest conservation. As such, the government and non-profit organisations (NPOs) supplied each household with CGI sheets for free. Presently, one rarely encounters shingle roofs, even in remote villages. Not only traditional houses, but the roofs of temples and dzong houses also use CGI sheets painted red or yellow. In general, traditional houses are left unpainted, but in places like wildlife sanctuaries, traditional houses are sometimes painted green (or similar colours) to prevent harsh reflections from the sun.

Conclusion

In Bhutan, the comprehensive preservation of traditional village scenery is well managed. Nevertheless, the distribution of villages, their composition, and the configuration of traditional house sites that we see today are completely different from those of 50 or 100 years ago. There are very few written records of Bhutan's history, so buildings and scenery can teach us valuable lessons of how people lived long ago.

Section 2-1 ("The distribution and structure of traditional villages") and Section 2-2 ("The spatial composition of traditional house sites") anticipate future studies of villages from a variety of perspectives and were written with a focus on what the author (Mukai Junko) have seen and heard in Bhutan in the past.

Traditional house enclosure and surrounding structures (Doteng, Paro Dzongkhag)

2-3 The Structure of Traditional House Architecture and Its Changes

An overview of traditional house architecture and the state of research

With their walls made of rammed earth and their roof structure comprising internal beam systems and floors, being made of wood, the historical dwellings of commoners in Bhutan (herein termed "vernacular houses") have a distinct appearance. The traditional rammed earth technique is common today, and rammed earth dwellings are still built in rural areas. It is not clear when such rammed earth dwellings first began to be built, but since rammed earth structures (such as *dzong* and *lhakhang*) are known to have been constructed in the 17th century, they are believed to have first appeared around that time.

Nevertheless, much remains unknown about the history of these traditional rammed earth dwellings. There have been fragmentary references to old dwellings in photographs and paintings in existing literature, but a detailed history of changes in those dwellings is largely missing.

The structural characteristics of vernacular houses

The front of the house

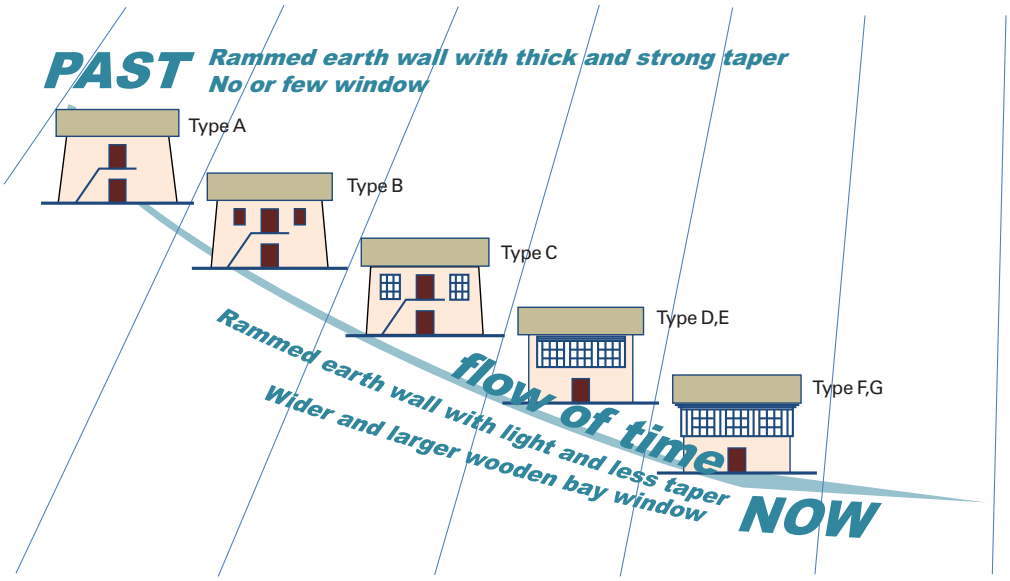
Bhutanese vernacular houses are built facing valleys. This may be attributed to the fact that space opens up in the direction of the valley, which ensures adequate light and bright living areas. The openings in most dwellings thus face the valley. Hence, it is reasonable to consider the side that faces the valley as the front of the building. Most roofs are gabled, and most have the flat side facing the front of the house. As a general rule, the construction of roofs should be width-side front.

Number of floors and floor plans

Such buildings have two or three floors, with the first and higher floors being occupied and the ground floor used as a space for livestock. There is a roof-level floor, a wooden roof structure on top of the rammed earth walls, which is used for storage (the storage barn). In two-storey buildings, the livestock space on the ground floor is generally one room, while the living area on the first floor is commonly arranged into two rows of rooms at the front and back, with a Buddhist altar room and living room at the front, and a living space (such as a kitchen or bedroom) or storage room at the back. In many cases, the kitchen is positioned relatively close to the doorway, while the living space, situated at the back, is used as a bedroom. In three-storey buildings, the ground floor is used for livestock, and the main rooms (such as the Buddhist altar room, living room, and kitchen) are located on the second floor to ensure bright spaces, while the second storey is often used as a living room and storage space for livestock feed.

Wall and opening

It is the rammed earth wall of the main structure that determines the external characteristics of the vernacular houses, however there are no distinctive features in terms of architectural design. The more it was built in the past, the thickness of rammed earth walls is thicker, and the angle of its slope tends to be larger.



Front-facing type and its transition

Various openings (such as small and large windows and doorways) punctuate the rammed earth walls. The walls around the openings or the partitions are sometimes made of a wooden structure, and this type of wall is called *ekra* to distinguish it from the rammed earth walls. Small windows (which appear to be for ventilation purposes) are not made using wood, but are instead narrow, vertical eyelet openings. Ordinary windows have a well-defined structure, with a wooden frame and lintel at the top. While some small fittings are only wooden vertical bars, in general, these doors are hinged to open on the interior side or are sliding doors. Wooden parts of windows are often painted; this serves to enhance the house's design aspects.

Many top floor façades have large wooden windows spanning their entire width, which are sometimes decorated with paint, murals, and sculptures. This architectural element mainly consists of a timber frame structure with multiple windows that usually cantilevers from the wall, which is called a *rabsel*. Indeed, in some cases, the windows will extend not only across the front, but also the sides. There are three patterns for the placement of the wooden elements of these windows: (1) a type that is affixed on the inside of the rammed earth wall; (2) a type of window that aligns with the rammed earth wall; and (3) a type of window that protrudes from the panel wall.

The ground floor for livestock has a single swing door entrance in the centre of the front of the building; some wider houses have two such doorways. It is common to have a separate doorway to access the house on the first floor. The fittings are wooden, with thick pillars standing up, and the frame is made by connecting stiles and rails made with thick timber of about the same thickness, with a single, thick plank door inserted by scraping a shaft hole into the inside of the upper and lower wood.

Roof and roof structure

The roof's shape is likely based on a gabled roof, where both sides spread outward at an angle from the ridge. This may be due to the fact that since the roof was originally a shingle roof—the ridge of which could not be finished simply by covering the opposite side of the roofing panel—it was difficult to add flashing to it. Corrugated galvanised iron (CGI) sheets have been imported in recent years, making it easier to build ridges. Hence, the number of hipped roofs has increased. As Bhutan experiences strong winds, it is considered that there is a structural weak point where the gable-side of the roof is wide open; the number of hipped roofs has supposedly risen to avoid this. The roof structure is such that beams pass over the rammed earth walls of the roof-level floor, above which struts support the ridge beam and purlin. Rafters are hung over them, over which roofing boards are placed at intervals and shingled with split panels. Examples of the use of thick round timber in bundles can be found in older houses. Their members are not connected together using pegs or tenons, but are characterised by the use of wide struts to sandwich the beam and purlin. Holes are drilled into the struts and bound using horizontal timber, but not wedged together.

Changes in vernacular houses

The exact periods in which Bhutanese vernacular houses were built is difficult to ascertain, given that there was no practice of record-keeping at the time of their construction. On the other hand, by surveying architectural traces, it is possible to determine how each of these houses has changed through restoration to the original state. Below, we outline changes in vernacular houses from two perspectives: changes in openings above the first floor, (mainly in the front-facing windows), and changes in room layouts accompanying increased floorspace.

Changes in openings

The forms of opening seen in first and second-floor façades can be classified as follows:

- **Type A:** Only a doorway on the front face, and no windows
- **Type B:** A doorway on the front face, with small vertical windows adjacent to it
- **Type C:** A doorway on the front face, and nearly square or horizontal windows adjacent to it
- **Type D:** A doorway on the rear or side, with wooden windows inside of the rammed earth wall on the front face
- **Type E:** Bay windows that open up in front of the rammed earth wall on the front face of the building

Type F: A continuous window that runs across the front and part of the side

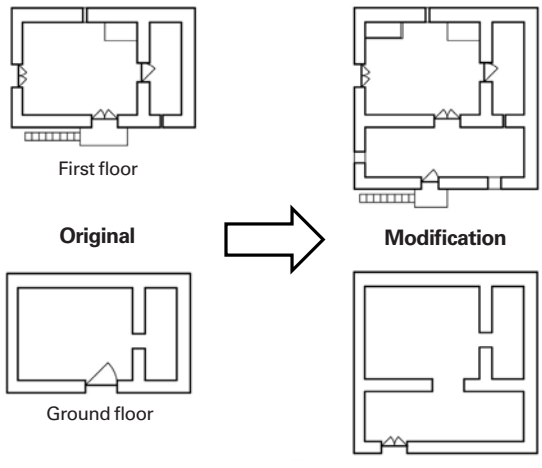
Type G: A continuous bay window running across the front and sides (there are two types, opening either on one side or both)

The front-facing type, considered to be the oldest, is an enclosed type (Type A) with only a single doorway, as observed at the Lham Pelzom House (3-3-1). The Galem House (3-1-4) was a small, two-room dwelling when it was built, with only a sliding door entrance opening at the front (Type A) but was later extended to the front, causing the house to take on its present shape with bay windows on both sides (Type G). The Tandin Zam House(3-3-2) also has one doorway in the centre of its front. Although some windows have been modified, it is clear that when it was built, it had small vertical windows opening in two points on the front of the second floor (Type B). The Ugyen Choden House (3-7-1) has wooden windows across the entire width of its front face (Type D). However, the ends of the woodwork are unnatural; when it was built, a rammed earth wall also surrounded the front face (Type A or Type B). The Chencho Pen House (3-4-2) has window openings on its front as well as its sides (Type F). That said, the bay windows were added later, and when they were built, the house had an enclosed form with a small window openings (Type B).

It is structurally disadvantageous to create large openings in rammed earth, which forms the main structure of vernacular houses. The development of carpentry tools and processing techniques are essential to developing wooden construction. It is natural to assume that the openings of Bhutanese vernacular houses had to be small in the past due to structural and technical constraints. Moreover, if we look at the process of economic and technological development, it is easy to imagine that dwellings with large amounts of wood in their structures would have become status symbols for their inhabitants. We can also infer societal development has played a crucial role in the expansion and sophistication in the quality and design of the openings of vernacular houses. In other words, the types of openings have changed over time from Type A to Type B, to Type C, to Type D, to Type E, to Type F, to Type G. From a functional viewpoint, within the limitations of the primary structure of vernacular houses of rammed earth, these houses started out as dark spaces enclosed by rammed earth walls, and have steadily transformed in order to achieve brighter living spaces.

Changes in floor plans

It is typical for vernacular houses to have been frequently remodeled or extended in response to changes in living conditions. Expansion through the addition of rammed earth walls can be identified as a general trend in extensions, with remodelling discerned through the architectural survey. The purpose of extending a house from two to three stories was likely aimed at improving the quality of one's living space by adding a third storey



An example of type G frontside modified from type A (3-1-4 Galem House)

with many windows, leading to an enclosed two-storey structure. Where the first floor living room is extended to the front or side of the house, in many cases, these new spaces are used as altar rooms and living rooms. Since the old altar was sometimes left in the storage room or on the roof, there may have been a time before the addition of an altar room where the altar would be placed in the living room. When extending to the front, although the front-facing wall on the ground floor protrudes from the front to create a layout with two rooms at the front and back on the ground floor, in some cases, the first floor is supported by pillars. As such, rammed earth walls are not featured. This would have eliminated the need to expand the room used for livestock on the ground floor, as well as providing more space for work at the front. Only an extremely small number of one-storey vernacular houses have been identified. At present, there are no examples of single-storey dwellings that have been extended to two or more stories.

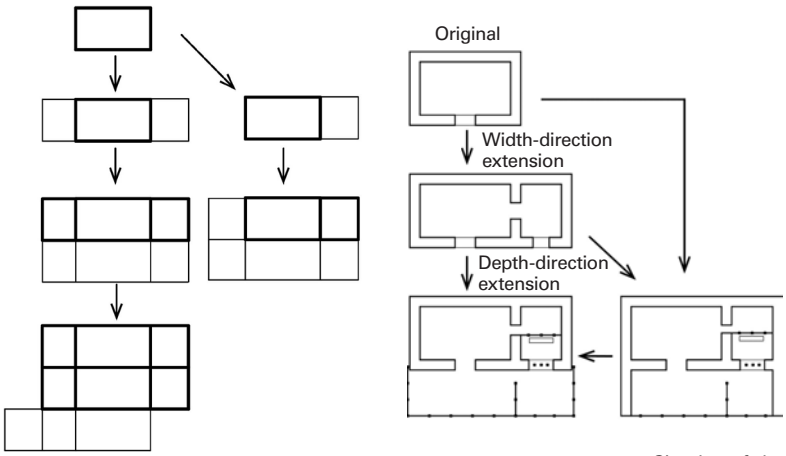
Living rooms in some older dwellings may have taken on the form of single-room living space (including the bedroom and kitchen) on the first floor. The Phub Lham House (3-3-4) is a two-storey dwelling in which the first floor is now divided into two rooms by a wooden partition. However, differences in the coverings of soot on the pillars and ceiling show it was an unpartitioned, single room when it was built. The Wangmo House (3-8-1) is similarly thought to have once been a two-unit long house. Even today, each unit still has a single living room. The Galem House (3-1-4) was a small, two-storey dwelling when it was erected, with two rooms on the first floor, a combined kitchen and living room, and an adjoining room.

As described above, the transformation of floor plans can be summarised as the switch from single rooms to multiple rooms in a single row, to multiple rooms in two rows, to multiple rooms in three rows, with the layouts of vernacular houses having shifted to increase the number of rooms (mainly living rooms) to improve the living environment. The development of the altar room is particularly remarkable; it is from this development that we can infer that faith has always held an important place in daily life.

Conclusion

Although precise construction dates for these examples remain unknown, the transformation process of vernacular houses bears significance from historical and cultural angles, and clearly indicates the ideas that everyday Bhutanese people held about their living spaces in each historical period. The Bhutanese people can experientially learn about the values held by people in the past and the changes in those values from these vernacular houses. This is essential for the proper preservation of Bhutanese history and culture. Moreover, one could learn about the history and importance of the formation of the Bhutanese people as they are today, providing them with a strong sense of identity.

Chencho Pem House (3-4-2)



Sketches of plan transformation process

2-4 How to View and Examine Architectural Heritage

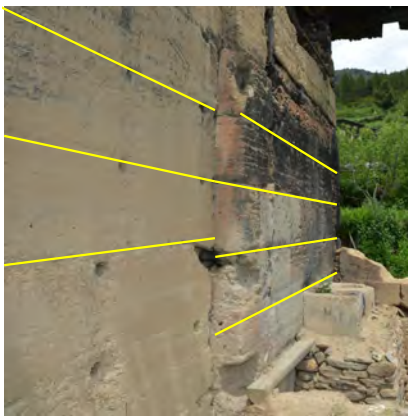
Setting the areas and subjects of the survey

In order to gain an accurate and comprehensive picture of traditional buildings, it is important to define the scope of the survey and the subject matter to be examined. This text covers four districts (*dzongkhag*)—Thimphu, Punakha, Paro, and Haa, examining the traditional house buildings constructed with rammed earth walls. The two main reasons for narrowing down the areas to be scrutinised are as follows:

First, by focusing on a specific area, it is possible to obtain a clear picture of that area's characteristics. Topography and climate vary by region; buildings' features vary accordingly, so there may be striking differences in the traits of traditional buildings among regions.

Second, in order to create an architectural chronicle, we must focus on a specific region to ensure accuracy. It is often impossible to compare buildings from the same period but in different geographical locations, as the shapes of traditional houses differ. In contrast, in places where there is a certain degree of consistency, the shapes of buildings and the changes in those shapes tend to show similar trends, making it possible to identify certain relationships between the time period and shifts in traditional house architecture.

Regional surveys have already been established in Japan to conduct architectural surveys of traditional houses and villages; this method can also be applied to traditional wooden buildings in Vietnam and other Asian countries. Although the content of this book is limited to regions in Western Bhutan and traditional houses constructed using rammed earth, the same technique can be used to analyse traditional house architecture in other parts of Bhutan.



Horizontal streaks on the rammed earth wall surface

Characteristics of traditional house architecture in Western Bhutan

Before describing the method of surveying architectural heritage, I would like to briefly describe again the features of traditional houses constructed using rammed earth as seen in Western Bhutan. Rammed earth is a method of piling up earth and compressing it into layers; the elements of construction (such as height and thickness) vary depending on the date of construction.

One easily understood yardstick is the thickness of the layers of rammed earth, which can be regarded as a certain unit of measure for each building. The horizontal streaks on the exterior wall surface are traces of this, and strikingly reflect the methods of the people involved in their construction; thus, these streaks are apt for presenting aspects of the time period in which the houses were built. Parts that have been added or demolished during subsequent renovations can also be identified from traces such as differences in layer height, wall thickness, and unnatural notches, forming important clues to grasping the history of modifications made to a building.

Next, let us examine the broad trends in traditional houses, which in Western Bhutan are generally built with a two- or three-storey main structure with rammed earth walls, and a wooden roof above. Two characteristics that can reveal the age of traditional houses are the angle of the inward slope seen in rammed earth walls, and the number, shape, and size of doorways and windows.

The angle of the slope of rammed earth walls tends to be smaller for buildings erected in later periods, and larger for those built further in the past. Older buildings also have thicker walls, giving them a sturdier appearance at first glance.

With regard to the shape and size of doorways and windows, older buildings tend to be more enclosed with fewer windows, while newer ones tend to be more open, with more and larger windows. However, care is required when determining the period of construction since many buildings that were enclosed when they were built were renovated in later years to make them more open. Today, many traditional houses have *rabsel* bay windows running across the front and

sides of the building, though many such houses look this way due to renovations.

Survey method

The process of surveying architectural heritage can be divided into two stages: blanket surveys and detailed surveys. The first phase (the blanket survey) is aimed at obtaining a comprehensive understanding of the target buildings in the target area, and involves a thorough inspection of the site and the selection of candidate buildings for detailed surveys based on their outward appearance. The second phase (the detailed survey of buildings identified in the blanket survey), which encompasses a survey of the building's condition, entails screening for traces of modification, interviewing residents, and photographic documentation. The purpose of detailed surveys is to accurately record the building's current condition, paying close attention to traces of modifications that remain, and analysing them extensively to discern the building's physical shape at the time of construction and the history of modifications. This is because each period's societal background and lifestyle underlie the building's form at the time of construction and subsequent changes made to it; architectural heritage possesses both cultural and historical value in testament to this.

Chronological indicators

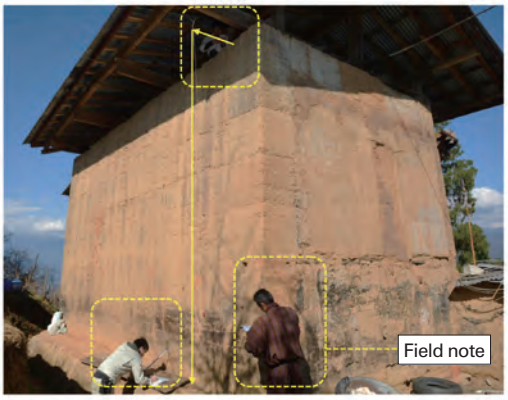
The accumulated findings of examining individual buildings through detailed surveys allow for the creation of a chronology of buildings' relative ages within a region. Through this chronology, by identifying buildings with features from each time period, it becomes possible to choose buildings to prioritise for conservation as cultural heritage. To determine their absolute age however, we must know the specific construction date of at least one building.

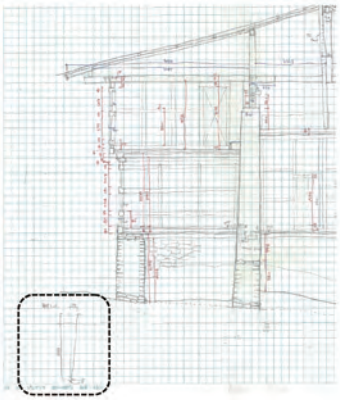
Measurement survey

The measurement survey primarily consists of creating floor plans and a cross-sectional view. Creating a bird's-eye floor plan facilitates gathering information about a building's size and use by recording its size and the arrangement of rooms within. Cross-sectional drawings can capture the building's structure, as well as record the methods used to construct walls, pillars and ceilings, and the roof frame construction.

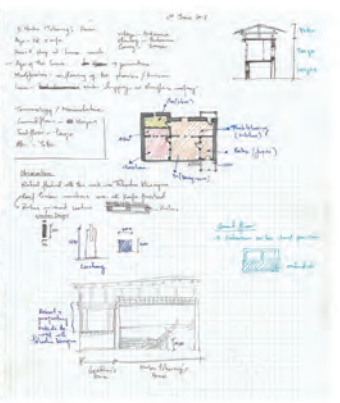
Interviews

Interview surveys ask people connected to a building (such as residents) about when the building was con-





Measurement of the slope's angle of the rammed earth wall



Interview on house owners

structed, its folklore, and when and how it has been modified. That said, it is necessary to consider the possibility of the interviewee having confused memories or having misunderstood, such as in confusing the date of a modification with the date of construction.

Photography

There are several points to consider when photographing. It is critical to be conscious of capturing the entire building, and to pay close attention to details such as eaves and joints in woodwork. There should be a minimum of two shots of the interiors of each room, preferably showing the walls and fittings on each side. Care must also be given to areas that are difficult to photograph, such as floors and ceilings, as well as to distinctive individual designs and traces of modification (described below). The recent introduction of 360-degree cameras has made it easier to take pictures of normally difficult to capture areas such as ceilings and floors, which is also useful for confirming the numbers of joists and floorboards at a later stage.

Trace survey

Lastly, trace surveys help to infer changes in buildings over time from the physical aspects etched into the building. Because of these surveys' particular importance as a method of surveying cultural heritage, in the next section, we present examples of specific traces observed in traditional western Bhutanese houses.

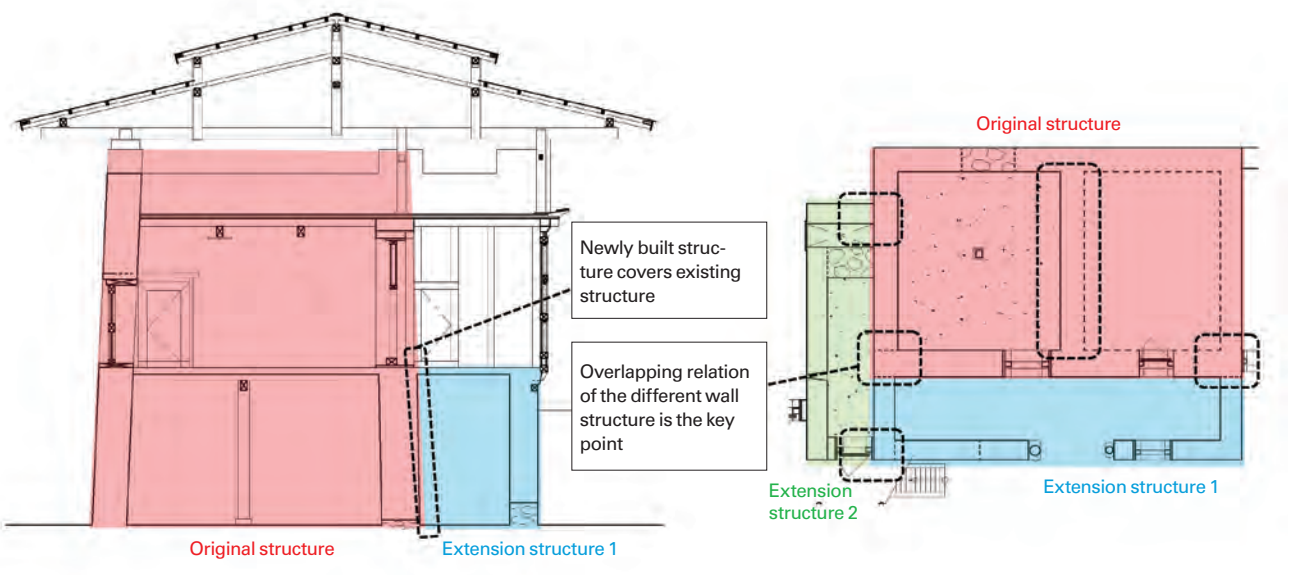
Examples of traces observed in traditional Bhutanese houses

There are seven major patterns of traces commonly observed in traditional Bhutanese houses. The first involves signs of additions to rammed earth walls, where new rammed earth walls have been added to the original rammed earth walls. In addition to the cracks that appear between old and new walls when rammed earth walls are added to, it is possible to determine the relationship between the front and rear of the building from differences in the slope and manner in which it is covered.

The second pattern (which also relates to additions to rammed earth walls) entails cases where it is possible to establish that walls were erected at different times due to differences in the number or thickness of layers. As a general trend, thinner walls tend to be newer additions.

The third pattern relates to the difference in the structure of foundations; even if the structure is the same stone masonry, if the stones are of different sizes or shapes, or if the height of structure itself is different, it can be inferred that a foundation was constructed at a different time compared to another foundation. If the foundations differ—despite being connected to the rammed earth wall above—it is possible that the wall was modified by adding a foundation and rebuilding it.

The fourth pattern relates to changes in floor height



Additions of rammed earth walls

due to additions made over the rammed earth walls. Besides the difference in layers between the part of the wall with rammed earth added to the top and the old wall, the wall is thinner on the inside, and is easily distinguishable from the old wall by the difference in thickness.

The fifth pattern entails a line of small holes in the exterior of the rammed earth wall, which are traces of joists used to stretch the floor to the exterior. This is a vital clue to the evolution of floor plans, as it shows that the overhang of a latrine was fitted, or that an overhang in front of an opening used as a doorway was once attached.

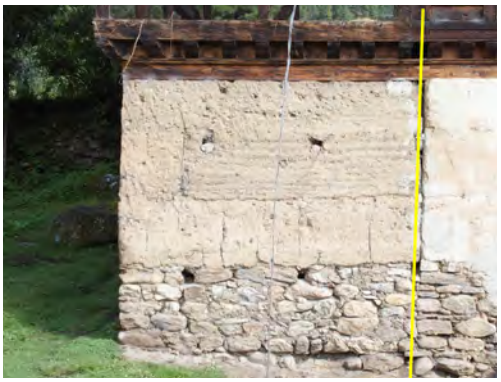
The sixth pattern involves traces of modification seen in openings; in many cases, lintels or front-side step member attachment points and shaft holes reveal that what is now a window was once a doorway.

The seventh pattern relates to interior partitions. In addition to situations where inconsistencies in style between the floorboards and partition make it possible to deduce that the partition was added later, if there are impressions left in the floorboards or differences in the appearance of fittings, it is possible to determine how the partitions changed over time.

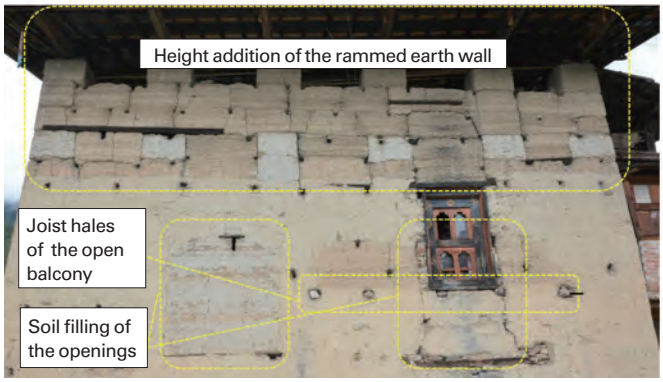
In the survey, we documented additions to rammed earth, as well as traces of modifications to (and work on) floors, ceilings and openings, and workmanship in a field book. We considered these holistically to compile a history of modifications. It is desirable to conduct such trace surveys and considerations for the history of modifications while in the field whenever possible, as it is possible to carry out a re-examination in situ.

Conclusion

In traditional house construction, there are numerous examples of exceptionally complex modifications (such as multiple extensions, or two buildings being merged into one, etc.) in response to changes in living conditions. Although it is not always possible to determine all such changes, in the course of surveying historical buildings, it is important to record and consider to the greatest extent possible the objective information that has built up within them and aspire to create a system that transmits this information to the next generation.



Deference of foundation structure



Traces on rammed earth walls

Traces of modification in openings

Additions of interior partitions

VERNACULAR
HOUSES in Bhutan

CHAPTER

3

ARCHITECTURE

ARCHITECTURE

3-1 House with Special Background

1

Am Bokom House

DATA

Dzongkhag
Thimphu

Thromde
Thimphu

Village
Langjophaka

Settlement location
riverside

Settlement pattern
urbanised

Coordinates: 27.4925, 89.6384

1 Side view (from southwest)
2 Back side view (from northeast)
3 Entrance of the west side

Location and summary

This is a large residence in a district that stands on a slope on the northern edge of Thimphu city; it faces Tashichho Dzong to the southwest directly across the river. It is said that Princess Ashi Wangmo, daughter of the first king of the Wangchuck royal family, Ugyen Wangchuck (1862–1926, enthroned 1907), had the residence built for her half-sister from a different mother, Ashi Bidha. Ashi Bidha's mother married a chamberlain who was a relative of the royal family, and the current owner is said to be their 7th generation descendant. The building is four storeys, facing west, with a hipped roof of corrugated iron. As for the plane scale, the overall length of the ground floor's outer wall is 11.8m wide × 10.9m deep. As for outward appearance, the ground and first floors have rammed earth walls totally, while the second and third floors have *rabsel* windows all over the south and west sides, as well as on the west end of the north side. On the east half of the north side, there is an overhanging section made of reinforced concrete and brick; the first floor and above are supplied with plumbing such as lavatories, and the east side of the second and third floors also have wooden parts jutting out, such as old lavatories. The surface of the outer rammed earth walls is coated with a white plaster finish. In front of the building, there is a yard that is narrow in depth surrounded by rammed earth walls with a gate on the north side, but at present, the wall in front of the ground floor's main entrance has been removed, so the building can be accessed directly.

The composition of each floor

The interior of the ground floor is currently divided with rammed earth walls into five rooms. The central front

door leads to the front room, which has a staircase leading to the upper floor on the immediate left. Another doorway at the back of this room leads to a large storage room; however, a feeding trough runs along the entire length of the south wall, indicating that this was originally a livestock shed. The front room has cement mortar floors, while the back room has earthen floors. The joists for the upper floor are exposed. There is also one room south of the front room, and two rooms, east and west, south of the back room. None of these three rooms has an entrance on the ground floor; all of them are granaries that can be entered from a ladder that descends from the first floor.

The first floor also comprises five rooms, but their arrangement is quite different. It is divided into three sections with rammed earth walls in the same position as on the ground floor, and further the northeast section (above the back room of the ground floor) is divided with a wooden pillar-exposed partition wall running parallel to the north outer wall. The north room is a wide stairwell (with stairs from the first floor in the northwest corner and stairs to the second floor in the northeast corner), and there is a lavatory of reinforced concrete projecting out from the east end of the north wall. This lavatory is new including the entrance fittings. Excluding the passageway, the greater part on the east side of the east centre room is sectioned off with a partition, covered with a ceiling and used as a bedroom; however, all this is recent work using plywood. The southwest and southeast rooms are used as food storerooms, and the two rooms are connected by an opening with no fittings. In three spots, portions of the floor have been made into trap doors leading to the granaries on the ground floor described above: 1) in the northeast end of the southeast room and in front of the installed rice bins, 2) in the south end of the southwest room, and 3) in the southwest end of the southeast room. For each room on the first floor, the joists for the upper level are exposed and the floor is earthen; however, the floor above the granaries has a unique structure. Halved round timber logs are lined up tightly with no crevices facing down on top of the joists, and covered with earth. The floor is 25–30cm thick. Such a structure may contribute to the prevention of stealing or grain damage from pests such as mice. The wall that separates the southwest room from the stair hall next to it to the north has a vine lathing base, but it appears to be as thick as a rammed earth wall, likely for the same reason.

On the second floor, all the partitions are wooden; most are plaster walls with a vine lathing base supported by wooden pillars, but a portion is plywood. At present, the space is divided into six sections of almost equal size, with the northeast section further divided into two rooms, east and west. This floor is the main living area; the stairwell room at the northeast end connects to the kitchen adjacent to the south, and from there to the living room west of the kitchen. The north and south of the living room are bedrooms, and the southeast is the altar room. The northeast corner of the altar room is sectioned off for the Buddhist altar; however, the fact that the altar does not face the front of the building is very unusual. The fact that the *rabsel* windows extend all the way to the east end of the south wall was also likely planned in coordination with this. North of the kitchen, there is a lavatory of reinforced concrete jutting out from the outer wall, and in the altar room, a wooden storeroom (formerly a latrine) projects out from the east wall. Adjacent to north of this storeroom, there is a large outdoor balcony which extends to the north end of the east wall; there is a staircase here that leads to the third floor. The interior of the second floor was recently renovated. Most of the wall surface and ceilings are made of plywood, and although the floorboards are composed of original materials, they have been reinstalled using round nails. The kitchen also has a tiled sink and range stand, and based on the present setup, it is impossible to surmise what the original furnishings such as the furnace may have looked like.

At present, the third floor comprises nine rooms, including a corridor-like space. However, at the time of investigation, the only room in use was the living area in the centre of the west front side; all the other rooms were under renovation.

Most of the materials for the attic space are new; it appears that the roof was renewed entirely at the time when the current hipped metal roof was installed.

Considerations for restoration to the original state

The rammed earth walls bear no clear traces of modifi-

cation; however, based on family status and information that has been handed down regarding the estimated date of construction, it is highly likely that the outward appearance when it was first built is similar to its current form.

On the ground floor, the south partition wall of the front room appears to be later work; it is believed that this room was originally longer horizontally, taking up the entire width. The door between the front and back rooms is also later work, so it is clear that the space from the front room to the back room was once connected.

On the first floor, other than the plywood partition in the east centre room, there appears to have been no particular changes to the layout.

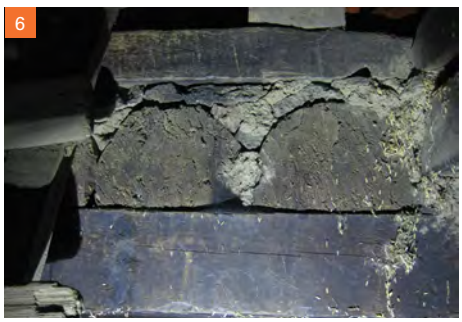
On the second floor, other than the plywood partition wall between the west centre room and the northwest room, all the partitions appear to be plaster walls with a vine lathing base supported by wooden pillars, including the area between the kitchen and the stairwell that has been converted to plywood. Although the layout when it was first built is unclear, it is believed that the layout has been similar to its present appearance since the intermediate period. In addition, according to the present occupants of the house, prior to the renovations, there were triple openings between the kitchen and the living room.

The northeast portion of the third floor was originally a semi-outdoor space with an earthen floor, and at the attic level, it appears that there were four living rooms lined up along the west and south faces.

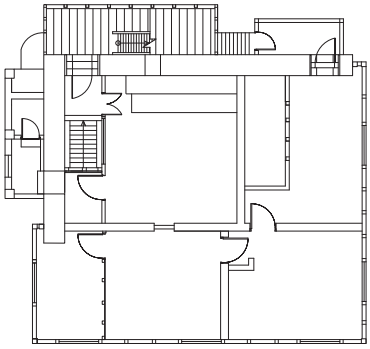
A 1998 photo shows the building with a gabled, stone-weighted shingle roof.

Conclusion

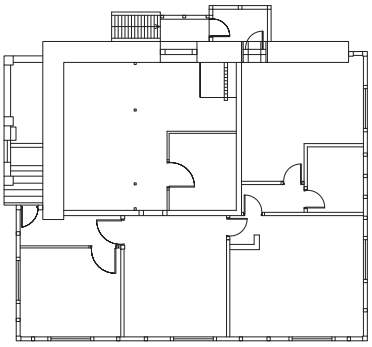
Due to urban expansion, the residence is now surrounded by medium-rise reinforced concrete housing and has lost some of its previous conspicuous presence; however, it is still one of the most ancient and venerable residences in the city, and can be seen as typical of a residence for the nobility. Based on the fact that the *rabsel* windows of the upper floors extend across the entire south face, as well as the position of the south-facing altar room, it is possible that the building was designed to face Tashichho Dzong. Other unique architectural features of this building include the multiple sturdy granaries, the fully equipped independent indoor plumbing which reaches the upper floor, and the existence of several living rooms on the third floor. In particular, for the second and third floors, how each room was originally used is a matter of considerable interest. Although there have been several modifications in recent years to the upper floors in particular, one can still get a good sense of the former structure. This is a valuable historical building in the capital, with a precious history. (Tomoda Masahiko)



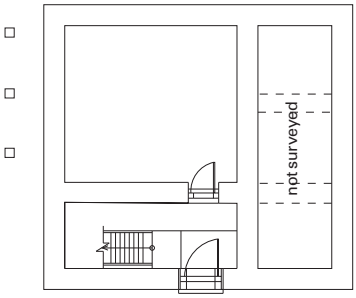
4 Stairway of the front room on the ground floor
5 Entrance from the southeast room of the first floor to the ground floor granary
6 End surface of the floor members above the granary



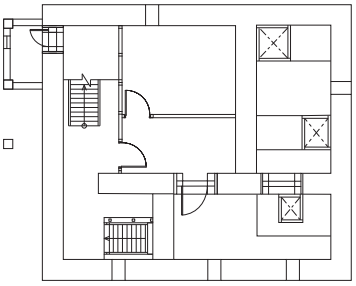
Second floor plan 1:300



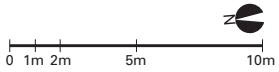
Third floor plan 1:300



Ground floor plan 1:300

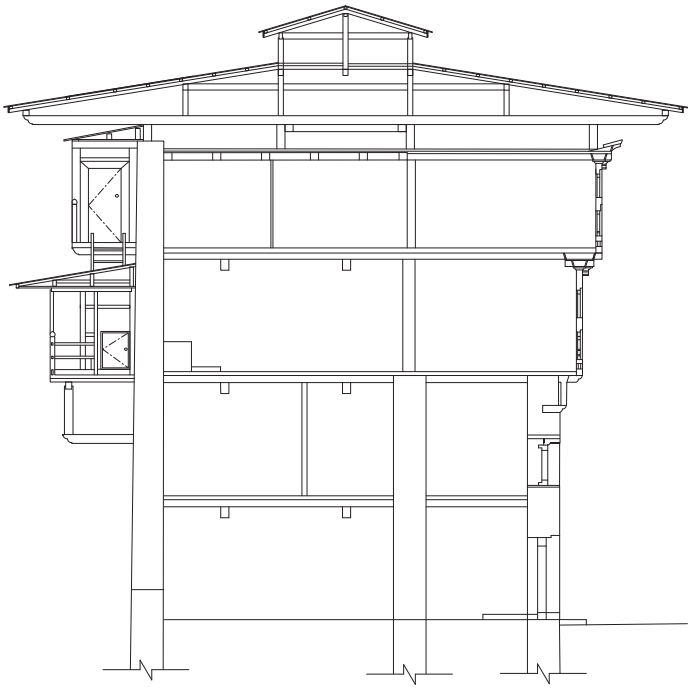


First floor plan 1:300



Altar room on the second floor

Distant western view before the renewal of the roof structure
(from west: Photo by Saito Hidetoshi, February 1998)



Cross section 1:200

ARCHITECTURE

3-1 House with Special Background

2

Dechen Wangmo House

DATA

Dzongkhag
Thimphu

Gewog
Mewang

Village
Wangsisina

Settlement location
tableland

Settlement pattern
dispersed

Coordinates: 27.3523, 89.5710

1 Distant view (from north)
2 Whole view (from southeast)
3 Front view

Location and summary

This is a large residence built independently on a plateau at the end of a ridge that overhangs the left bank of the Thimphu River, about 7km upstream from Chuzom. According to the owner, Druk Tenzin, the nineteenth *desi* (prime minister) acquired it as his residence in 1788, and three generations of *desi* lived there until the beginning of the 19th century. If this is true, the building dates back to the 18th century. The owner currently operates the building as a guesthouse with the name "Wangsisina Farmhouse."

The west-facing main building stands in the north-central part of the site, surrounded by walls of slate-shingled, rammed earth; the building's front and back are connected by a stone-paved yard on the southern side. To the western side of the front yard is a wooden annex with a slanted roof, with a gate in the middle. The eastern side of the rear yard also features a structure with a slanted roof, at the north end of which is a side gate; a stupa is enshrined in a central room between two rammed earth storage rooms.

The main building is a three- storey structure with a gabled, corrugated iron sheet roof, with total ground-floor exterior wall dimensions of 14.7m in width and 11.3m in depth. With the exception of the bay-window style *rabsel*, which runs from the front face of the second floor to the front ends of both side faces, the rammed earth wall is covered with white plaster, and the eastern and southern faces of the second floor have highly decorative attached parts across almost their entire widths, while the northern side of the second floor has an open balcony and an overhanging latrine. The building has one entrance slightly to the north of the centre of its west face, which is almost

exactly opposite the main gate.

The composition of each floor

The basic structure of each floor is the same, separated into four rooms in a grid by rammed earth walls of the same size.

Entering through the entrance on the ground floor, one finds the northwest room: its flooring is solidified earth, and only the entrance leading from the interior of the building entrance to the stairway on the northern side has stone paving. The ceiling is a timber joist ceiling, which, together with the plastered white walls, creates an entrance hall-like space. From here, doorways lead to the southwest and northeast rooms. The three rooms (including the southeast room which is connected by a narrow opening to the southwest room) were used to store grains and animal fodder and feature round log joists and an exposed fascine. The opening between the two rooms in the building's southern half was clearly made smaller in recent years, and the windows at the rear of the two rooms in the eastern half show traces of closed-up doorways. It is unclear whether this was its original form when it was built, although apparently there once was direct access to the two rooms in the eastern half from the exterior. There are mangers built into the north and south walls in the northeast room; this is presumed to have been a livestock shed.

The first floor is a storage space. The northwest room (which is connected to the upper and lower floors by staircases) is the front room, with the path of flow leading, as on the ground floor, from here to the northeast and southwest rooms, and from the southwest room to the southeast room. Only the northwest room has a wooden floor, white plaster on the walls, and a neatly finished ceiling. The other three rooms have earthen floors, with large rice chests attached near the walls (only traces of this remain in the northeast room).

The second floor contains the living area, the present layout of which is rather complex. However, taking a broad view, the southern half is for ceremonial occasions, while the northwest and overhang on the eastern side are for daily living activities, and the northeast is a kitchen space. The staircase from the first floor leads to the east end of the northern side of the northwest room; this corner is surrounded by the *ekra* walls to form a stairwell. There is a doorway to the living room to its southeast, but the wood is new. The room seems to initially have had only an L-shaped partition wall surrounding the staircase. Currently, a wooden wall connects to this wall, running to the west exterior wall, on the north side of which is a small bedroom. However, this obviously is a result of recent modifications, and the entire northwest section can be restored to its initial state as a single room. This is connected to the kitchen in the northeast section by a wide opening with a central pillar, but at the north end of this partition wall in front of the stairwell there are signs of a closed-up wall (the north face of which is used as a storage on the kitchen side) what may have been a doorway when it was built. The kitchen has two furnaces at the northern end of the east wall, surrounded by earthen flooring, while the rest of the kitchen has wooden flooring. There are narrow doorways on the exterior walls of the northern and eastern sides. From the degree of weathering, both appear to have been in place for a long time, but the original fittings have been lost. There is a doorway at the eastern end of the south wall of the living room, which leads to an altar room in the southwest section. The eastern side of the altar room has a tri-

4 Northeast room on the ground floor (mangers on the left)
5 Northwest room on the first floor

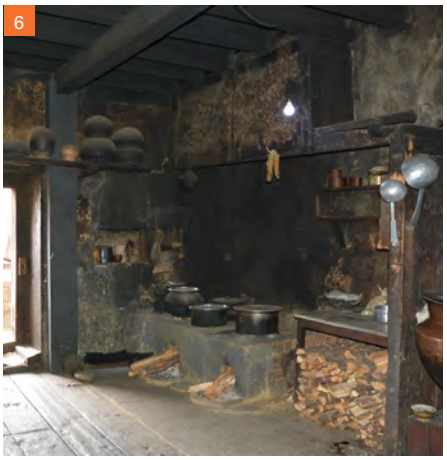
ple opening with carvings in the centre of the rammed earth wall below the ridge, single door entrances at the north and south ends, of which the first two lead to the altar room and one at the north end leads to a storage room behind the altar. Based on the condition of the wood, only the doorway at the south end is old. The other openings, along with the wooden partition wall around the altar, are later work. The interior walls of the altar room are covered with vivid Buddhist paintings, which are also very new. There are doorways on the south exterior walls of the altar room and storage room, respectively, which lead to an overhanging room divided into east and west. This overhang consists of newer wood, but the entrance on the altar room side (at least) is thought to have existed for a long time. There is a doorway on the east exterior wall of the storage room that also leads to another overhang; this is considered to be old as well. The overhang on the eastern side is divided into three rooms, the central one being a stairway to the attic, while the north and south rooms are bedrooms; all of these were rebuilt in recent years. The wood of the outer corridor and the latrine on the north face is newer.

In the attic, a ceiling is set above the beams to create an interior below. Although its entirety is separated into five rooms by the *ekra* walls, the eastern half (with earthen floors and a slatted ceiling) is fairly old, while the western half (which contains a wooden floor and ceiling) appears to have been converted to an interior more recently. Sliding doors are built around the front-facing perimeter above the second-floor bay window, and there are two openings in the centre of the western side that lead outside. The roof beams, roof struts, and interconnecting members of posts are all made of older materials, while the rafters and other members above them are composed of more recent materials.

Considerations for restoration to the original state

There is an old photograph of this building taken from the northeast side, which differs from the building's present form in that the second-floor overhang is walled off on the northern side, while the eastern side is an open balcony. Moreover, there is no long support pillar currently propping up the overhang on the eastern side. It is not known when this photo was taken. That said, in this photo, the roof is already an iron sheet roof, and the step in the middle of the two roof slants is the same shape as at present.

The *rabsel* bay window on the front side of the second floor and attic space was likely changed into its current form through the removal of the rammed earth wall that existed there when the house was erected, since the edges of the rammed earth wall that connect to the *rabsel* have been disturbed. It is unusual for the east-west partition wall (perpendicular to the ridge) to be made of a rammed earth wall in the western half of the second floor; there is a high likelihood that when it was built, all the exterior walls were rammed earth, as evinced by the pillar-shaped, rammed earth structure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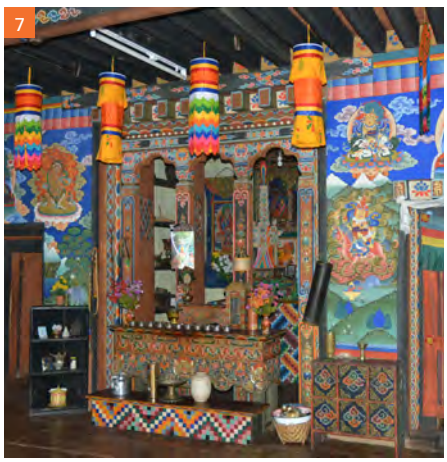

7

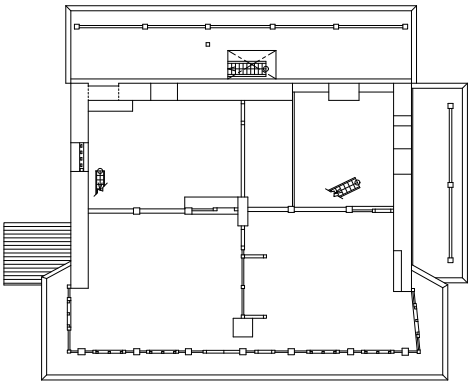

8

6 Kitchen on the second floor
7 Altar room on the second floor
8 Northeastern view of the past (from northeast, date uncertain)

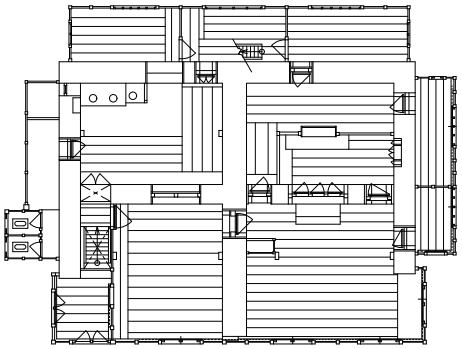
that remains directly above it. Even among the openings in the partition walls in the second-floor interior where the wood is newer, there are disturbances on the edges of openings in the rammed earth walls. Excluding these subsequent modifications, the floor plan of the second floor (from when it was built) can be restored to its original state in almost the same configuration as the first floor. In light of similar examples, there was likely a simple wooden overhanging terrace attached to the front face of the second floor.

Conclusion

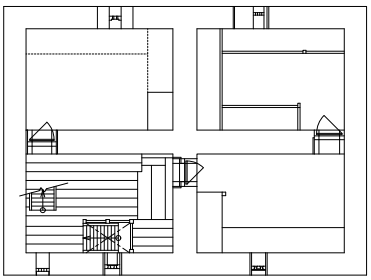
The number of examples of rammed earth traditional farmhouses in their original style with a two-by-two layout is extremely low. Within the scope of our surveys to date, we have identified the only such example upon excluding structures of the row houses. In addition to the building's complete exterior and size, the flow of movement from the exterior to the top floor is configured to be entirely within the building, clearly separating it from other rooms. With its consideration for receiving guests, the building exhibits the characteristics of a high-class residence. Given its highly enclosed architectural structure, it seems very probable that, as legend has it, this house dates back to the 18th century. It is well-preserved and constitutes a valuable piece of heritage. (Tomoda Masahiko)



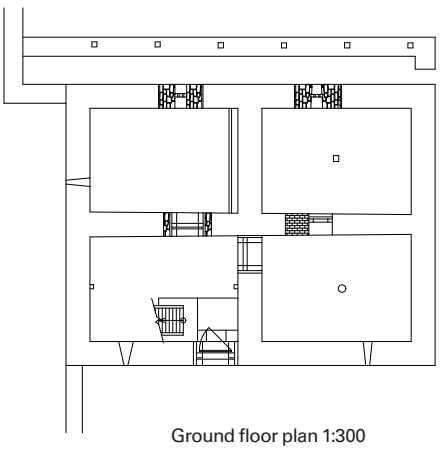
Third floor plan 1:300



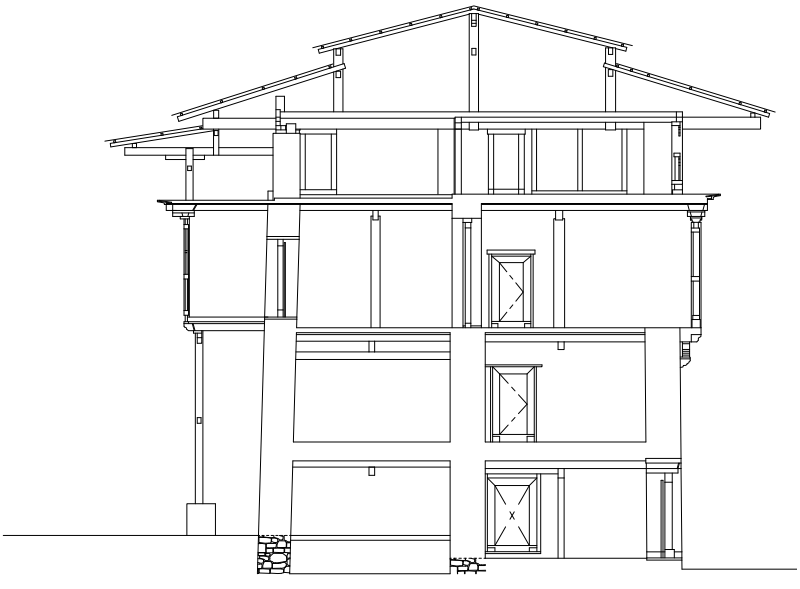
Second floor plan 1:300



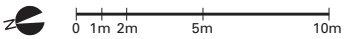
First floor plan 1:300



Ground floor plan 1:300



Cross section 1:200



ARCHITECTURE

3-1 House with Special Background

3

Kinley Dema and Sherub Gyeltshen House

DATA

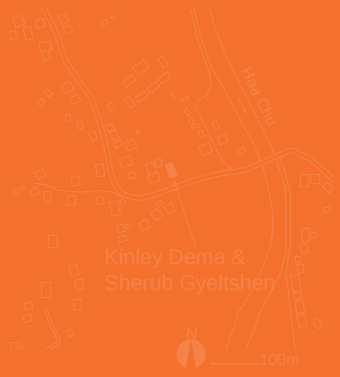
Dzongkhag
Haa

Gewog
Kartsho

Village
Ingo

Settlement location
riverside

Settlement pattern
clustered



Coordinates: 27.3910, 89.2766

1

2

3

1 Whole view of the front side (from southwest)
2 Whole view of the back side (from southeast)
3 North side view (from northwest)

Location and summary

This building is located on the main road southwest of the centre of Haa Dzongkhag and stands on a flat area in the Ingo settlement, near the bridge over the Haa River.

The village is one of the typical settlements in the flatlands of the Haa Dzongkhag, and the building is a width long rammed earth building divided north- and south- parts and is inhabited by two families. The time of construction of the two structures is unknown, but the central construction main structure highlights the old style.

The main building faces west and is surrounded by rammed earth and masonry walls. There are south- and west-facing yards in the south section of the main building, and north- and west-facing yards in the north section. The west-facing yard in the north section is particularly large. The yards are separated by rammed earth walls with sloping roofs. The yard in the south section has east- and west- entrances, and the yard in the north section has a west entrance. The north and south sections are not connected within the premises and are independent.

The main building is a two-storey construction of rammed earth and consists of a southern and northern part, each with a roof. The northern section of the house has a gabled roof comprising of corrugated metal sheets with a raised central section, whereas the southern section has a gabled roof with stone shingles. This family was apparently very influential in the region and was allowed to raise the roof ridge higher than the other houses. The plane scale is not rectangular because the rammed earth on the rear side is not straight, but the first-floor outer wall measures about 10.3m in width (excluding the rammed earth on the north-south bor-

der) and about 11.1m in depth on the north side. On the south side, the width is about 15.1m (including the rammed earth on the north-south border) and the depth is about 10.7m.

Regarding the exterior, *rabsels* surround the north side of the first-floor façade (west face) and the north face. Additionally, *rabsels* are present on the overhang on the north face of the north side. The back of the building is lined with *rabsels* above and below, and a small window opens on the first floor. There is a *rabsel* bay window at the front of the first floor of the southern section between the side walls. A small overhang is attached with a rammed earth wall on the first floor of the north face of the north section. A small window and *rabsels* also open on the rear side of the first floor.

There is a west-facing entrance in the south section and a north-facing entrance in the north section of the ground floor of the building. On the north side, there is a staircase in the northern overhang that leads to the first floor, and the entrance beyond that opens to the north side. On the south side, there are stairs attached to the façade on the west side, and the entrance opens in the southwest corner.

The composition of each floor

Looking at the ground-floor plan, the northern section is further divided into north-south halves, and the southern section is divided into two east/west rooms, both of which are livestock sheds with earthen floors. The north side of the northern section has a wooden floor and is divided into three rooms with wooden walls. The room in the southeast corner of the northern section has a small window that opens toward the east. The southern section is divided into four quarters—three on the north side and one on the south side—with rammed earth walls. Each of the quarters is further divided into east and west halves by rammed earth walls to form a total of four rooms, all of which have earthen floors.

Except for the overhanging section to the south of the rammed earth wall, the northern section of the first floor is divided into six rooms that are all enclosed by rammed earth walls. An altar room is set up in the centre of the south side of the northern section, and to its front is a triple opening with two central pillars. Along with the altar room, all three rooms to its west (in the front) are living rooms lit by the *rabsels*, and the northwest corner also has a *rabsel* on the north side. This *rabsel* is flush with the side walls. The furnace is placed in the centre of the east side, and except for this part, which has an earthen floor, everything else has a wooden floor. A small lattice window opens on the rear side of the first floor. The southern section has the same rammed earth wall structure as the ground floor, but the northern section is further divided into two rooms on the west side and three


4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4 Overhanging section on the south side
5 Addition of rammed earth wall to the upper part of the first floor in the north
6 In front of the altar room on the first floor of the south side
7 The other side of the altar room on the first floor of the north side

rooms on the east side by wooden partitions. There is an altar room in the centre of the north side, with two central pillars forming a triple opening in front of it. On the west side (front-facing), there is a well-lit room with a *rabsels*. The swing door entrance that connects the two rooms on the south side is lined with a joist at the top, which may be related to the old altar room. A small window opens on the south wall of the first floor, which appears to be an extension from when the original was built. Only the altar room and the room to its south with the furnace have wide floorboards and their width is not uniform—retaining the old style.

In the attic space, there is a rammed earth wall around the southern perimeter, and there is no east-west dividing wall. In the northern section, the rammed earth wall rises like a square pillar. The northern and southern sections have differing roof structures. A pillar has been erected in the northern part, and the penetrating interconnecting member at the top end of pillars and the roof struts have been erected on the roof beam. On the other hand, the southern section has preserved its former appearance quite well. The structure of the pillar, roof beam, and roof strut are the same, but an interconnecting member that penetrates the roof structure passes along the width of the ridge strut. Although the current roof was constructed when it was expanded width-wards, the joint for each component is placed at the joint position of the beam line and the width and depth joint respectively, suggesting that the roof was also expanded using the old roof structure.

Considerations for restoration to the original state

The transition of the modification is evident from the composition of the rammed earth wall. When it was built, the northeast side of the southern section of the building was the only room on the northeast side and was surrounded by rammed earth on all four sides. Rammed earth was added to the upper part of this and raised. Following that, the west face (façade) was extended. It appears to have been followed by the width-wards extension. The order of the addition at the southern extremity of the south section and the northern section extension is unclear, but the southern extension consists of an west-facing *rabsel* with sidewalls, which seems to precede the northern extensions that face the west and northwest sides.

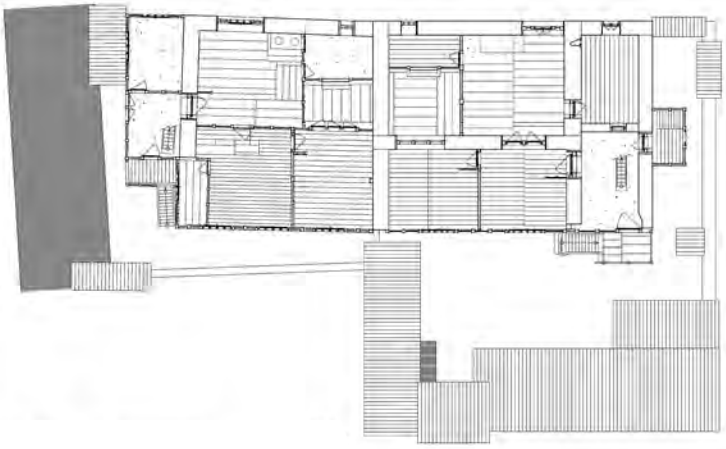
The addition on the north side occurred over two periods. The traces of rammed earth on the west face indicate that it was first enlarged by about 4m, following which it was expanded to its present form. It is believed that the north wall of the first floor in the northern section of the building (the current east-west wall of the northern section) was removed at this time. It is possible that this part of the first floor was not rammed earth on both the west and north sides before the extension and that a *rabsel* could have been turned, but there are no traces that indicate the same, which makes it unlikely.

The original small-scale roof structure of the southern section was used and expanded, and the stone shingled roof retains its old style. On the other hand, the northern roof and the central gable are recent renovations, as is the remodelling around the altar room on the first floor and the east-facing *rabsel* window on the ground floor, which appear to have been conducted around the same time.

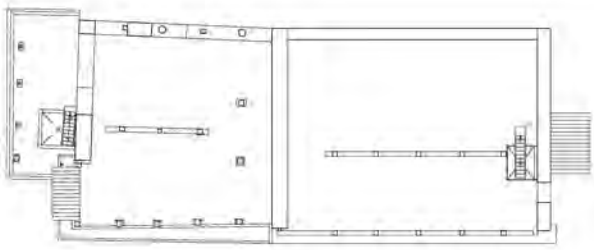
Based on this, we can conclude that traces of the reconstruction process remain in the rammed earth wall on the ground floor in both the northern and southern sections of the present building, while the sidewall of the first floor was newly constructed with a *rabsel*. Additionally, the small windows on the ground floor and the lattice windows at the rear of the first floor appear to be additions to the original.

Conclusion

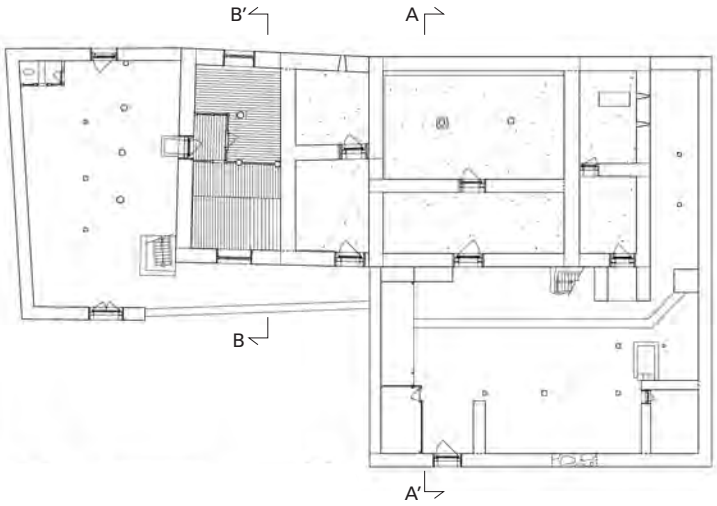
This building has many modifications throughout, such as the *rabsels* on the front, but the expansion to the front, the configuration of the façade with sidewall and *rabsel*, and the construction and transformation of multiple *rabsels* on the various sides are significant. The fact that it appears to have had a small, one-roomed configuration when it was built is particularly invaluable for understanding the structure of an old-style rammed earth traditional farmhouse. Further, the form of *rabsel* inserted between the side walls on the first floor of the northern section is unique to the Haa region. It is also considered a significant example of a rammed earth wall being removed during its expansion. (Unno Satoshi)



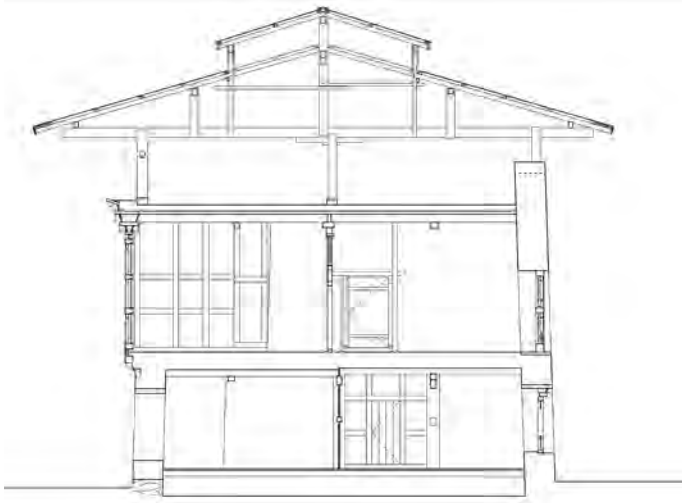
First floor plan 1:400



Attic floor plan 1:400



Ground floor plan 1:400



Cross section B-B' 1:200

Cross section A-A' 1:200

ARCHITECTURE

3-1 House with Special Background

4

Galem House

DATA

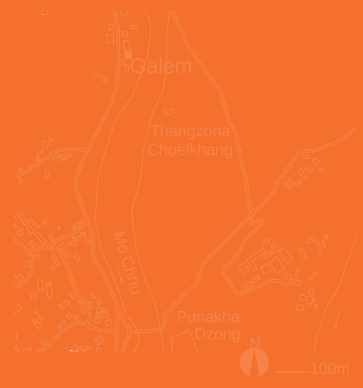
Dzongkhag
Punakha

Gewog
Guma

Village
Changyul

Settlement location
riverside

Settlement pattern
clustered



Coordinates: 27.5903, 89.8612

1 Whole view of the front side (from southeast)
2 Evidence of rammed earth expansion shown on the sidewall
3 Living room on the front side of the second floor

Location and summary

Changyul is located on the coast of the Mo Chhu River near the centre of Punakha, about 1km to the north of the Punakha Dzong along the road that connects Punakha and Gasa. This building is famous as a site of tragic love in Punakha Dzong. This tale of this tragic love is that of two lovers, Singye and Galem. Singye was an official of Punakha Dzong and Galem was the beautiful daughter of a farmer. They met at the market-place and fell in love but were torn apart due to Singye's transfer and the forced matchmaking conducted by the local chief and their parents. Galem was expelled from her house by her parents when they found out about the relationship and she died of illness. Singye grieved Galem's death and followed her soon after. As told in this tragic tale of love, the building is located near the riverside on the west bank of the Mo Chhu River.

This building is located on the open flatlands along the Mo Chhu River. There are houses on the north and south sides of the building, but they have few restrictions due to the site. The building is a three-storey rammed earth building and its east side faces the river. The gabled roof has a corrugated metal roofing with thin shingles, held down by stone. There are no rammed earth walls or other connections, and it is on a single slightly distorted rectangular plane. The width and depth measures of the plane are about 10.4m and 10.3m respectively.

The outward appearance is enclosed by a rammed earth wall with a slope that is relatively larger on the west side of the rear and smaller on the eastern side of the front. There is a south-facing entrance at the front of the east side on the ground floor and stairs lead from there to the overhang in front of the entrance in

the centre of the first floor. Small lattice windows open on the north side of the first floor. The second floor has *rabsel* bay windows that wrap around the front and the eastern half of both sides. Facing the south, small vertical windows and high windows open on the west side of the ground floor, and the old doorway opens on the first floor. The second floor has a *rabsel* bay window on the west side and a *rabsel* in the centre. The west and north sides of the rear have very few openings. A *rabsel* is set on the south side of the rear, whereas the north face only has a *rabsel* only on the west side of the second floor. As described above, the *rabsel* bay windows wrap around the second floor in the front of the building, but there are few openings in the building, thereby making it a closed structure.

The composition of each floor

The ground and first floors are surrounded by rammed earth walls on all four sides, and the front room is divided into two rooms—north and south—each separated by rammed earth walls. The front and back of the second floor are separated by a rammed earth wall, and the partition at the rear of the building is a wooden wall instead. The rammed earth wall at the front of the ground floor shows only a masonry structure in the centre of the wall, which closes the breakage. All three rooms that are separated by rammed earth walls have earthen floors and were probably used as livestock sheds. The rooms at the front and the southern rear are connected, and though there is no fitting now, the doorsill and entrance indicate that it was once an open door. The rooms at the back are connected to each other as well, but it is currently a window and has no fittings. The front room has a depth-wise joist, and the upper-level floorboards are used as ceiling boards. A pillar stands in the south room on the rear side, not in the centre of the room but near the centre width wise; a sleeper beam has been placed width-wards and the joist—on top of which are the floorboards—rests on the sleeper beam. This sleeper beam is built over the bracket-arm-like member that drops onto the top of the pillar. Only the central part of the west side on the first floor, where the furnace is placed, has been laid out with fascine to make an earthen floor.

The first-floor entrance is through a western doorway in the living room space. Its front side consists of three north-south rooms and a passageway, each divided by a wooden partition. The north side has a wooden floor and the south side has an earthen floor with a stairway to the second floor. The front and back borders retain the pivot-hinge holes of sliding doors, but not the fittings; a small room has been made in the front side with a wooden partition, where the fitting has been inserted. The south room at the back is a living room and has floorboards to keep the furnace and grain chest. There is an opening on the south side of this room, which appears to be the old doorway. The north side has a grain chest and an earthen floor. The border between the two rooms has a pivot-hinge hole in the bottom-edge plate of the entrance, and the door is made up of three distinct boards with an ax-scraped pattern. There is a small high window on the west side of the northern room that opens to the front room.

Apart from the stairway, the second floor is divided into three rooms by wooden partition walls on both the front and rear sides. The rooms have a mixture of wooden and earthen flooring, and the front side has a *rabsel* bay window along the side, but the floorboard on the south room has carved circular crests, which confirms that it is diverted material. There is a verifiable painted altar in the north room at the front, which may be later work. A furnace is placed at the rear of the

4 Furnace in the room on the back side of the first floor
5 Furnace in the room on the back side of the second floor

south room in the same position as on the first floor, which also contains a grain chest.

Instead of an attic floor, there is a roof beam over the rammed earth wall on the second floor, and the roof beam on the rear side is old and is connected to the front by a connection joint. On top of that are roof struts that support the purlin and ridge beam. These roof struts are set by processing the bottom ends into an L shape not a U shape. Moreover, no interconnecting member that penetrates the roof struts has been used.

Considerations for restoration to the original state

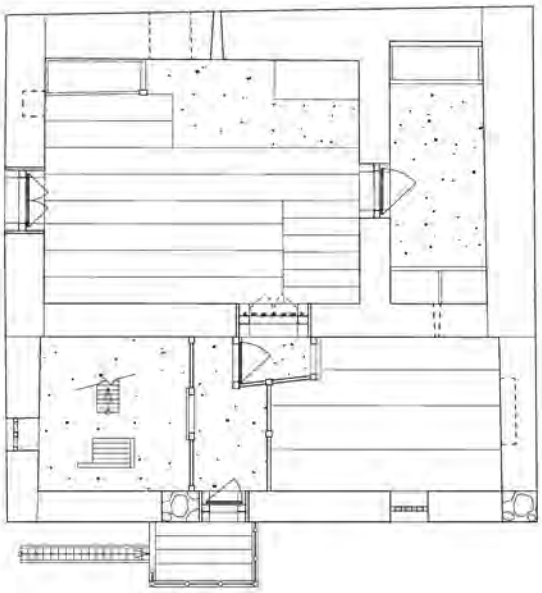
It is clear from the extension process that the western rammed earth wall was added to the rammed earth wall on the rear side. Although the second floor has been expanded, both additions are on the south side, and the rammed earth wall of its back section overhangs on the front side, indicating that the front-side expansion preceded them. In addition, based on the connection joint of the roof beam, it seems that the second-floor expansion was not a sequence of additions. It appears that the rear side of the original material roof beam was first constructed, and the front side *rabsel* bay windows with the new roof beam could have been added after the extension on the read side of the second floor. In other words, when it was built, the rammed earth wall was added from the rear part of the two-storey building to the front side, following which the rear side of the second floor was extended and the front side became a two- storey structure. The present form of the house seems to have been adopted with *rabsel* bay windows on the front and east half of both sides of the second floor, which become a series of large roofs.

Considering the above modificatory changes, it seems that the house was originally a two-storey structure surrounded by rammed earth walls and very few openings and that its first floor consisted of a living room and an altar room. When it was built, it had two openings, one in the centre of the ground floor and the other on the south side of the first floor. Additionally, it only had small high windows on the front and back of the first floor, which made it a very insular configuration.

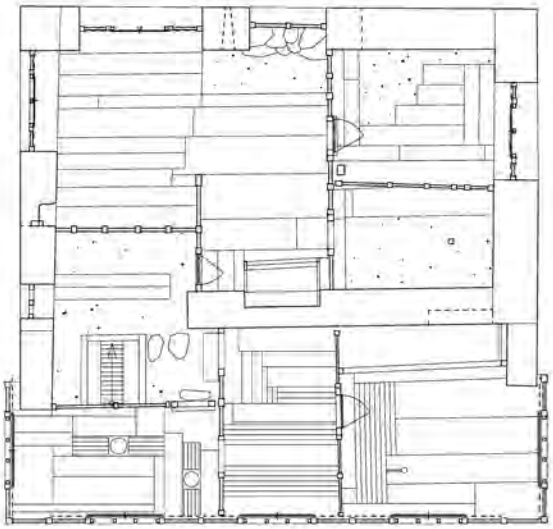
Conclusion

Although the date of construction is unclear, the building is a three-storey rammed earth structure that retains the traditional farmhouse form. There are several later changes, such as the extension of the second floor and the *rabsel* bay window on the front side, from which we can infer the history of modification. Parts of the house retain the original style, and the closed structure surrounded by rammed earth walls is particularly significant in terms of the history of traditional farmhouses in Bhutan. It is also the setting of a tragic love story set in the Punakha Dzong and is an important traditional farmhouse in the history of Bhutan. On the other hand, the fittings, wall breakage, and the floorboard and joist breakage indicate the need for appropriate conservation measures. (Unno Satoshi)

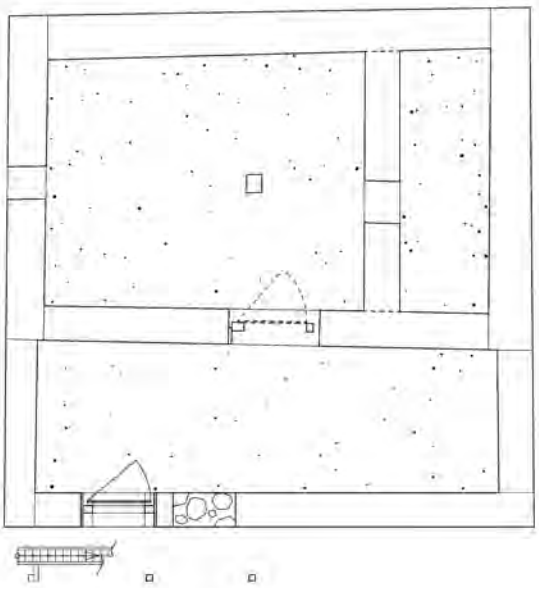
6 Grain chest on the first floor
7 A floorboard on the second floor converted from the door with the crest
8 Attic space



First floor plan 1:150



Second floor plan 1:150



Ground floor plan 1:150

Wooden partition and rammed earth wall on the second floor

Cross section 1:150

3-2 Upper Class Houses

1 Phub Bidha House

DATA

Dzongkhag
Thimphu

Gewog
Mewang

Village
Namseling

Settlement location
tableland

Settlement pattern
dispersed

Coordinates: 27.4031, 89.6122

1 Front side view (from southwest)
2 Back side view (from northeast)
3 Southeast room on the ground floor

Location and summary

This building is an old traditional farmhouse that stands out among the villages scattered on the slopes of the hills on the left bank, about 10km downstream from Thimphu City. It is in a place overlooking the valley and it seems to have formerly belonged to the ruling class. It was donated to the sister of the fourth king and is now used as a meeting facility of the village.

It is a four-storey building with a corrugated iron roof, and its plane scale is 13.4m wide and 8.5m deep for the overall outer wall of the ground floor. A rammed earth fence encloses the yard from west to south facing the front of the building, and there is a gate on the west side. There is a Mani (square-roofed stupa) set up in the east of the rear area.

The exterior has *rabsels* wrapping around the front and half of the two sides on the second and third floors, and rammed earth walls make up the rest of the building. The north and northern half of the east sides of the third floor have an attached wooden overhang respectively, and the second floor has an open balcony with a handrail and a latrine in the same locations.

The composition of each floor

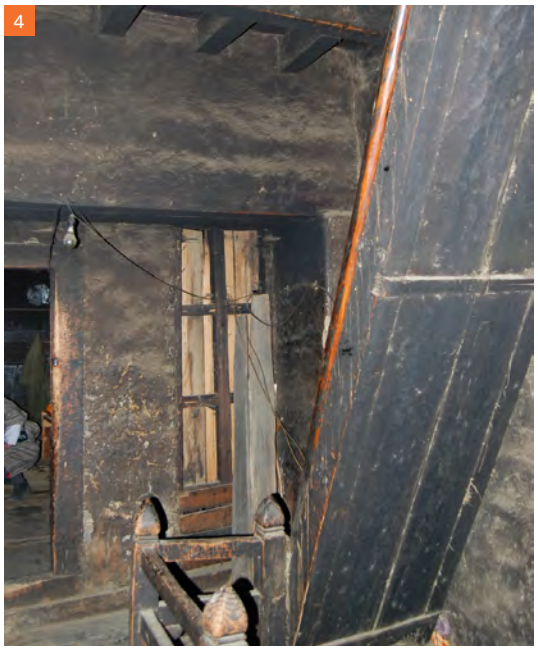
The ground-floor entrance is located centrally at the front of the building and has windows with vertical bars to its left and right. The other three sides have no external openings at all. A rammed earth wall along the ridge direction divides the interior into front and back rooms, and the two sides are connected by an opening without fittings. The western third of the southern half is divided by a stone masonry wall, and the western end of the northern half is divided by a rammed earth wall. The former has a doorway, while the latter has no opening.

In other words, this northwest room is a granary that has no entrances on the ground floor, only the first floor opening directly above. All other rooms are livestock sheds with earthen floors that show the log joist of the upper floor.

The first-floor entrance is also at the front of the building, but slightly to the east of the ground-floor entrance, and there is an external staircase in front of the entrance that leads to the open balcony with a handrail. There is a larger vertical lattice window directly above each of the ground-floor windows. Additionally, there is one small crenel-like opening at each end of the north face. The interior is divided into three sections by rammed earth partitions in the same location as the ground floor, and further divided by the *ekra* walls at both the ends of the southern half and the east side of the northeastern part, forming a total of six rooms. The northeast and northwest rooms can be accessed from the southeast and southwest rooms respectively through doorways in the rammed earth wall, and the opening between the north- and south-central rooms is wide and does not have fittings, akin to the configuration on the ground floor. The southwest room is presently a kitchen with a gas range, and the southeast and northwest rooms are bedrooms, but they were probably originally used for food storage or were storerooms like the northeast room, which has a rice bin. The central room in the south is an entrance space. This room, in addition to four other rooms, has a solidified earthen floor. In contrast, the central room in the north unusually has a higher wooden floor and a staircase that leads to the upper floor.

Only the northern half of the outer wall and the rammed earth wall along the ridge on the second floor continue up from the lower floors. The other sections are surrounded by the *rabsel* outer wall and divided by the *ekra* walls. The room layout of the northern half is the same as that of the first floor. The west side of the southern half has been made into a separate room. The space between the stairwell in the centre of the northern half and the living room on the southeast is divided by an *ekra* wall that has a window and a doorway. The two western rooms are a living room and a bedroom, and the northeast room is a kitchen with a furnace. The doorway on the east wall of the kitchen leads to the open balcony of the overhang and the former latrine, while the doorway on the north leads to another balcony with a former latrine in its west end and a small storage in the east end.

On the third floor, only the northern half of the outer wall is made of rammed earth, and the partition along the ridge is is an *ekra* wall. Including the stairwell, the northern and southern halves are divided into three rooms each. All have wooden flooring and are currently vacant, except for the two rooms in the west that are used for



4 Stairwell on the second floor
5 Living room on the second floor
6 Altar room on the second floor

a Buddhist altar and its front room. The overhang rooms that are attached to the north-face and northern half of the east-face are also not in use. Along the north wall of the northeast room, there is an earthen flue that leads from the stove on the lower floor to the attic level.

The attic space can be accessed with a ladder from the stairwell. On the north face, the roof beams are placed directly on the top edge of the rammed earth wall. On the south face and near the ridge (directly above the partition wall of the lower floor), there are struts rising from the floor that receive the beams. The central part of the roof was recently raised to a higher level, which was probably done simultaneous to the replacement of the shingle roof with corrugated iron sheets.

Considerations for restoration to the original state

The process of modification for this building is quite complicated. Based upon a comparison of old and new wood parts and traces that remain on the rammed earth wall, the following four steps of transition can be proposed:

Among the three sections divided by rammed earth walls, the northeast section is the oldest part of the building. The rammed earth walls on the north, east, and west sides of the area are components from this period but based on the position of the joints on the outer eastern wall, the south wall at this stage seems to be located in front of the current one. Since the upper end of the northwest corner of the original outer wall seems to be at the second-floor level, the building was probably two storeys high when it was built. There are traces of a blocked window on the back of the first floor, but it is assumed that the building had few openings other than those in the front. Based on the plane scale, it is highly likely that there was only one room on each floor.

The extension to the west side gave it its current width. The position of joints on the outer western wall is almost the same as on the east face, indicating that its original depth has been retained. Further, the second floor was added, but the east and west exterior walls on the second floor from this stage remains only near the back, and this is also the case for the original west wall of the ground floor. This raises the possibility that the building was once no longer in use and was abandoned.

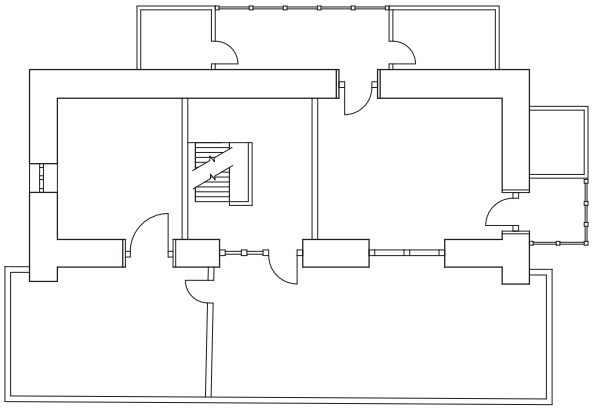
It was expanded to its current plane scale with the 2m addition to the rammed earth wall to the south. The rammed earth partition wall along the ridge was constructed in the current position up to the second floor at the same time. The outer wall was also added to the existing area to form the four storeys. The south edge of the east and west outer walls of the second and third floors is unnaturally disturbed, so it probably did not have the three-sided *rabsel* form that it does now. Instead, it may have had a rammed earth wall around the front or a front– *rabsel* between the two side walls. Also, the placement of the joist above the northwest end of the southern half of the ground floor indicates there was probably an opening in the upper floor. It means that an interior staircase to the first floor existed here, and the current entrance at the front of the first floor is probably later work.

The front façade of the second and third floors was modified into a three-sided *rabsel*. The *ekra* walls and many of the fittings on the second and third floors seem slightly newer than the wooden openings in the central rammed earth wall and the partitions on the lower floor. Thus, it is assumed that they were newly installed during this modification. It is possible that the interior staircase from the ground floor was abandoned and the main entrance to the first floor was built after that, and that the stone masonry partition wall in the southwest ground floor was built even later.

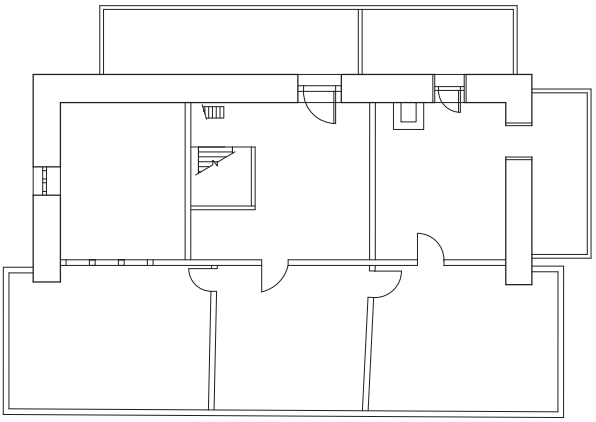
Conclusion

There are few examples of full-scale four-storey traditional houses. This building serves as a good example for highlighting the features of ruling class residences, such as the high spatial independence of the route to the upper floor, which is a reception area. It came to its present form through multiple modifications to a two-storey building that was probably closed, but we can perceive the traces of efforts to make the outward appearance grander.

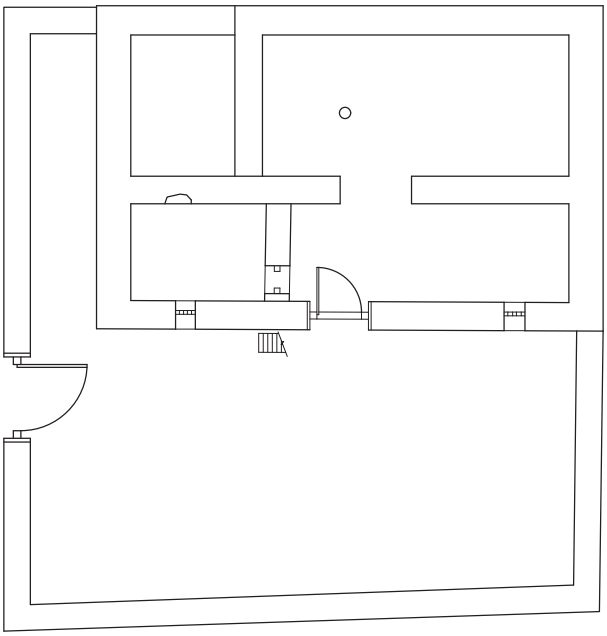
It is said that old traditional houses in Bhutan face towards valleys. While this is often the case, it is not necessarily true for all old traditional houses. This building faces the mountain, which suggests that its priority was to be south facing. (Tomoda Masahiko)



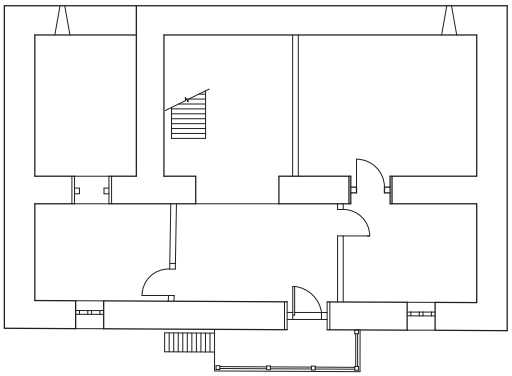
Second floor plan 1:200



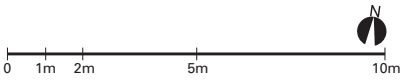
Third floor plan 1:200



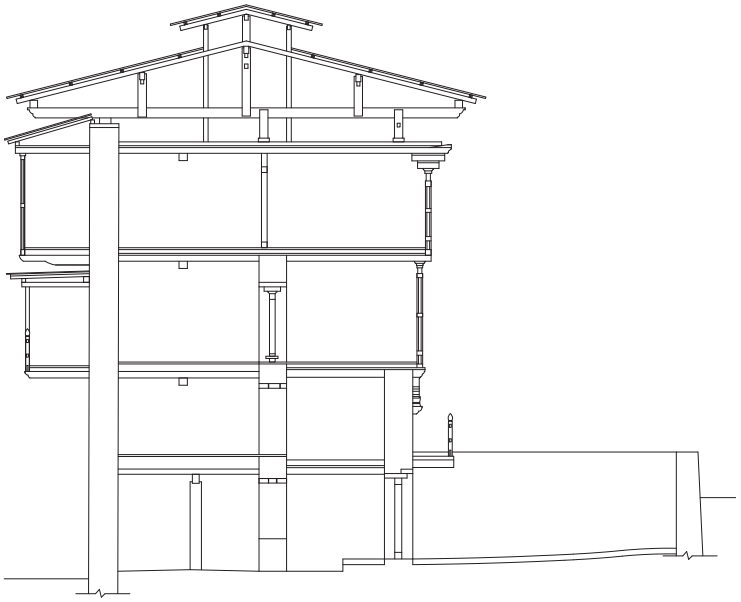
Ground floor plan 1:200



First floor plan 1:200



Traces of the opening in the first floor viewed from below



Cross section 1:200

3-2 Upper Class Houses

2

Sangay Wangmo House

DATA

Dzongkhag
Punakha

Gewog
Shengana

Village
Garakha

Settlement location
mountain

Settlement pattern
dispersed

Coordinates: 27.5986, 89.9173

1 Whole view of the front side (from southwest)
2 Whole view of the back side (from southeast)
3 Earthen floor room on the east side of the ground floor

Location and summary

Garakha village is in a mountain valley near Punakha. It is dotted with private houses and surrounded by rice terraces. Though it has a landscape common to western Bhutan, this village is unique in that it has a four-storey rammed earth traditional farmhouse. This building is located on a slightly elevated site at the edge of a cliff, which is to its north.

This building is a four- storey rammed earth structure with large depth and a corrugated metal gabled roof at the centre. It has a rectangular surface plane. The rammed earth outer wall has a width of 10.6m and a depth of 8.1m. Built with its front to the west, it has a yard that is surrounded by a rammed earth wall in the front. There is a sloping shingle roof made of earth at the top, which has open space on the top of it. The southwest has a sloping thatched roof. There is an independent one-storey annex to the southwest.

Looking at the exterior, the west and north sides of the front have a white plaster finish. The front of both the ground and first floors have a central entrance and small vertical lattice windows on both sides. However, on the ground floor, the roof over the front yard obscures the entrance. *Rabsel* bay windows open on the second and third floors; the first floor wraps around to the front half of the north face and the third floor wraps around to the front half of the north and south face. To the north, there is a vertical lattice window on the back of the first floor, and the second and third floors have *rabsel* bay windows at the front and a small window at the rear of the first floor. The rear has few openings, and the third floor has a wooden overhang. On the south side of the building, the ground and first floors have small windows at the rear, but they are not

visible due to the thatch. The second floor has a shingle roof overhanging the *rabsel* window and the third floor has a corrugated metal roof overhanging on the rear side and a *rabsel* window.

This building is a rare four-storey rammed earth traditional farmhouse in Bhutan and serves an important example in the history of traditional Bhutanese farmhouses.

The composition of each floor

There is a yard to the front of the building that is enclosed by a rammed earth wall. There is an entrance to the site in the centre of the west face, which is used as a storage room. The east-west joist that supports the upper floors is made of logs and squared timber. The ground floor of the main building is surrounded by a rammed earth wall, and a rammed earth wall divides it into east and west sections. Both have earthen floors. The front room was used for storage, and the back side was probably used as a livestock shed. An independent pillar of thick logs stands on the rear, and the top of the pillar has a bracket-arm along the north-south direction, upon which rests a sleeper beam of squared lumber that has a thick axe-scraped pattern. The joist of surface-coated logs is on top of it, and fascine and earth are spread over it.

A staircase ascends to the rammed earth wall surrounding the front yard on the west side, and the first floor can be accessed by passing through the earthen floor above the yard to the entrance in the centre of the main building. The rammed earth wall extends at the same position as on the ground floor, dividing it into two large rooms—east and west. Using the entrance row as a passageway, wooden walls divide the rooms along the north and south to form a total of six rooms. The northwest and southwest rooms are connected to the central balcony through a passageway, but the northeast and southeast rooms are not. The southeast room is connected to the southwest room by a side entrance on the rammed earth wall, all of which have earthen floors. The two rooms on the north side are inaccessible and have not yet been studied, but since they have no openings to the balcony, the northeast and northwest rooms are likely connected by a side entrance on the rammed earth wall.

The second floor does not have a rammed earth wall in the west or the west half of the north. In addition to the room in the east centre that has the staircase, the structure consists of four rooms: southeast, northeast, southwest, and northwest, and the rammed earth overhang on the south side exterior is further divided into three. All the rooms have a wooden floor. The east and west rooms are connected with a triple opening, and the northeast room has an altar room. A *rabsel* bay window opens in the north room, which is used as a living room. On the south side, the east and west rooms are connected by a double opening. 90cm wide floorboards have been used in the southwest room.

The third floor cannot be accessed or seen except for the stairwell in the centre of the east side, but a *rabsel* bay window goes around the front as well as the west half of the north and south sides, where there appears to be a living room. There is also an overhang in the middle of the east side at the rear and in the east half of the south side.

A low rammed earth wall rises on the east face as well as the east half of the north and south face of the attic, and a roof beam is laid on top of it. The rammed

4 South-west room on the second floor
5 Triple openings in front of the altar room on the second floor

earth wall does not rise since the *rabsel* bay window goes around, and the roof beam is supported by placing a sleeper. The roof struts are tenon jointed and supports the ridge on top of the roof beam, and the roof struts are erected from the floor, and directly receives the purlin to hold up the roof in the centre. The roof beams are interconnecting members that penetrates those roof struts.

Considerations for restoration to the original state

The only modifications to the building are to the *rabsel* bay windows on the second and third floors, and the rammed earth exterior overhang. The west-front and the north and south sides of the building have a plaster finish which prevents any examination of the condition of the rammed earth, but we could examine the series of rammed earth walls at the rear. There is no clear accumulation of rammed earth, which indicates that the building was planned as a four-storey structure when it was built. We can tell from the ground-floor rammed earth construction that it was planned on the scale of the current rammed earth wall around the perimeter, but the addition to the rammed earth wall in the main building cannot be confirmed. The rammed earth in the interior that divides the structure into east and west also appears to be from the original construction. There are few openings except for small windows at the rear and the north-south face, which likely preserves the old style.

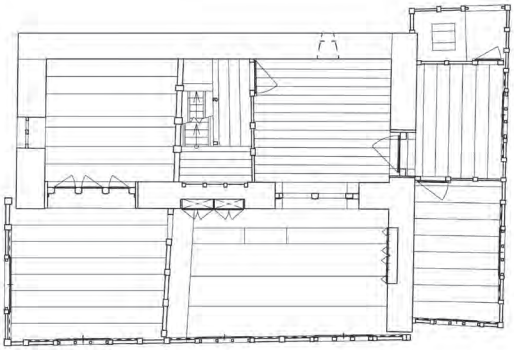
The *rabsel* bay window at the front of the second floor has no rammed earth wall at the northwest corner and wraps around to the west side, while the south side extends in a side wall. Looking at this, it seems that some of the north side of the building was also covered by a rammed earth wall. However, it is not possible to determine from the traces whether there was a rammed earth wall around the front side.

Based on the above, a concrete restoration is difficult, but this was planned as a four-storey rammed earth building and was probably a closed-off structure.

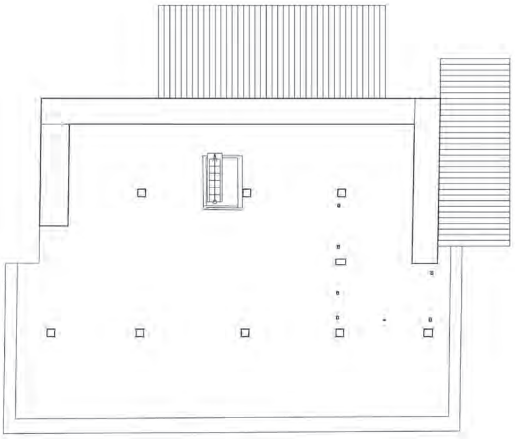
Conclusion

The building is a four-storey rammed earth structure in a village in the valley around Punakha, and is valuable as a traditional multi-storeyed farmhouse, which are scarce in Bhutan. Although its original shape is unclear, we can assume that it was a closed structure surrounded by a rammed earth wall. As with the tower-like architecture of Changjokha village, this is an important example of the characteristics of traditional farmhouses in central Bhutan. It is in a good state of preservation, and we hope the maintenance and management is continued. (Unno Satoshi)

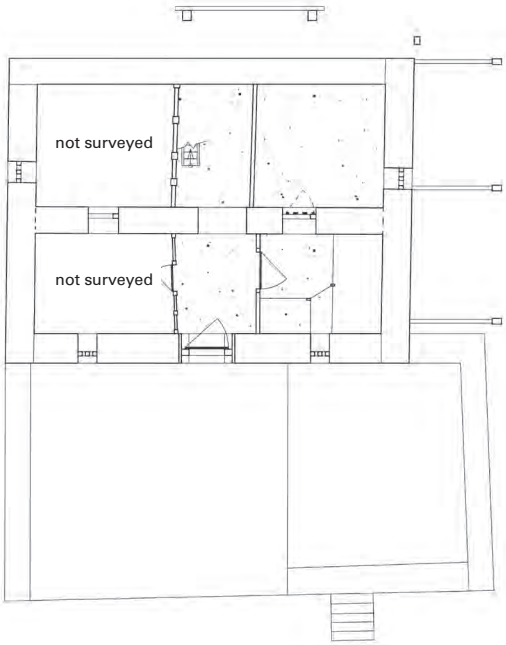
6 Altar room on the second floor
7 Internal stairway on the first floor
8 Attic space



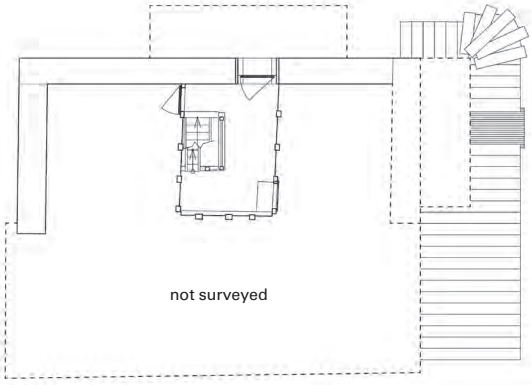
Second floor plan 1:200



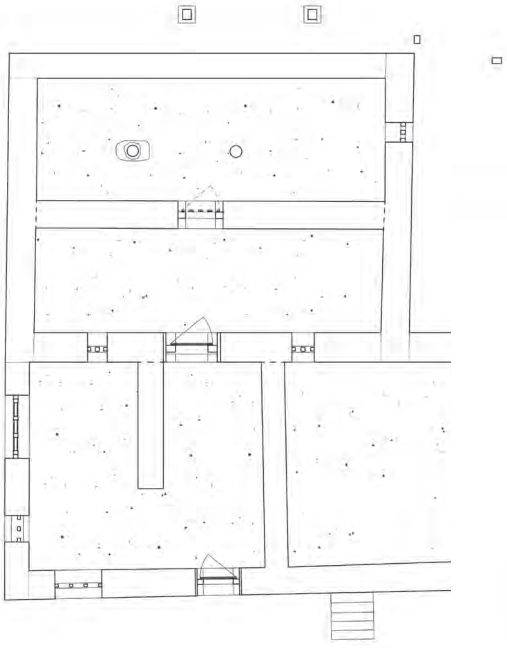
Attic floor plan 1:200



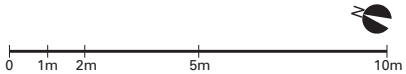
First floor plan 1:200



Third floor plan 1:200



Ground floor plan 1:200



3

Dechen Wangmo House

DATA

Dzongkhag
Thimphu

Gewog
Mewang

Village
Kharji

Settlement location
tableland

Settlement pattern
dispersed

Coordinates: 27.3669, 89.5661

1 Distant view (from east)
2 Side view (from south)
3 Back view (from west)

Location and summary

This building is a residence belonging to a former *deb* (village chief), standing on a gentle slope near a confluence with a tributary on the right bank of the Thimphu River, with views of the upstream and downstream of the river valley.

The building is east facing, with three storeys and a gabled (raised at the ridge), corrugated iron sheet roof. The plane scale is 13.6m in width (the west side) by 10.9m in depth (the north side) at the ground-floor exterior wall. A front yard is attached to the front, enclosed by a rammed earth wall with a gate facing east. A *mani* (a square, covered stupa) is installed in front of the gate on the southern side, and a *lu* (Buddhist altar) stands outside the gate on the northern side.

Its exterior features a *rabsel* spanning the front and half of both sides of the second floor and attic space, together with rammed earth walls. All of the exterior walls are plastered in white. An open balcony with balustrade and a latrine project from the back of the second floor.

There are entrances on the ground and first floors of the building's front face. At present, there is no indoor connection between the ground and first floors.

The composition of each floor

The ground-floor interior is currently separated into four rooms, each of which has an earthen floor, with the joists of the floor above exposed. The interior is used as a livestock shed. However, the southwestern corner room has no access to the outside or adjoining rooms; judging from similar examples, it is inferred to be a granary, accessed using a ladder from an opening directly above on the first floor. There is currently no

external openings on the ground floor, other than the front entrance.

The entrance on the first floor is accessed using an external staircase. In addition to rammed earth partition walls (which are the same as those on the ground floor), the northwest room is separated east to west by an *ekra* wall, creating a total of five rooms. Nevertheless, for this survey, it was only possible to survey the front room (with a wooden floor) at the front of the building and the northwest stairwell (which has an earthen floor). The partition wall at the back of the front room has an entrance to the stairwell and windows with vertical bars on either side, leading from the stairwell to the northwest and south-central rooms. There is a doorway in the rammed earth wall on the western side of the south-central room, which leads to the southwest room.

The layout of the second floor is similar to that of the first floor, with a kitchen in the northwest corner accessible by stairs from the lower floor, which is flanked by a storage room in the southwest corner and the north-central room, the latter leading to the northeast living room. To the south from the living room is the southeast room giving access to the altar room to the west. Of these, the three rooms in the southern half have not been surveyed. The boundary between the kitchen and the east-adjoining room is the same *ekra* wall as on the first floor. Excluding the earthen floor in the southwest corner room and the stone floor in front of the kitchen furnace, each room has a wooden floor. That said, the floor in the northeast room (which has a *rabsel* on two sides) is one step higher than in the rooms in the western half; the southeast room in front of the altar room is presumed to be the same. The west-facing doorway of the kitchen at the front face of the stairwell leads to the open balcony, at the south end of which is the old latrine and a ladder to attic space.

The height of the attic space from floor to beam is high, and to the east of the rammed earth wall that partitions the north from the south, fittings has been installed on the perimeter (directly above the second-floor bay window) independently from the struts which support roof beams. The interior is partitioned into three rooms by an *ekra* wall, and a joist ceiling runs over the beam to form a living space (the two north rooms have a continuous wooden floor, while the south room has an earthen floor). On the western side of the rammed earth wall as well, the south end is partitioned by an *ekra* wall to serve as a storeroom, but the extent of weathering of the wood and its fit with the rammed earth wall demonstrate that this was made into an interior in later times. The living space on this floor is no longer in use, yet the northeast room is fitted with a Buddhist altar and a furnace and seems to have been occupied by a separate household compared to the one downstairs. While the beams, struts, purlins, and a ridge beam around the roof structure appear to use wood from the same old period, the rafters and above are new wood.

4 Stairwell on the first floor
5 Kitchen on the second floor

Considerations for restoration to the original state

The rammed earth walls are the same material from top to bottom, and their present height is believed to be the same as when they were built. On the south exterior wall, the location of the front face of the partition wall in the width direction features a construction technique of overlapping corner blocks in an alternating pattern. There is also corner chamfering on the first floor. As such, the area forward from this joint is believed to be an extension. The foundation masonry structure is also lower at the front. Since this addition is consistent with the front yard wall, these extensions and the enclosure wall appear to have been made at the same time. On the other hand, the whole north exterior wall is consistent and shows no signs of extension, but the foundations differ in height from those of the west exterior wall. The west exterior wall is blocked by weeds, making it inaccessible, but there are no indications of any particular extension. There is also a thin layer of rammed earth on the south exterior wall close to first-floor height. However, this is not present on the north face. Hence, there must be multiple differences in the age of the exterior walls, including the possibility of the reuse of partially abandoned walls.

The ground-floor entrance is later work. There are traces of the closing up of the old entrance to the south, as well as from the closing up of an old window to the north. Since the current entrance frame retains the old material and the external dimensions match, it is highly likely that the wood from the former entrance was repositioned. There is also a blocked-up, small crenel-like opening on the ground floor of the north-facing side. Later work can also be seen on the first floor from the extent of weathering in the wood of the exterior stairs, balcony, and entrance frame. There are vestiges of a blocked-up former entrance to the south of the present entrance, but above the current door remains an upper frame of the same dimensions as the windows to the left and right. Thus, previously, there were likely three windows on the front face of the second storey and no entrance. The original design involved an interior staircase running from the north end of the ground-floor front room; the staircase members, the frame of the floor opening on the first floor, and the balustrade still exist. The flooring in the blocked-off area is new and the staircase appears to have been used until recently. On the other hand, the *ekra* wall at the boundary between the first-floor stairwell and the northwest corner room has rough workmanship, clearly indicating later work, as evinced by the length of the studs, which have been adjusted to accommodate the deflection of the north-south beam that runs directly over it. The floor joists on the second floor that this beam receives are built from a single piece of wood that runs through two rooms partitioned by the *ekra* wall; this second-floor wall also points to later work. It is possible that all the rammed earth partition walls (except for the original front face) may be later work due to they being attached irregularly to the exterior wall, in which case when it was built, it would have had a north-south rectangular plan with a single room on each floor.

The wall's thickness on the south side of the first-floor front room decreases upon reaching 2,100mm above the floor. The technique of reducing the thickness of upper floor walls can be seen on occasion, but here, the position of the steps does not correspond to the current floor structure on the second floor. Moreover, when observed from the outside, compared to the material of the bracket supporting the bay window, the


6

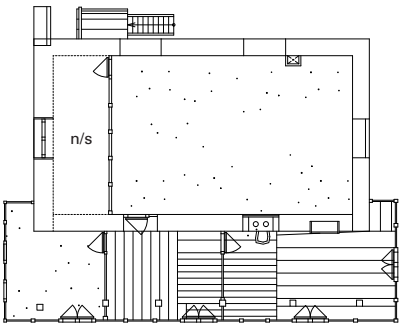

7

6 Living room on the second floor
7 Northeast room on the attic level

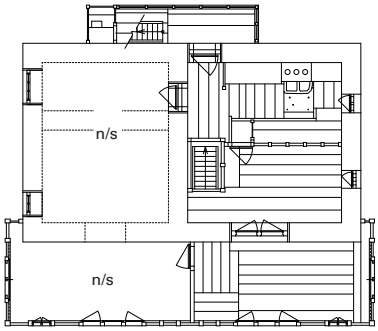
material in the upper part above the bracket appears to have suffered less weathering. Based on these facts, we can determine that after extensions were made to expand the floor plan, the building was modified to increase the height of the first floor by adding to the rammed earth wall on the front side of the building. This modification was probably carried out with the intention of enlarging the bay window to make the building's exterior more attractive. The difference in floor height in the rooms on the second floor is likely related to this modification.

Conclusion

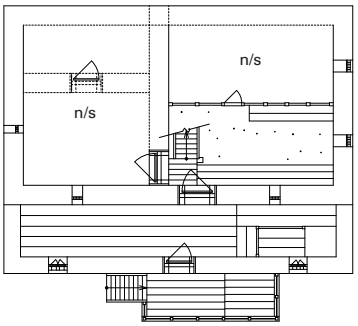
This building has many elements in common with the Phub Bidha House in Namseling village, about 8km upstream. The latter is a full four-storey building but is also a house of the ruling class and has a similar current layout to this one. There are many similarities in the modification process that have led to its present form. Other examples can be found in neighbouring villages. It is hoped that a survey and comparison of these will provide insights into the procedure by which the residences of the ruling class in this region developed their shapes. (Tomoda Masahiko)



Attic floor plan 1:300

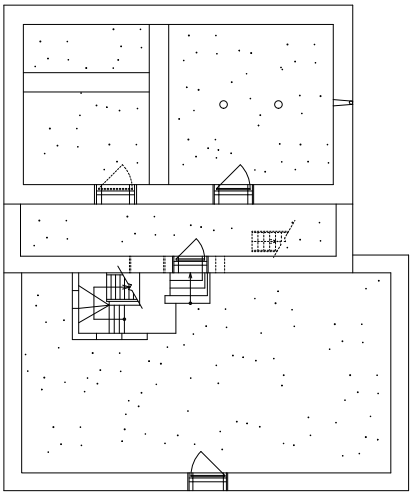


Second floor plan 1:300

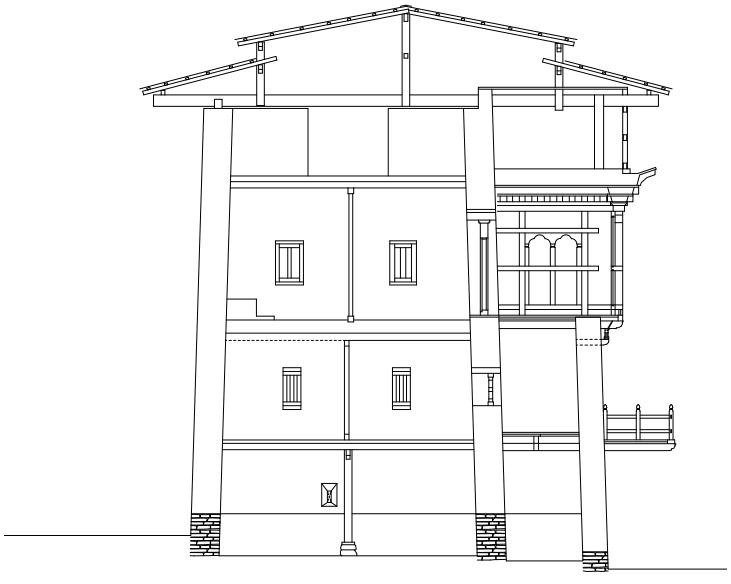


n/s: not surveyed

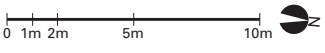
First floor plan 1:300



Ground floor plan 1:300



Cross section 1:200



4

Tshering Wangmo House

DATA

Dzongkhag
Paro

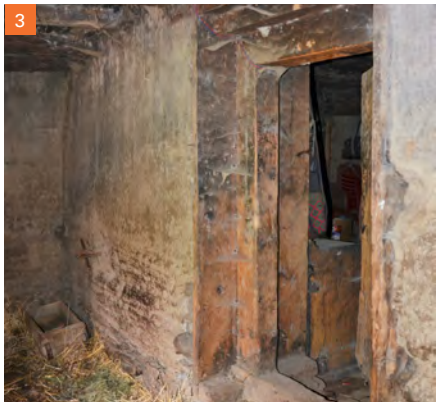
Gewog
Wangchang

Village
Wangthangkha

Settlement location
riverside

Settlement pattern
dispersed

Coordinates: 27.4223, 89.4193



1 Rinpung Dzong and Tshering Wangmo House (front right) from west
2 Front view (from east)
3 Southeast room on the ground floor

Location and summary

This building stands independently on a flatland about 500m southwest of Rinpung Dzong, surrounded by rice paddies. Together with its large area of cultivated land, the house is said to have belonged to Paro Penlop and dates back to at least the 19th century.

On the eastern side of the east-facing main building, a slate-roofed, rammed earth wall connects to the north and south ends to surround the front yard. The front gate opens at the north end of the east-facing side, and a back gate opens at the southwest end. The southeast part of the yard is divided by a stone wall with a work shed on the southern side; a *mani* (small stupa) is enshrined by the back gate.

The main building is a three-storey structure with a gabled, corrugated iron sheet roof, with a plane scale at the ground-floor exterior wall measuring 14.0m in width (west face) and 10.8m in depth (north face). With regard to its outward appearance, besides the front of the second floor, which is a *rabsel* sandwiched between two side walls, the building's exterior is a rammed earth wall. Although the entire building was once covered in white plaster, much of it has peeled away. A balcony covered with a shingle roof protrudes from the middle of the western side of the second floor.

The composition of each floor

On each floor, the interior, enclosed by the outer wall, is divided into two sections by a rammed earth wall along the ridge; the back side of the wall is further divided into north and south sections by an earthen wall.

The ground floor currently consists of four rooms in the shape of a crossed square. There are separate entrances on the eastern side of the northeast and south-

east rooms, and in each room, a doorway connects to the northwest and southwest room respectively. There is no access between the north and south rooms. The only external windows are two extremely small ones on the southern side of the southwest room, and one each on the western and northern sides of the northwest room. Each room has an earthen floor, with the upper part showing the upper floor joists (round timber logs that have had their sides trimmed to become flat and parallel) and fascines (coarse twigs) laid on top. The southeast room is used as a livestock shed, and others for storage.

The entrance to the first floor is on the northern side of the east façade, with an external staircase attached to the south end of the covered platform. The roof and the east wing toilet are very recent additions. The balcony is not especially old. The eastern half of the three sections, created by the earthen wall partitions, is further divided into three rooms by wooden partitions: from the north side, the entrance with kitchen, the living room, and the children's room, respectively. Of the two partitions, the one on the southern side is intermediate stage work made using diverted materials, while the one on the northern side is very recent. Also, at the same time as the latter, reinforcements were added in the form of a large beam along the entire north-south length; the ceilings of these three rooms are covered with plastic sheets. The southwest section is the bedroom, and the original joist ceiling can be seen only here on the first floor. The northwest section is divided into two by a wooden partition, with a bedroom on the southern side and a closet on the northern side. This partition is also recent; the ceilings are all covered with plywood and plastic sheets. There is no access between the northwest and southwest bedrooms.

The stairs from the first to the second floor are at the building's northeast end. This is a new L-shaped staircase with an intermediary landing; the original form would have been a straight staircase. The eastern half of the second floor consists of the stairwell, living room, the front room for an altar from the north onwards, and the *ekra* wall partitions between them seem to originate from when the house was built. The northwest room is a reception room, and the southwest room has an altar dug into a rammed earth wall on the western side. The entrances to the two rooms on the western side have triple openings with middle pillars and are almost identical in scale, but there are wooden doors on the southern side only, while the northern side shows no signs of fittings. The doorway on the western side of the northwest room leads to the outer balcony, but there are no facilities or rooms on the balcony with the roof, and the materials are new. The entire eastern sides of all east rooms are *rabsels*, and glass fittings are provided on the inside of the windows, but the shaft halls for the single wooden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4 Southeast room on the first floor
5 Altar's front room on the second floor
6 Rammed earth structure supporting the roof beam
7 Details of the former entrance to the first floor on the east wall

doors remain.

A ladder hangs from the stairwell leading to the attic. Besides the upper part of the eastern *rabsel*, it is unusual to directly receive the roof beams with square pillar-like blocks of rammed earth. The ridge beam, purlins and parts below are mostly made of old materials. The rafters and elements above were renewed during the recent roofing replacement.

Considerations for restoration to the original state

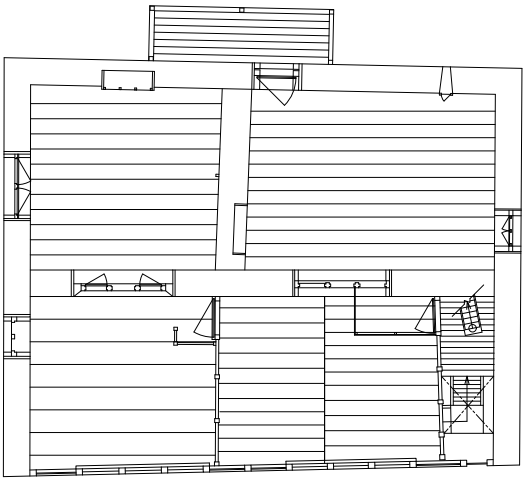
On the ground floor, the stone masonry partition in the centre of the eastern half is later work. The original layout was likely a three-room structure without this partition, but the reason for the two entrances is unknown. All the large beams and their supporting pillars are later work. The thickness of the rammed earth walls is about 750mm, but only the north ends of the west outer wall and the partition wall along the ridge are as thick as 1,100mm, indicating a clear difference in the time they were built. The thick rammed earth walls were probably parts of the previous building, but the range is so piecemeal that preserving and reusing them may have been intentional.

The first floor is used for daily activities, but prior to the 2011 earthquake, the present owner's grandmother's sister and her family lived on the second floor. It is unusual for a traditional three-storey farmhouse to have a kitchen on the first floor; current indoor use is likely a remnant of two families living together. The original floor plan can be restored to a three-room configuration similar to the ground floor. As for external openings, the testimonies of family members and old photographs revealed that the large window with the bottom-edge plates in the central-east face was the original entrance, while today's entrance was a later modification of the window. From looking at the end surfaces of the rammed earth wall, out of the windows on the first floor, at least one window on the eastern side of the southeast room, and one window each on the northern side of the northeast and northwest rooms with fittings, were probably newly installed or enlarged in the intermediate stage of building.

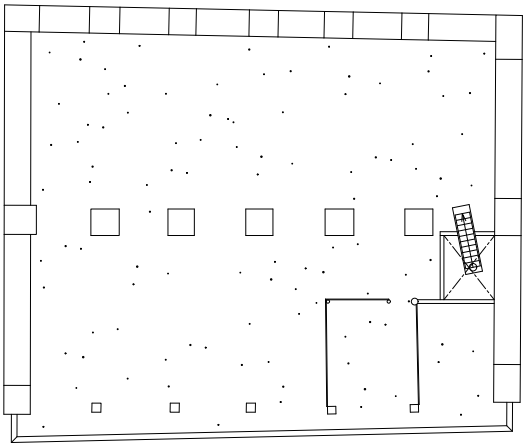
Not too long ago, the second floor was the original living space, with the northeast room being the living room and the northwest room being the kitchen. There is still a chimney in the northwest corner of the attic, but no traces of a furnace have been found. As for the *rabsel* window on the front side, there was no particular disturbance in the connecting rammed earth wall, so the style was the same from when the building was first erected. On the other hand, the large window on the southern side of the southwest room was likely an old doorway, as it has bottom-edge plates attached. There are signs of joist support holes on the exterior walls, as well as three small windows and two blockage marks of the same size at approximately equal intervals on the first floor. These are probably holes in which cantilever beams were inserted, and there likely used to be an overhang running the entire length of the southern side of the second floor. Since there are indications of joist support holes on the north wall of the second floor, this suggests that an overhanging part existed here as well. Hence, the opening on the northern side of the northwest room (with the bottom-edge plates attached) may have been the doorway to access the overhang. The 1998 photo shows walled overhangs on both sides, both of which were latrines and storage rooms. By contrast, in another photo from the same time, the doorway on the western side of the second floor is blocked off, and the current outer balcony does not exist. The existence of the doorway demonstrates that there was once an overhang on the western side before that, but it is not certain whether all of these concurrently existed. From the appearance of the beam support holes, the overhang on the southern side probably dates back to when the building was built. The removal of the north and south overhangs is said to have occurred prior to the 2011 earthquake.

Conclusion

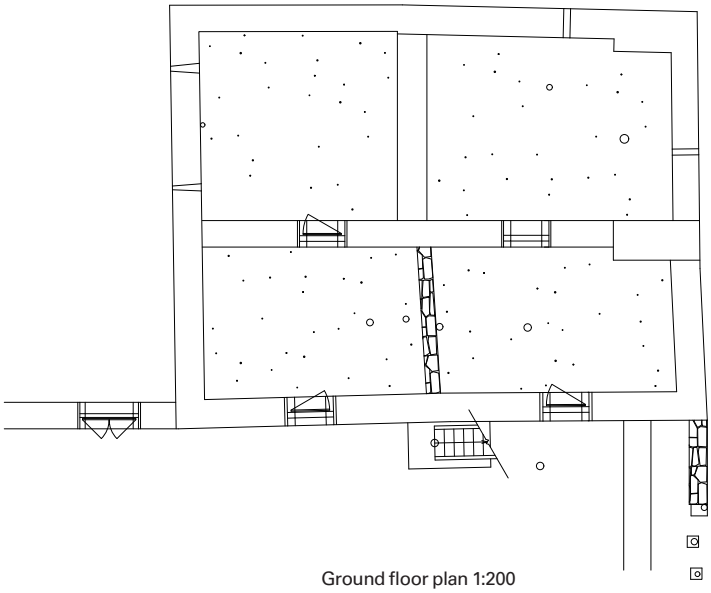
Aside from the modification of partitions and windows, the building well retains its original form. The façade, with its full-length *rabsel* at the front of the uppermost floor, can be regarded as a transitional stage in its transformation, from a closed style with a surrounding rammed earth wall to an open, three-sided *rabsel* style. Such changes likely occurred first in upper-class residences. It is also interesting to note the recent changes in room usage, with daily life being conducted on the first floor and the second floor being dedicated to ceremonies and receiving guests. (Tomoda Masahiko)



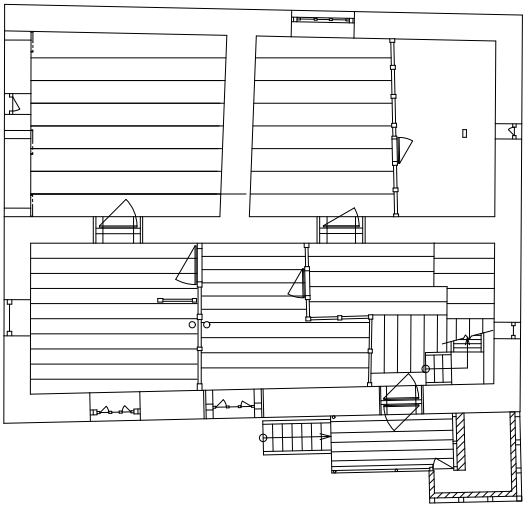
Second floor plan 1:200



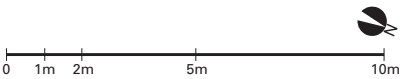
Attic floor plan 1:200



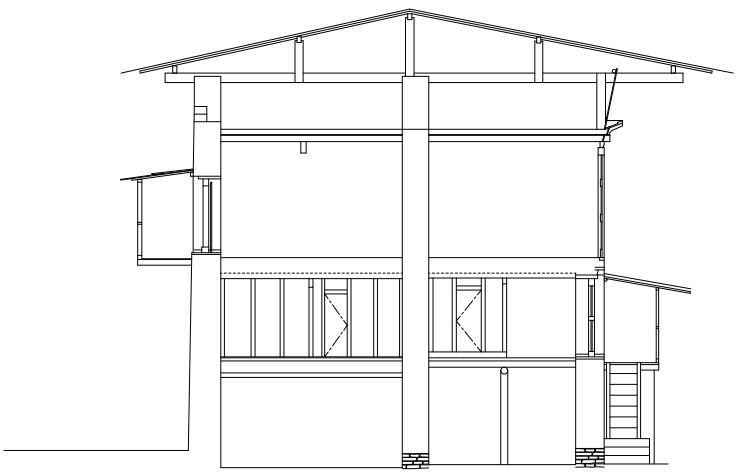
Ground floor plan 1:200



First floor plan 1:200



Northeastern view of the past
(Photo by Saito Hidetoshi, October 1998)



Cross section 1:200

5

Woochu Nagtshang

DATA

Dzongkhag
Paro

Gewog
Lungnyi

Village
Woochu

Settlement location
riverside

Settlement pattern
dispersed

Coordinates: 27.3912, 89.4221

1 Overview (from southeast)
2 Back view (from northwest)
3 Side view (from southwest)

Brief description of Nagtshang

The term Nag-tshang, derived from Dzongkha colloquial term སྔག་ཚང་། or written as ནག་ཚང་།. The etymology of the term defines a den or a house owning bountiful domestic cattles therefore, the term is a combination of two terms; Nag also called as *chugs* (ཕྱུགས)- cattles and *tshang* (ཚང་)- den, house or home. However, colloquially, the term is understood as a mansion or a palace owned by an aristocratic family, merchant or rich people are widely known as Nagtshang. These types of mansion are three or four storied, elaborate *rabsel* (main façade), *jam-tho* (double tier roof), etc. which are not found to be constructed by common citizens in old days.

Ancient Bhutan have different classes of citizens such as; *Choe-je* (dharma lineage holder), *Dung* or *Dung-jud* (divine blood-line holder), *Thre-pa* (Tax payes), *Zur-pa* or *Khim-sar* (houses that are waived from paying tax), *Dra-pa* (religious lay people associated to *Choe-je*) and lastly, *Za-pa* (serves). Amongst these classes *Choe-je* and *Dung* are only the two classes that own Nag-tshang or a mansion build by any bloodline holder can have an entitlement of Nagtshang.

Brief history

The exact date of construction of this structure is not known however according to the locals, the structure was used by Paro Penlop Tshering Penjor (uncle to second King). It was used as the office for tax collections, solving disputes and performing other important activities.

One of the important responsibilities performed was during the Paro *Tshechu* (annual festival which takes place for seven days). The first and last days of the festival are conducted in Dzongdrakha Goenpa (monastery)

which falls under the Lungnyi Gewog and the Paro Penlop presided the occasion. This custom is still practiced to date and *Gup* (local leader) of Lungnyi Gewog now shoulders the responsibility of this custom.

Change in usage of the structure

After the use of the Nagtshang as an important office, the structure was left unoccupied for many years since the Penlop didn't have any descendants.

Later the structure was offered to The Royal Grandmother Ashi Kesang Choden Wangchuck and during fourth King, Michael Aris, the then royal tutor resided in the Nagtshang. Michael Aris was an English historian who wrote and lectured on Bhutanese, Tibetan and Himalayan culture and history.

Later the structure was used as a hostel for the students of Woochu Higher Secondary school. The ground floor was used as store, the first and second floors were occupied by girls and boys respectively. The additional entrance to the second floor was then introduced.

In the later years, the community used the structure as community hall and store which later the local administration took the custody of the structure, and roof maintenance was carried out.

The structure was not maintained and unoccupied for many years until 2016. His Majesty the King commanded the Royal Project team of Pangbisa to restore the Nagtshang and preserve as it is. Further commanded to institute a Royal Museum to showcase the arts and crafts of metal (swords) works in Bhutan. Currently, the structure is under the care of the Royal Project team and the roofing work has been carried out with adornment of *gyeltshen** on the roof.

**Gyeltshen is an element in traditional Bhutanese architecture that represents the sacred parasol of victor of compassion and good. The gyeltshen is thus only placed over roofs of religious buildings, palaces and residences of important figures/religious master.*

Structural layout and the context of additions

The building has a rectangular ground plan measuring around 11m wide, 9.3m depth and 11.4m height,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4 Details of the front side
5 Details of the north rammed earth wall
6 Short lintel of the doorway on the back side of the first floor
7 Long lintel of the original doorway

where the height is measured to the top of the outside wall (and not to the rooftop). The structure is three-storied built up by rammed earth walls and wooden floors, openings and *rabsel*. The wall measure around 84cm at the base and 70cm at the top. There is one inner transverse wall running the entire height. The front of the structure is being covered by the courtyard measuring around 14m wide and 11m in depth.

In the earlier renovations, many windows and doors were constructed or replaced. The newly constructed windows and doors have shorter lintel than usual and the gap in between is filled with stones and mud mortar. As a consequence, the newly constructed openings are not well connected with the walls. In few areas, there was no lintel at all. So due to shorter lintel, the cracks have developed along the new openings. Windows were replaced or newly constructed at the left and right walls, and consequently, the cracks formed. However, a door was newly constructed at the back wall. The window at the side has been closed with stone masonry wall. Since the old strong wall has been disturbed by making huge opening, thereby making the wall weaker, and as a result vertical cracks are formed at the back. The *choesum* - decorated space/room of the second floor which is immersed into the wall has also weakened the wall at the crack developed area. Vertical cracks are also observed on the left wall, at the intersection of transverse wall and left wall.

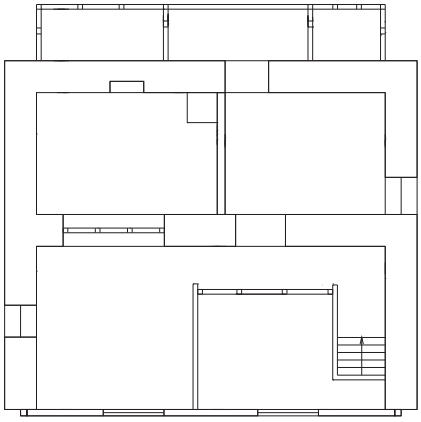
Detected issues

Upon the visual inspection mentioned above, some of the timber components were found in bad condition. The front *rabsel* and the timbers components at the ground floor are in good condition, However, the *cham* – joist at the first floor, below the *choesum* was in bad condition. The temporary partitions on the first and the second floor are also in bad condition and its deteriorated. The part of the wall has fallen off. The latrine is attached at the back side of the building on the first and the second floor. The latrine is found to be in bad condition with all the timber components deteriorated.

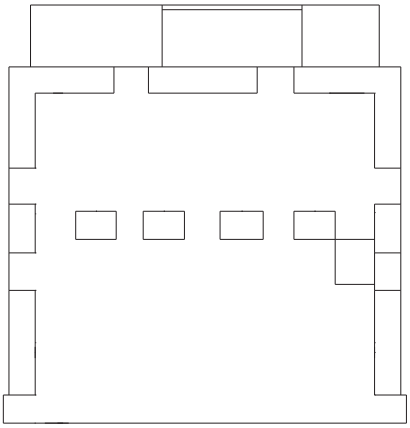
Conclusion

Woochu Nagtshang is a valuable example of traditional residential buildings with a venerable history. It is an architectural masterpiece that was constructed with high-quality craftsmanship and resources. However, the structure has become unstable due to modifications in addition to deterioration over time. It is imperative to take immediate actions for the rehabilitation of the building. (Pema Wangchuk, Jamyang Singye Namgyel, Dendup Tshewang)

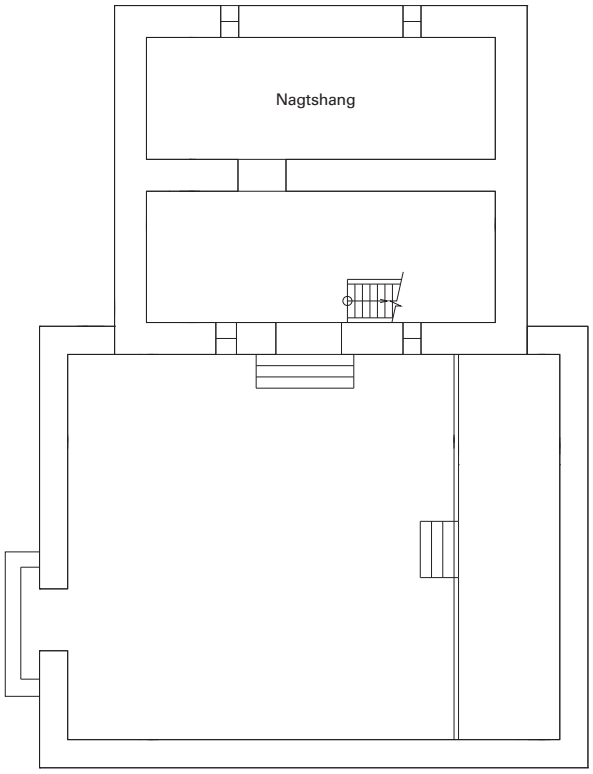
8 East room on the ground floor
9 West room (Nagtshang) on the ground floor
10 Temporary partition at the first floor
11 *Choesum* at the second floor



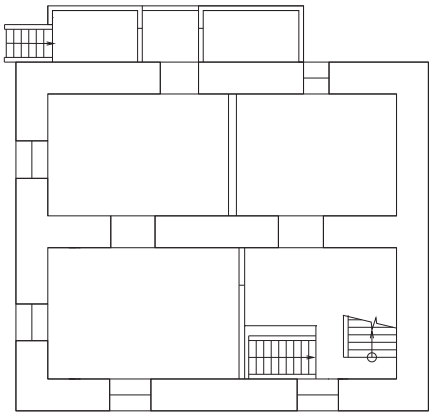
Second floor plan 1:200



Attic floor plan 1:200

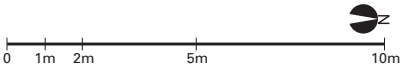


Ground floor plan 1:200



First floor plan 1:200

Cross section 1:200



1

Lham Pelzom House

DATA

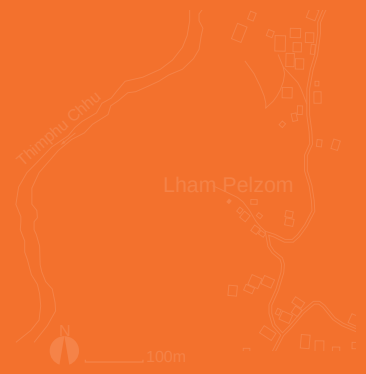
Dzongkhag
Thimphu

Gewog
-

Village
Kabesa

Settlement location
tableland

Settlement pattern
clustered



Coordinates: 27.5465, 89.6543

1 Front side view (from southwest)
2 Detalis of the front façade
3 Details of the bottom part of the balcony

Location and summary

This building is located in a village at the top of a terrace in a valley in the northern part of Thimphu and is apart from other homes. The details of its history are unknown, but the building, along with another, that is, now part of the Choki Traditional Art School is said to be the oldest farmhouses in the village. Lham Pelzom House is a three-storeyed building with a gabled, stone-weighted shingle roof, facing northwest. The plane scale is almost square, with the ground floor's outer wall spanning a width of 10.5m and a depth of 10.1m. Although the scale is relatively large, it does not accompany a front yard enclosed by rammed earth walls. As for the outward appearance, the building has a doorway on the centre front façade of the ground and second floors, a small window at the same position on the first floor, and a crenel-like opening to the north of the ground floor and the east of the first and second floors. Everything else is rammed earth wall with no finish coating. An open wooden balcony projects from the second-floor façade.

The composition of each floor

The ground floor includes a front and a back room, divided by a rammed earth wall partition to the east of the ridgeline; the rooms are connected through an opening in the centre with no fittings. Both are livestock sheds with the earthen floor, and joists are overlaid with fascines at the top, revealing the underside of the floor above. On the north edge of the entrance in the west room, there is a ladder leading to the floor above.

The layout of the first floor is also divided into a front and a back room, but with a wooden door in the middle

of the partition wall. With an earthen floor and a joist ceiling, it is thought to be a storage space, but there are remains of a small furnace in front of the back wall of the east room, so it may also have been used as a dwelling once. Mortises where wooden vertical gratings were inserted remain on the small window at the centre of the façade. According to the house owner, there is a tradition in the village of seasonal migration to Punakha, when the ground floor entrance would be locked from the inside, and the window would serve as the exit. The wooden gratings were made to be removable for this purpose.

On the second floor, in the same location as the rammed earth partitions on the floors below, there is a large beam that spans the entire width, with the thick central pillar built in the middle to the north. To its northeast is a food storage, to the northwest is a stairwell, and the rest to the south is a large living room/kitchen. There is a furnace in front of the east wall, and a large cupboard along the south wall. Wooden floor makes up the entire surface, except for the stone paved area in front of the furnace. For the partitions that enclose the food storage, rather than the customary *ekra* wall, the studs with a rectangular cross-section have been built at intervals, with vertical boards laid in between. Most of the wallboard separating the stairwell and the living room has been lost, but there are traces suggesting that boards were attached to the studs and the cut ends of the top and bottom penetrating tie beams; it can be assumed that the wallboard was constructed this way. The entrance openings in these walls are low and thought to be in the ancient style. On the outside façade there is a balcony with a depth of 2m; at its south end is an old latrine with a wooden wall. The capitals of the pillars that support the decorative edges of the eaves of this balcony are carved ornamentally, and there are unique engravings chiseled into the underside of the brackets above. There is a niche in the face of the outer wall between the doorway and the latrine; it is said that statues of Buddha were worshipped there in the past.

The roof beams are placed on sleepers laid on top of rammed earth block crowns on the upper edge of the outer peripheral wall. Of the four beams, the two that are inside are supported only by the top of the wall and have no struts in the middle. The presence of penetrating tie beams in the roof structure passing through the ridge struts and connecting the front and back purlins, is a technique not commonly seen in the construction of traditional farmhouses.

Considerations for restoration to the original state

There are almost no traces of modification to this building, and its original form has been very well maintained. There are several characteristics not seen in traditional farmhouses today, conveying a rather old architectural style. For example, the building has a closed structure

4 West room on the first floor
5 Ladder in the west room of the ground floor

and little openings to the outside. The only access to the upper floors is through a ladder in the livestock shed, the *ekra* walls are not used for the partitions, the *rabsel* has an open shape, and there are decorative carvings on key points of the wooden parts. Although the building is not small, there is no altar room, which may tell us something about how people performed rituals in older times. Many such square-planed traditional farmhouses can be seen in Thimphu region.

Conclusion

In the latter half of the 18th century, Samuel Davis drew a sketch of a traditional farmhouse similar to this building in terms of outward appearance. Moreover, it is said that the Choki School building described above, also located in Kabesa village, was constructed at the end of the 17th century. Judging by these factors, we can assume that the construction of this building too goes back to at least the 18th century. It is believed to be one of the oldest architectural structures among existing traditional farmhouses in western Bhutan and can thus be considered as extremely important.

The building has been unoccupied since 2008, and at the time of the investigation in 2013, the roof, the floor, and other wooden parts such as the balcony were showing significant decay. The building finally collapsed in 2017, leaving the outer rammed earth walls intact. From 2018 to 2019, all of the remaining materials were collected and sorted, and work began to identify the original location of each member, and to consider methods of reinforcement. The installation of the temporary roof to protect the rammed earth wall was completed in 2020 by the Department of Culture, and preparations are now underway for restoration work.

(Tomoda Masahiko)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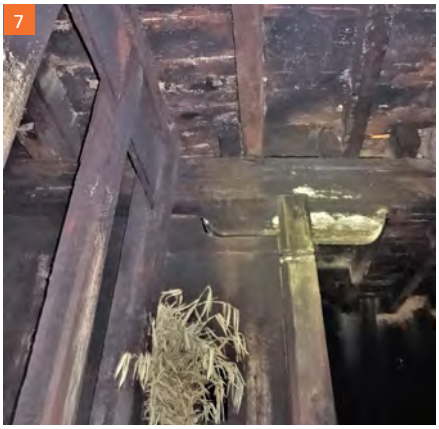
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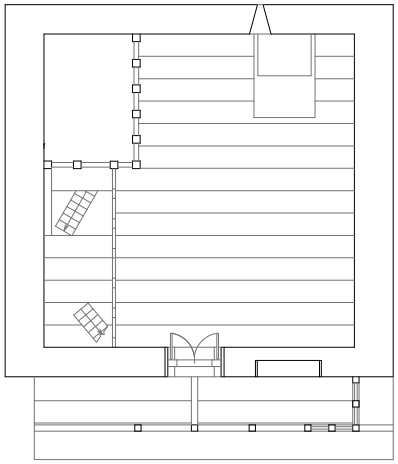
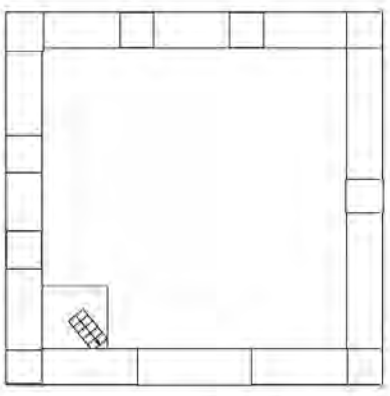
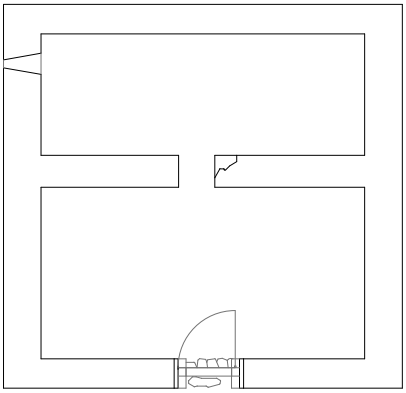
6 Partition on the second floor
7 Details of the central pillar on the second floor
8 Details of the upper part of the balcony
9 Attic space



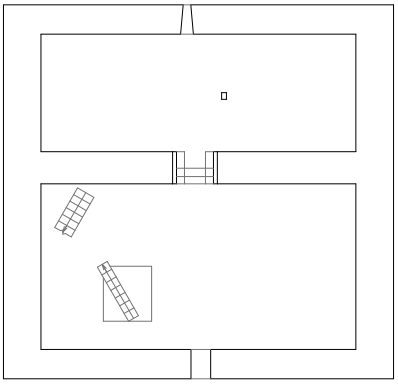
Second floor plan 1:200



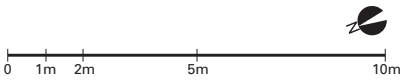
Attic floor plan 1:200

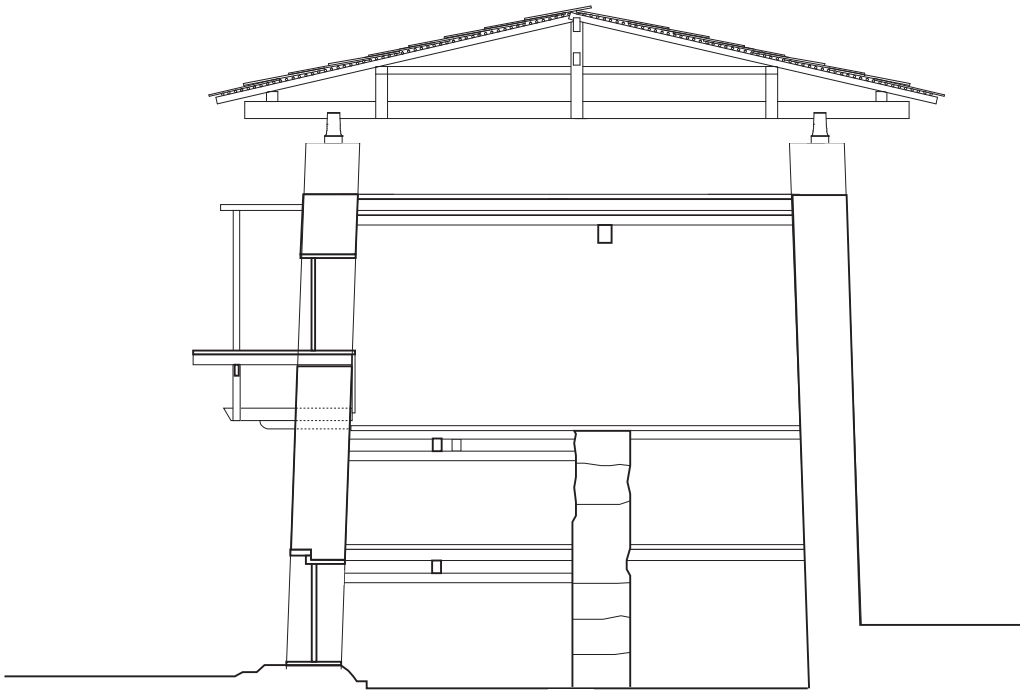


Ground floor plan 1:200



First floor plan 1:200





Cross section 1:150

Tandin Zam House

DATA

Dzongkhag
Punakha

Gewog
Dzomi

Village
Changjokha

Settlement location
riverside

Settlement pattern
clustered

Coordinates: 27.5813, 89.8693

1 Whole view of the front side (from southwest)
2 Whole view of the back side (from northeast)
3 Slender lattice window on the back side of the second floor

Location and summary

This building is a traditional farmhouse located in Changjokha village in the centre of Punakha, across the river from Punakha Dzong. It was one of the villages that migrated seasonally with a group of monks. The construction of Punakha Dzong is reported to have occurred around 1638, which is the highest limit for the establishment of Changjokha. Samuel Davis' sketch from 1783, which depicts several houses on the riverbank opposite to Punakha Dzong, resembles the present-day landscape of the village and houses of Changjokha. Therefore, it is likely that this building was built in the latter half of the 18th century.

The building is a three-storey rammed earth building with a gabled iron sheet roof—its plane scale measuring approximately 9.0m wide and 5.9m deep over the entire length of the first-floor outer wall. The building faces the west, where a rammed earth fence surrounds the front and two sides to form a front yard. The rammed earth foundation surrounding the front yard and the foundation of the main building are contiguous, which suggests that they were constructed at the same time.

In terms of its outward appearance, there are entrances on the ground and first floor and in the centre of the front, in addition to a doorway on the south side of the second floor, each of which have an external staircase. There are sweeping windows that open at the front of the first and second floors and in the north surface of the second floor. The rear has a closed outward appearance, with only a few small window openings throughout. The taper of the outer walls is evident. White plaster remains on the upper part of the front and the two sides. Its three-storied height, relatively small planar scale, and the limited number of openings in its

outward appearance give it a tower-like appearance.

The composition of each floor

With an almost rectangular plane, the outer rammed earth wall has a standard thickness of about 75cm at the base. The interior of the ground floor and the first floor is divided into north and south quarters, which are surrounded by the outer wall.

The ground floor consists of the north- and south-rooms, both of which have earthen floors. The doorway in the south room opens in the centre of the front, and small windows open on the south and east sides. Squared timber that has an axe-scraped pattern has been laid along the direction of the ridge, which is lined with axe-scraped-patterned half-logs on which the fascine has been laid. The room on the north side is a storehouse for grain that is surrounded by rammed earth walls on all sides and has a special configuration that prevents entry into it from the ground floor. It can only be entered through stairs that go down from the first floor. This feature is apparently only seen in houses of the village chiefs. The ceiling has a similar configuration to that of the south room.

The first floor can be entered through the doorway in the centre of the front of the house. It has the same plan as the ground floor and its north and south rooms are connected to each other by doors. The room on the south side is lined with 40cm wide boards. It has sliding bay windows on the west and south sides and high windows on the east side. The windows on the west side are long and narrow, while the high windows on the east side are narrower on the exterior wall and appear to be the original windows when it was built. The north room has an earthen floor and a ladder that leads down to the ground floor. Both rooms have square timbers that have an axe-scrapped pattern in the ridge that penetrates the middle wall. Surface-coated logs are placed on it, and fascine is laid on top of those.

The second floor can be accessed by an external staircase attached to the front and is divided into the north and south rooms. However, instead of a rammed earth wall, a pillar is built in the centre width-wise to shield the earth wall, which is thought to have been a later addition to what was once a single room. The floor is paved with wide boards and the ceiling is laid with fascine and there is a joist on the corner timbers along the ridge. The south room has a vertical lattice window that opens on the east side, and the sweeping that opens to the south is now blocked. This appears to have once been a doorway. In the north room, wide *rabsels* open with sweeping windows on the west face and the north face.

The attic has an earthen floor, and except for the front and rear centre part, rammed earth walls rise around the perimeter. The roof structure stands on a large beam of square timber that has an axe-scraped pattern, with a roof strut receiving the member by processing the end into a U shape. The roof strut has a tie beam that penetrates its ridge but does not go through. The purlin side beam is formed of square timber that has an axe-scraped pattern. The purlin penetrates the tie beam at the top end of the pillars into a roof strut, to which a rafter of surface-coated logs is attached. A lath is placed on top of it, and the roofing is made of metal. The rafter shows a lot of weathering, but the lath has little weathering, which can probably be attributed to the recent renovations.

Considerations for restoration to the original state

Overall, there are few modifications besides the open-

4 Earthen floor room on the south side of the ground floor
5 Traces of the doorway on the floorboard on the north side of the second floor

ings and the method of raising and lowering. A major modification is the addition of an exterior staircase at the front that has entrances to each floor but based on the traces from when it was built, we can assume that the first and second floors were originally connected by an interior staircase. Also, at some point in time, the south window on the second floor was used as the entrance and exit, and there was a veranda on the south side of the second floor. The doorway is thought to have been converted to a larger window. Traces indicate that the north window was enlarged, and other modifications were made to the building.

According to interviews, the interior was divided into the ground and first floors by rammed earth inner walls, and the second floor was divided into north-south rooms by a partition. The ground floor was used as a livestock shed, the first floor was used for storage, and the third was utilised for living. This could be the usage of the building according to the present plan.

Although it would be difficult to restore the original shape of the building, the configuration of the ground and first floors appears to be unchanged. On the other hand, except for the opening at the back, the second floor has been modified. However, the opening seems to have been enlarged, and the lack of traces makes the former shape of the building unclear. The traces indicate that the second and second floors were connected through an internal staircase. From the above, it appears that the openings were smaller, and the configuration was more closed than the present.

Conclusion

This building dates back to the 18th century and is the oldest rammed earth traditional farmhouse built in western Bhutan. It has been less subject to later modification and retains the style of when it was built. Given its outward appearance of a traditional farmhouse surrounded by a rammed earth wall, the building is considered to be an example of a traditional farmhouse typical of the 18th century in west Bhutan, as seen in Davis' sketch from 1783. It is also highly valuable in that it verifies the deep relationship between the Punakha Dzong and the village.

Architectural features such as large tapers and rammed earth with few openings are important in the history of Bhutan's traditional farmhouse architecture in terms of dating. It is also significant as it retains old fittings, such as high, small-latticed windows and long-latticed windows.

Although currently uninhabited, it is well maintained and in good condition, and continued conservation measures are recommended. (Unno Satoshi)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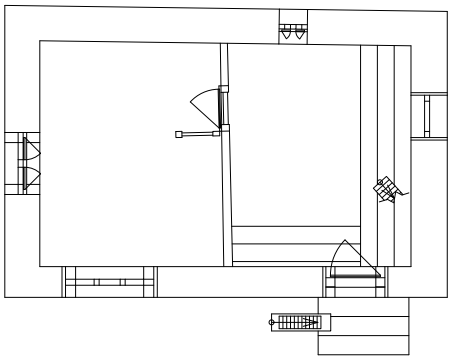
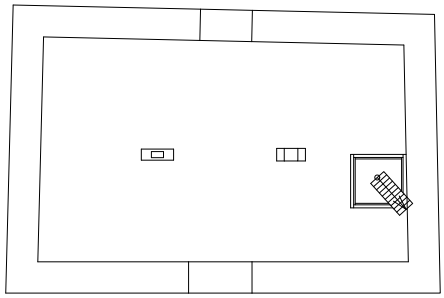
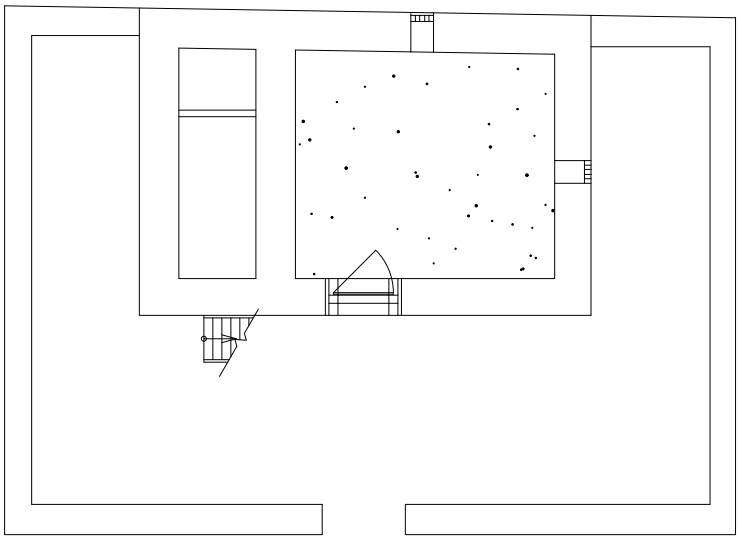
6 Entrances and the stairway on the outside of the front at present
7 Doorway on the first floor to the storage on the north side of the ground floor
8 Room on the south side of the second floor
9 Attic space



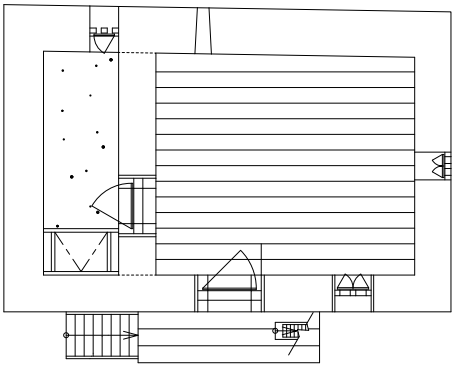
Second floor plan 1:150



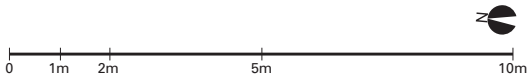
Attic floor plan 1:150



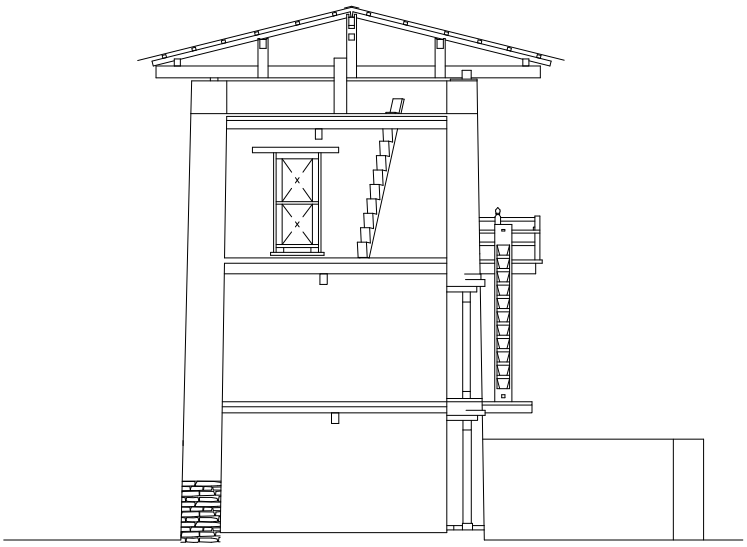
Ground floor plan 1:150



First floor plan 1:150



Fascine of the ceiling on the ground floor



Cross section 1:150

Peldon House

DATA

Dzongkhag
Punakha

Gewog
Dzomi

Village
Changjokha

Settlement location
riverside

Settlement pattern
clustered

Coordinates: 27.5811, 89.8693

1 Whole view of the front side (from northwest)
2 Whole view with Tandin Zam House standing side by side
3 Whole view of the back side (from southeast)

Location and summary

Changjokha village is in the centre of Punakha, across the river from Punakha Dzong. This was one of the villages that migrated seasonally with a group of monks. The construction of Punakha Dzong is reported to have occurred around 1638, which is the highest limit for the establishment of Changjokha. Samuel Davis' sketch from 1783, which depicts several houses on the riverbank opposite to Punakha Dzong, resembles the present-day landscape of the village and houses of Changjokha. The Tandin Zam House is next to this building.

This building is a three- storey rammed earth building with a corrugated metal-gabled roof. The total length of the ground-floor outer wall is the plane scale. Its width is 8.2m and depth is 5.9m. The front of the building is to the west. A large block wall of sun-dried bricks surrounds the front yard, and the entrance to the building is at the centre of the front wall. The front yard wall is considered later work since it differs from the main building in terms of the materials and method that were used for its construction. The front yard section has a sloping corrugated metal roof that is connected to the main roof and is equipped with a grain storage area and a furnace.

In terms of the outer appearance, there is an entrance on the west side of the building on the ground floor; on the centre of the first floor there is an overhang with an entrance, and *rabsels* are fitted on both sides. The white plaster on the front side is in good condition in comparison to that on the sides. On the second floor, *rabsel* bay windows open on the front and sides. On the other hand, there are few openings on the south, north, and east faces of the first and first floor, and only

small vertical lattice windows open on the east face of the ground floor. There is an overhang on the east face of the second floor.

Overall, the height of this structure is tall for the plane scale. There has been a lot of reconstruction and the building has a greater number of openings in comparison to the Tandin Zam house, which likely brings down the age of the architecture. However, their overall proportions are similar.

The composition of each floor

The ground-floor plane structure is surrounded by a rammed earth wall, and a wall of large sun-dried bricks further divides the north quarter and the three southern quarters into two separate rooms. This wall of sun-dried bricks is similar to the wall that surrounds the yard and may have been built at the same time. Presently, the north side room cannot be entered as there is no door that leads into it. The south side room is currently used for storage, and there is a small lattice window at the back of the east side. There are no pillars in the interior, and a large, squared timber sleeper beam passes width-wards along where the ridge is. A joist of surface-coated logs rests on top of the beam, and the fascine sits on the logs.

There is a staircase on the front to ascend to the first floor, which has its entrance at the centre of the front face. The interior is divided into three rooms along the north-south direction; there is a wooden wall that separates the north and centre room, and a plywood partition separates the south and centre room. The flooring crosses under the plywood wall in the two rooms, which suggests that the central and south room used to be one room. The southern room is equipped with a furnace at the east end, where a small window seems to serve as a chimney, and there is a *rabsel* on the front side. The central room has a staircase going up to the second floor and side entrances that connect to the north and south sides. The north side room is used as a living room, and similar to the south side, it has a *rabsel* at the front.

A wooden partition wall divides the second floor into two rooms, north and south. There are *rabsel* bay windows at the front in the west, as well as on both sides. There is an overhang at the rear side that has stairs to the roof. Both rooms have a wooden floor, and the south room has an altar room, but it does not have a triple opening with pillars. The room on the north side is currently in use, and traces of the old furnace can be found in the northeast corner.

The roof, similar to the second floor, has rammed earth at the rear as well as at the back of both sides. The rammed earth wall cuts off only on the north side of the back, where the entrance is located. Roof beams have been laid on sleeper beams at the back, and pil-

4 Small vertical lattice window of the storage on the ground floor
5 Kitchen space in the annex of the ground floor
6 Living room on the front side of the second floor

lars have been set up to support the roof beam at the front. On top of the roof beam, the roof strut joint has been processed into a U-shape, and a hole for an interconnecting member has been drilled in the roof struts, but no interconnecting member has been inserted. The ridge beam and purlin are at the top of the roof struts, on top of which are rafters made of surface-coated logs, and the roof is constructed of corrugated metal. There are thin shingles that are held with stone on top of the second floor *rabsel* bay window.

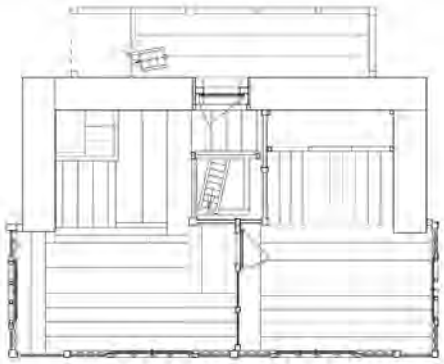
Considerations for restoration to the original state

Restoration to the structure's original form is difficult, but traces can be found in the rammed earth section of the front side of the first floor and the *rabsel* bay windows on the second floor. It is possible to infer the former conditions and the changes in modification. Except for the sun-dried brick wall partition, the structure of the ground floor seems to not have changed significantly. On the other hand, the *rabsel* at the front of the first floor appears to be later work, but its spherical shape is indistinct. The small window at the back, in contrast, is probably original. The three-side facing *rabsel* bay window on the second floor appears to be a modification. The original state is not apparent from the traces, but the rammed earth wall goes around the *rabsel* part, which may have been similar to the Tandin Zam House. According to interviews, the second and second floors were extensively renovated around 1950, which is consistent with the modifications mentioned in the restoration study.

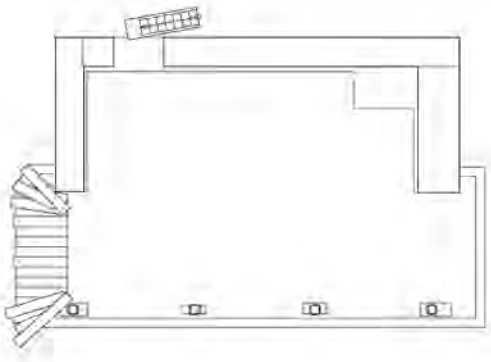
Conclusion

As a three- storey rammed earth structure, this building is a valuable example with relatively few modifications. The small slope of the rammed earth wall suggests that it was built later than the Tandin Zam House, but the similarity in proportions suggests that the architectural style was developed in the area during that time. It is a good example for highlighting the characteristics of a three-storey rammed earth traditional farmhouse. At present, it is being properly maintained and is in a good state of preservation. (Unno Satoshi)

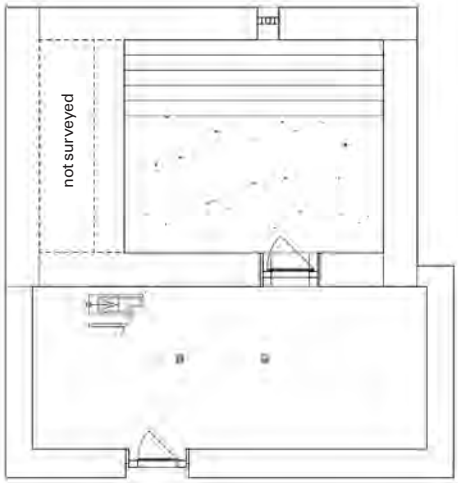
7 Altar room on the south side of the second floor
8 Attic space
9 Floorboards crossing under the plywood wall on the first floor



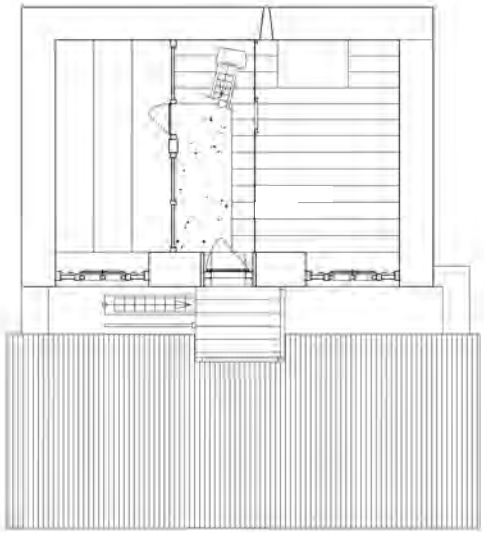
Second floor plan 1:150



Attic floor plan 1:150



Ground floor plan 1:150



First floor plan 1:150

Cross section 1:150

Phub Lham House

DATA

Dzongkhag
Haa

Gewog
Bji

Village
Talung Toed

Settlement location
tableland

Settlement pattern
clustered

Coordinates: 27.4331, 89.2512

1 Front view (from southeast)
2 Front side view (from south)
3 Back view (from northwest)

Location and Summary

This building stands on a gentle slope near the northern edge of the village above a valley line that follows a tributary feeding into the left bank of the Haa River. This is a southeast-facing, two- storey building with a gabled, stone-weighted shingle roof. It features a small yard enclosed by a wall built by piling up stones on its front face, and a wooden door opens on its southwest side. The plane scale of the building's main structure is 10.7m wide by 6.9m deep, with an attached wooden overhang on the west side of the second storey of the main rammed earth structure, as well as a simple balcony on the western section of the front face.

The composition of each floor

The entirety of the ground floor is a single-room livestock shed, with a single door entrance on the south face. A large beam of tall square timber runs along the ridge direction, supported by two round log pillars. Six pieces of half-split round timber (partly square) are affixed as joists on the beam; thick floorboards are placed directly on their top. Typically, there is a layer of soil underneath the floorboards to provide insulation, though this building lacks such a layer and is considered old-fashioned.

The first floor is accessed with an exterior ladder on the south end of the west side, which leads to the front room inside the southern half of the overhang. The front room contains a ladder leading to the attic, an entrance to the main part of the building on the right side in the rammed earth wall, and a storage room behind the rear partition wall. In the rammed earth section, a centre partition wall divides the space into two rooms (east and west), with the western half serving

as a living room and kitchen, and the eastern half as an altar room.

There is an area in the northwest corner of the west room where soil has been filled in, but not covered by the wooden floor. Although a stove currently sits here, this area used to be occupied by a furnace for cooking. Looking at the floor in this location from the ground floor up, joists are placed diagonally running from the large beam to the north wall, and small round logs are laid over them. This technique is relatively common among traditional farmhouses in the Haa region. In addition to the entrance on the west face, the exterior opening in the west room has a large opening leading to the balcony in the centre of the south face. A small, high window is located on the centre of the north face. Of these, the large opening on the south face has a central mullion. At present, only the western half can be gone through, while the eastern half has been closed up with wooden boards from the outside. The east room's north face is the altar of the whole width with a wooden niche installed into the rammed earth wall at the upper part of the centre, the upper edge of which is ornamented with small eaves with bracket-like decorations. Furthermore, the entirety of this north wall is covered in murals of the Buddha and eminent monks. There is a large opening in the centre of the south side as in the west room. Nonetheless, this has a dividing sill separating it into upper and lower sections, with each of the quadruple windows containing double opening doors on the upper section, and double sliding doors on the lower section.

The external balcony, supported by three round pillars, is currently only on the western section of the building's front face. Notwithstanding, according to the homeowner, it once extended further east to a wooden overhanging latrine on the south end of the building's east face, but only the framework of what appears to be its north face remains on the east wall.

The materials of the roof structure up to the roof beams, struts, and purlins are essentially old. While the struts that receive the ridge on the beams are square timber, the materials of the struts that receive the purlins have a cylindrical cross-section and are used differently, which together with the high quality of finish on these timbers is unusual.

Considerations for restoration to the original state and other technical features

The partition *ekra* wall in the centre of the first floor appears to be quite old, however, because the floorboards are continuous across both rooms, and given the difference in the soot covering the partition pillars and the ceiling, this space was likely a single room when it was built. There are traces of a large opening in the centre of the east side having been closed up using a pile of stones; this may have once led to an exterior overhang or balcony. Since there is a small window directly behind the Buddhist altar in the east room and a partition being a later work, the Buddhist altar and paintings were probably created at the same time when the partition was added or later. Nevertheless, they (including the wall closing-up the former opening on the east side) were likely renovated a rather long time ago. The interior side of the large opening on the south side of the west room has a double swinging door. Since the large opening in the east room also has partly broken bottom-edge plates, as well as shaft holes and traces of a central pillar on its lower frame, both these doors may have once been entrances with double swinging doors. On the other hand, it is unusual to have a front-facing balcony that is not accessible from the ground, which creates the impression that this was once an entrance. In that case, the present entrance on the west side could be used to access the overhang, or it could be a later work. In this building, a technique that widens openings at their base can be observed, with the entrance on the south side of the ground floor (with an internal vertical dimension of 1,780mm) measuring 995mm at the top and 1,030mm at the base. Meanwhile, the entrance on the west side of the first floor (with an internal vertical measurement of 1,795mm) measures 815mm at the top and 825mm at the base. Although there is a clear difference in the former case and only a slight difference in the latter, these two examples provide another basis to assume that the entrance on the west side of the first floor was created in a later period compared to when the building was erected.

The rammed earth outer wall exhibits a single, thin layer in the middle that corresponds to the height at which the floor beams of the external balcony are

inserted. The upper and lower framing materials for the insertion holes were probably embedded when constructing the rammed earth. This layer is built such that the top edge aligns with the crown of the upper frame, as well as the bottom edge of the front-face opening, and its position has been made horizontal. By contrast, the bottom line of the thin layer is slightly tilted, and the thickness of the layer is not consistent. In other words, the rammed earth in each layer is not strictly horizontal, but was re-leveled at a height corresponding to the second-storey floor. A similar insertion hole for the horizontal materials can be found in the layer of rammed earth that corresponds to the attic floor level. Although the relationship between the top edge of the layer and the top of the frame differ slightly, here too, it may have been re-leveled. This technique has been identified in several buildings in previous surveys (not only in the Haa region) and appears to be a relatively ancient one.

Conclusion

There are no traces of expansion for rebuilding the rammed earth walls of this building, and the particularly strong taper is striking. There is a strong possibility that the openings have been preserved in an old style. This is considered to be a valuable example of a house that retains particularly well the form that was once typical for ordinary farmhouses in the western region.

At the time of this survey, the vine-bound, round timber rafters, laths, and roof shingles had deteriorated considerably, and some had been replaced with CGI sheets. However, replacement and repairs to the shingled roof were completed in 2019. The main body of the building has remained relatively stable, but local authorities have restricted occupancy due to damage from the 2011 earthquake, such as the partial loss of the exterior wall. Full-scale repairs are a task for the future. (Tomoda Masahiko)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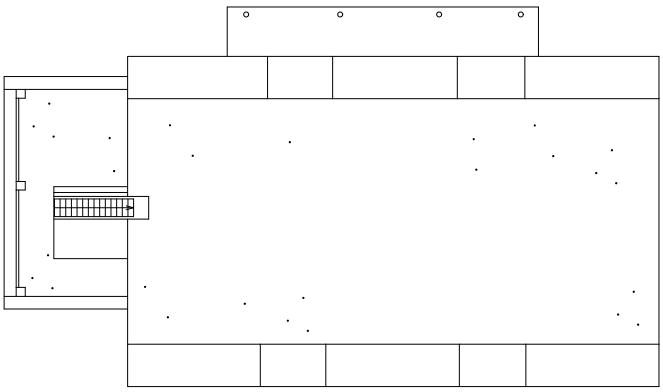
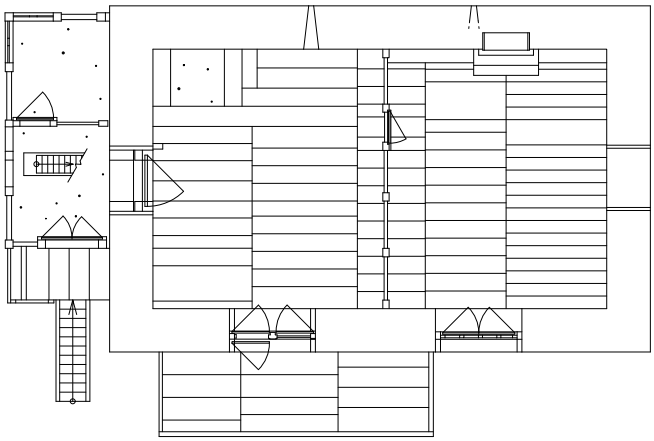
4 Livestock shed on the ground floor
5 Room border wall on the first floor
6 Altar room on the first floor
7 Ridge struts (rectangular, on the left) and other roof struts (round, on the right)

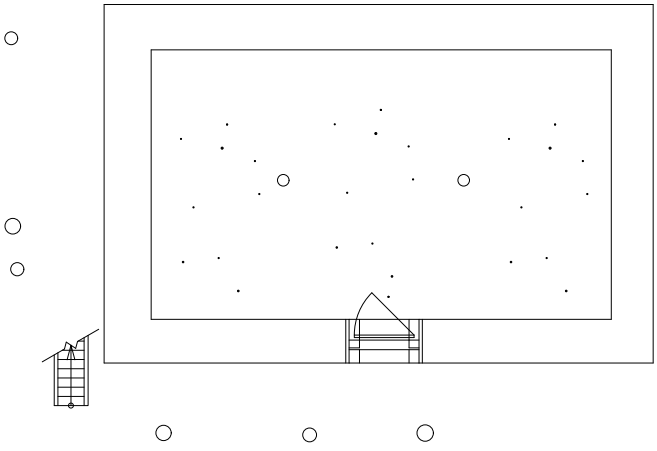
Low height layers of the rammed earth wall



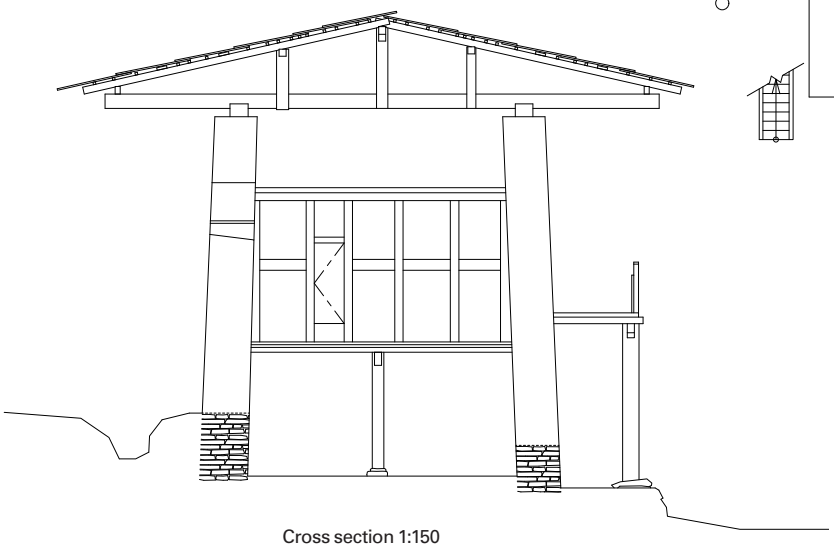
Attic floor plan 1:150



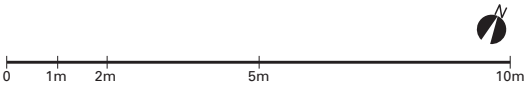
First floor plan 1:150



Ground floor plan 1:150



Cross section 1:150



3-4 Examples Showing Transitional Style

1

Gyem Pem House

DATA

Dzongkhag
Paro

Gewog
Dogar

Village
Tshephu

Settlement location
mountain

Settlement pattern
clustered

Coordinates: 27.3387, 89.5306

1 Front view (from south)
2 Front side view (from southwest)
3 Details of the façade

Location and summary

This building is one of the traditional farmhouses scattered around the village on the steep slope of the mountainside that overlooks the valley where the Paro and Thimphu rivers meet.

This is a three-storey structure with a half-hipped roof made of corrugated iron sheet, and its ground-floor plane scale is 9.5m wide and 7.8m deep. The front of the south-facing building has a yard enclosed by a high rammed earth wall with a slate roof, and the gate opens at the northeast corner at present. However, there is an old gate in the centre of the south face, which has been blocked by piling up stones.

In terms of the exterior appearance, the building has *rabsels* all over the west and south sides as well as the front section of the east side of the second floor, and the south side of the first floor. The ground floor is open and has pillars at the front, apart from which everything is made of rammed earth wall. Since the widths of the north and south sides are different, the *rabsel* on the north half of the west face of the second floor is cantilevered from the outer wall of the lower floors, while the south half of the same floor is placed on the rammed earth wall—independent of the main structure.

The composition of each floor

The front of the ground floor has six thick log pillars (only the second pillar from the left is a square pillar), which are built on the line connecting the front ends of the east and west rammed earth side walls, and the 2.2m deep space between the pillars and the rammed earth front wall forms a semi-outdoor space. The main structure, which is surrounded by rammed earth walls,

is a livestock shed with an entrance doorway in the centre of the front wall and has a small crenel-like window on its each side. A sunbaked brick wall divides the west end of the room—raising the floor one step and creating a narrow opening in the middle without fittings, but it is unclear what the facility is for. All of this has an earthen floor, which shows the log joist and the back of the upper floorboards.

The first-floor entrance is located near the west end of the front face, and there is an external staircase leading to the open balcony with a balustrade in front of the entrance. The interior has an entrance-cum-stairwell at the west end of the front, a living room to the east of the entrance, and a kitchen on the main part of the rammed earth. West end of the kitchen is separated by a sunbaked brick wall that forms a granary. In terms of external openings, there are two sets of triple lined three-stage windows in the *rabsel* in front of the living room and one crenel-like window at high position on the north face of the kitchen. All the rooms have wood floors, and the top part is covered with a screen made of woven thin-slatted wood on a log joist.

The stairwell on the second-floor wraps around the southwest corner of the rammed earth main body to form an L-shaped plane. The northern end is partitioned by a board wall and is in disrepair but appears to be an old latrine. In front of it, on the west side of the rammed earth wall, there is a doorway that leads to the storage room at the west end of the main structure. Most of the main structure of the building is occupied by a Buddhist altar, and the centre of the back wall has been recessed to accommodate the altar itself. There is a triple door entrance to this room from the front room to the south. The front centre of the *rabsel* has quadruple windows, and there are triple windows on both sides of it. There are triple windows on the east face as well (all of them are three-stage windows). Different from these two sides, the west face is mostly an *ekra* wall. There are no external openings in the main rammed earth structure. All the rooms have a wooden floor, and the upper part is made of planks placed on joists of squared timber. All partitions except for the old latrine entrance are *ekra* walls, and the wall between the storeroom and the Buddhist altar room is painted with mud only on the side of the latter. Laths are visible on the storeroom side. The walls of the altar room and the room in front are painted yellow and have Buddhist paintings and botanical designs.

All the roof structure materials are relatively new and appear to have been modified from when the old gable roof was replaced by the current metal roof.

Considerations for restoration to the original state

There is no evidence of extensions to the rammed earth wall of this building and it seems to have originally been a three-storey building with a plane scale similar to the current one. The front edge of the side wall protrudes on the east side of the ground and first floors, while on the west side, the wall is separate from the main structure. The three corners of the main body, excluding the southeast corner, all use the masonry technique of alternately stacking corner materials, which suggests that the structure was originally asymmetrical. However, the rammed earth wall at the southwestern end of the building is believed to be later

4 Front space of the entrance on the ground floor

work because its construction is different from the main structure, and the wooden structure above may have been supported by wooden pillars like those in the front.

On the other hand, the front rammed earth wall of the main building structure has small crenel-like windows in the same position as on the ground and first floor. Though these windows on the first floor are currently indoors, they may indicate that this area once faced outward. In other words, it is likely that the first-floor front was originally more like an open balcony, as opposed to the close *rabsel* that it currently is. Since the wood of the ground-floor pillars is heavily weathered, it is possible that they are made of the original material from this period.

The four corners of the second floor, including the southeast corner of the rammed earth main structure, are built using the masonry technique of alternately stacking corner materials. This may indicate that *rabsel* may have originally wrapped around the sides. Since there are no front windows similar to the ones on the lower floor, it is possible the front building was an interior space like at present, but this is difficult to determine as the wall is painted and blockage marks cannot be seen. Based on the disturbed surroundings, the entrances that open on the south side of the first and second floors of the main structure are probably later work, and it seems that the first floor originally had a swing door entrance. However, since the west side of the second floor has an entrance, we cannot ignore the possibility of a south side window. Alternately, we can consider the possibility that there was a south entrance that could be accessed by an external staircase from the first floor, and that the second-floor front had no *rabsel*. The current indoor partitions are all believed to be later work, and the original structure only had a single room space on each floor. The floor construction varies between the first and second floors as well. The former has floorboards placed directly on the joist, while the latter has an insulating earthen layer under the floorboards. This leads us to assume that the second floor was the main living space in the past.

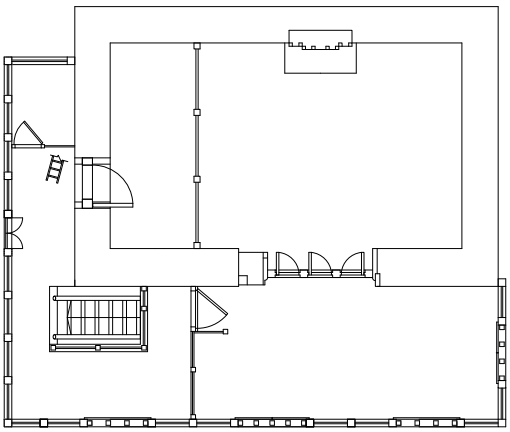
Conclusion

Although there are limits to how much the current traces on the front can lead to restoration, this is a form of which there are very few existing examples. It appears that various transitional forms existed in the process of developing from a closed form enclosed by rammed earth walls to the triple-sided *rabsel* that is common today, and this building is one such example. There are several examples of old traditional farmhouses with thick log pillars that support the *rabsel* but few of them are still in good condition, which makes this structure a valuable one in this respect.

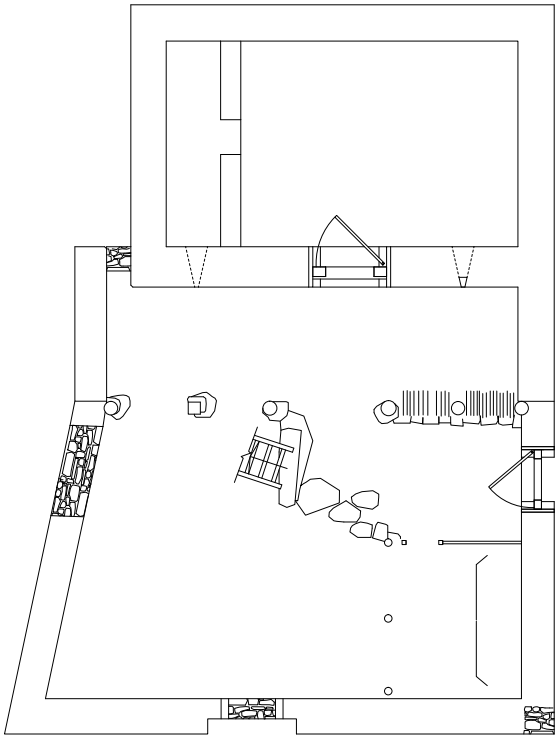
(Tomoda Masahiko)

5 Living room on the first floor
6 Stairwell on the second floor
7 Doorway of the altar room on the second floor

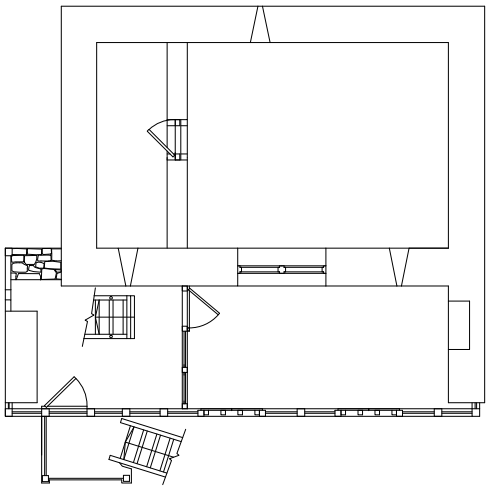
Details of the ceiling of the kitchen on the first floor



Second floor plan 1:150



Ground floor plan 1:150



First floor plan 1:150

3-4 Examples Showing Transitional Style

2

Chencho Pem House

DATA

Dzongkhag
Haa

Gewog
Bji

Village
Talung

Settlement location
tableland

Settlement pattern
clustered

Coordinates: 27.4255, 89.2500

1 Outside view (from southeast)
2 General view of the valley from west. Chencho Pem House stands in the front centre. Rinchen House can be seen to the right in the background
3 Outside view from west

Location and summary

Talung village is a settlement located in a valley to the north side of the Haa river. Chencho Pem House stands on the higher part of the west side of the valley, facing south and overlooking the entrance of the valley. It is a two-storey building, approximately 9m wide and 10m deep. It has thick rammed earth walls (around 68cm measured on the ground floor) with a noticeable taper. The gabled roof has deep eaves and is covered with wood shingles held in position with stones. On the ground floor, to the front, a row of wooden pillars stands between the side rammed earth walls, creating an entrance porch. On the first floor, the L-shaped *rabsel* closes the front and the right side of the building. A wooden covered balcony supported by pillars is attached to the right side of the building, giving access to the first floor.

The building suffered significant earthquake damage. It shows deep cracks on the rammed earth walls, prominently on the west side. The family has moved away and the house was unoccupied at the time of the survey. According to the owner, the house dates back four generations.

The composition of each floor

The ground floor is divided into the stable to the back and the entrance porch to the front. The stable room is approximately 7.4m wide and 5.7m deep; all four walls are made of rammed earth. It has no openings except for the entrance door, on the right side of the front wall. A former entrance door, which was located in the middle of the front wall, is currently closed with a stone wall. A row of small round wooden pillars runs from right to left through the middle of the stable sup-

porting the structure of the first floor. The two side rammed earth walls extend approximately 2.7m to the front forming the entrance porch, which is closed at the front by a row of three wooden pillars standing between these side walls. These three pillars have a large round section with a diameter of around 30cm; they stand on foundation stones, and their upper part is cut in a U-shaped groove to receive a beam that supports the joists of the first floor. In addition, a currently unused mortice hole is carved on their upper half; this suggests that these pillars might be salvaged members previously used in a different building.

The first floor is also divided into the back part, which is surrounded by rammed earth walls, and the front part, which is closed by the *rabsel*. It is accessed from the wooden balcony through a door located on the right wall of the back part. The back part is divided roughly in half by a wooden partition wall running from front to back. The right half is the main living space, with the oven located at the right-back corner. The left half is further divided into a back room and a front room by a partition wall, although this seems to be a recent addition. A window is opened to the back of the left wall. The front room was used as altar room. The back and front parts of the building are connected by two openings in the rammed earth wall. The L-shaped *rabsel* runs through the front and the right side of the front part of the building, while a rammed earth wall closes the left side. The front part is also divided roughly in half by a partition wall into a right and a left room.

The corners of the rammed earth wall dividing the front and the back of the building rise to the attic creating two high parapet walls, which divide the attic also into a front and a back area. Four struts supporting the roof beams are set between these two parapet walls. The base of this struts is circular, but their upper part is carved into a square section. Another row of roof struts (of square section from top to base) stands on top of the front *rabsel*. All the struts stand on wooden boards set as a base, and their surface is finished with hand axe. The back rammed earth wall also rises to the attic creating three high parapet walls. Six roof beams run from front to back supported by these parapet walls and the centre and front struts. These beams project around 2.2m from the front wall and 2m from the back wall. The purlins running from right to left also project noticeably from the wall, creating deep roof eaves on all sides.

4 Outside view showing the wooden balcony attached to the east side of the building
5 Front entrance porch
6 Entrance of the stable
7 Inside view of the stable

Construction history

The joints on the rammed earth walls and the configuration of the parapet walls suggest that the back part of the building, surrounded by four rammed earth walls, is the older core part of the house. This core part had a simple rectangular plan, approximately 7.4m wide and 5.7m deep on the ground floor, and was at least two storeys high with a high parapet. At this stage, the building had only a few openings: the entrance of the stable on the ground floor, the entrance to the living quarters on the right side of the first floor, and the windows on the left and front walls of the first floor (these windows may have been modified or enlarged later).

At a second stage, the two side rammed earth walls were extended to the front, creating the front part of the building. The ground floor was closed with the row of pillars to create the porch, while the *rabsel* was added to close the front part of the first floor. Originally, the front-right side of the first floor might also have been a rammed earth wall, creating a symmetrical layout with the *rabsel* to the front encased between two rammed earth side walls. Afterwards, this front-right rammed earth wall might have been demolished to create the current L-shaped *rabsel*. On the attic floor, the parapets of the front rammed earth wall were demolished (except for the right and side corners) in order to extend the roof to the front.

Conclusion

Chencho Pem House, together with Rinchen House, are the two oldest buildings in this area, and as such they are essential to understand the original layout of the settlement and the features of its buildings. Moreover, in an area where almost all other buildings have roofs covered with corrugated metal sheets, both houses retain the original roofing technique of wood shingles held in position by stones; this adds to their visual value as part of the landscape.

In addition, Chencho Pem House has experimented relatively few alterations, and it is possible to read the original configuration of the building from its current condition. The front porch with the row of pillars is also an interesting feature, shared by other traditional houses in the area such as Lham Tshering House.

Therefore, this building can be considered to have an important cultural significance due to its high visual, historical, and architectural value. (Martinez Alejandro)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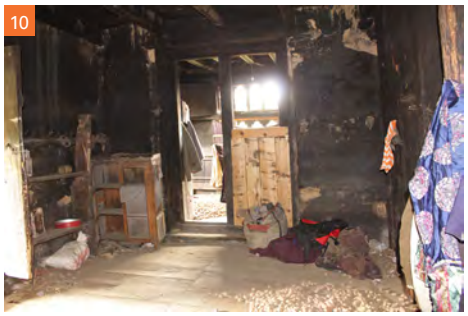
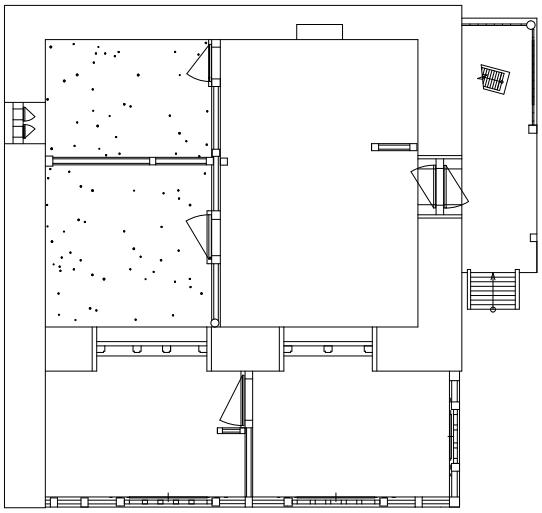

10

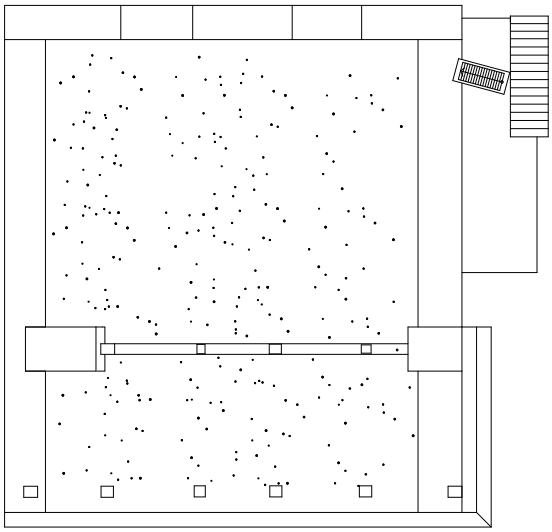

9


11

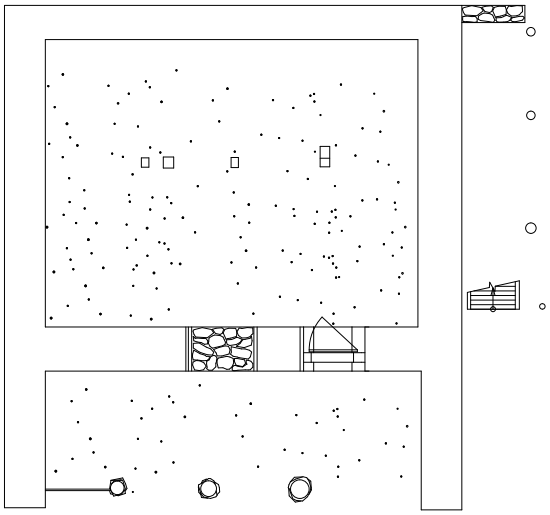
8 Former entrance of the stable closed with a stone wall
9 Detail of the *rabsel*
10 Inside view of the main living space on the first floor
11 Detail of the roof struts standing on the centre of the building



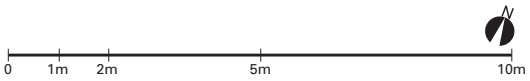
First floor plan 1:150



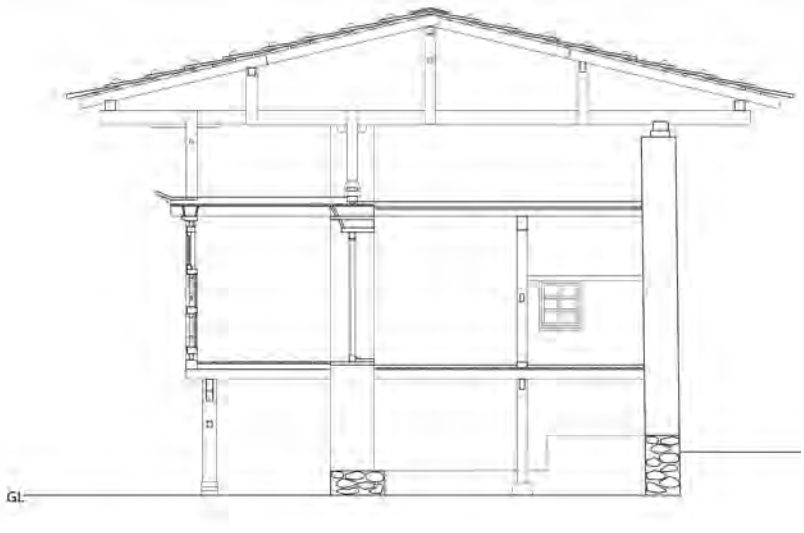
Attic floor plan 1:150



Ground floor plan 1:150



Attic space



Cross section 1:150

Rinchen House

DATA

Dzongkhag
Haa

Gewog
Bji

Village
Talung

Settlement location
tableland

Settlement pattern
clustered

Coordinates: 27.4251, 89.2504

1 Front view (from southeast)
2 Distant view (from northwest)
3 Gutters on the north wall of the first floor front room

Location and summary

Located on the left bank of the valley of the Haa River, the house sits in a village with a scattering of traditional farmhouses on an east-facing slope overlooking a mountain stream.

This building is a two-storey, south-facing structure with a gabled, stone-weighted shingle roof. Its plane scale is 9.4m in width (south side) by 8.6m in depth (west side) at the ground-floor exterior wall. There is a yard surrounded by a rammed earth wall connected to the east side of the building, with a gate at the northern end and a slanted, shingled roof on the eastern side. With regard to the building's outward appearance of the front half of the building features rammed earth walls on the first storey, while the second storey has a typical, three-tiered *rabsel* running along three sides. In the rear half of the building, the upper and lower floors feature rammed earth walls from the north to the west face, while from the east face to the east end of the north face runs a *rabsel* without eaves resting on a row of square pillars and the rammed earth wall. A small, overhanging attached part connects to the west of this on the north face.

The house was uninhabited at the time of the survey, and most of the floorboards had been removed.

The composition of each floor

The ground floor comprises two rooms (one at the front and one to the rear) enclosed by rammed earth walls, but the width from east to west is 9.4m along the south exterior wall and 6.8m on the north exterior wall; the placement of the east wall is off by that amount. The north room has a wooden doorway on the east side and a very small window that opens up on the west side. It has an earthen floor and appears to have once been a

livestock shed. The south room has an entrance door on the east side and a small window with a vertical wooden bar on the south side. The floor is earthen and appears to have been used recently as a workspace. The two rooms are separated by a rammed earth wall, but traces of a blocked-up doorway can be seen in the centre when viewed from the north room. In addition, the floor in the north room is about 400mm higher.

The first floor comprises three living rooms that correspond to the interior of the ground floor and a section attached on the northeast side. Entering the building via the outer balcony on the east side with the ladder at its north end, we first come across a long front room stretching north–south with an earthen floor. The border with the room on the south side is an *ekra* wall together with the east exterior wall within which there is a window with a single sliding door. The north exterior wall features vertical boards, western side of which a gutter carved from round timber protrudes out from the floor height to the exterior. It is thought that tasks involving water were used in this front room. To the west of this is a small room surrounded by vertical boards similarly accessed via a swing door. This is assumed to be an old latrine from signs of an opening having been blocked up on the floorboards, which are lined with round timber shaved flat on the upper surface. From the west face of the front room to the south face of the old latrine, there is a conspicuous taper in the exterior surface of the rammed earth wall running from the ground floor. Entering the entrance doorway at the north end of the east rammed earth wall, one enters the largest room in the house. Only the boundary with the south rooms is partitioned by an *ekra* wall; the other three sides are surrounded by rammed earth walls. There is a large window that occupies most of the western wall, equipped with a double sliding door on each of the three upper and lower levels. There are no other openings besides the entrances to the east- and south-adjoining rooms, while the north side is entirely made of rammed earth wall. The floors are wooden. Only one part of the southeast corner features a stone floor, and it is clear from the indications of a blocked-up opening of an old chimney in the ceiling above and the sooty surroundings that a furnace once stood there. The southern half of the first-floor features two rooms running east–west, with the eastern room being the slightly

4 South room on the ground floor
5 Front room of the first floor
6 North room (former kitchen) on the first floor
7 Northwest corner of the southwest room on the first floor

larger of the two. The exterior faces are all *rabsel* walls and windows. The windows have been remodeled from wooden sliding doors into double-folding glass doors. The boundary between the east and west rooms is an *ekra* wall with a wooden door at the north end. On the south side of the east face of this entrance there is a concealing wooden wall. In light of similar examples, the east room is believed to be a Buddhist altar room. Although the two rooms originally had wooden flooring, the majority of the wooden floorboards have been ripped out. The wooden members are all newer than those around the north and front rooms. It is apparent that these additions were added comparatively recently.

A ladder runs from the southern end of the first-floor front room to the attic space. The roof is gabled with an east–west ridge; although it is a shingled roof, some parts, such as the southeast side, have been repaired using corrugated galvanised iron (CGI) sheets. The wood around the roof structure (including the beams) is comparatively thin, and considering the extent of weathering, is not particularly old.

Considerations for restoration to the original state

The history of modifications to this building is generally presumed to be as follows:

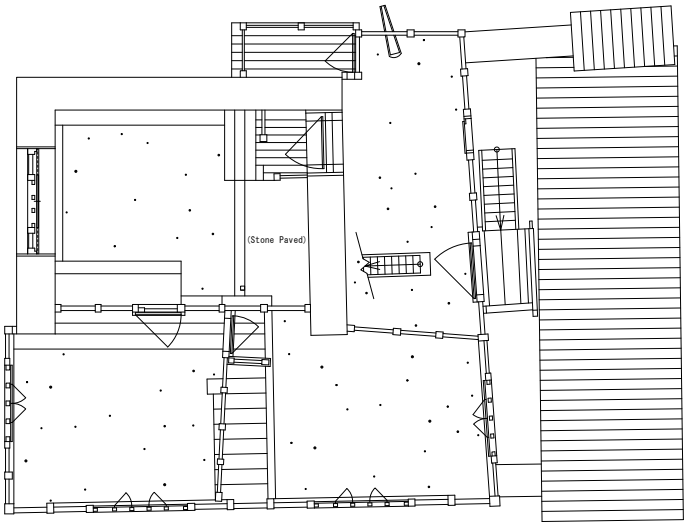
When it was built, the building was the size of only the northern half of the current rammed earth structure, a small dwelling with only one room on the upper and lower floors. The window on the west face of the first floor is later work, as is the small window on the west face of the ground floor. The entrance on the east face of the ground floor is inferred to be later work from the similarity of the condition of the wood to the extended southern half section. When the house was built, the entrance is believed to have been located in the centre of the south face. On the west face, at the south end of the northern half section corresponding to the southwest corner of the original exterior wall, rammed earth wall is constructed using a masonry technique of sticking corner materials in an alternating manner. The interior face of this wall corner on the first floor has been disturbed, suggesting that when it was erected, the south side of the first floor was also covered by a rammed earth wall. Since the wood for the first floor entrance on the east side appears to be reused material, and its positioning relative to the furnace appears somewhat unnatural, it is highly likely that when it was built, there was no attachment on the eastern side, and a balcony on the south front face served as the main entrance.

An entrance and overhang fitted on the east side of the first floor. Through a comparison of the degree of weathering of the wood, the old latrine is older than the area around the front room. The rammed earth wall that the north side of the front room rests against is also comparatively new, suggesting that at the time of this modification, the front room area had a simpler structure than it has today with an external balcony etc.. The large window on the west face was probably added around the same time.

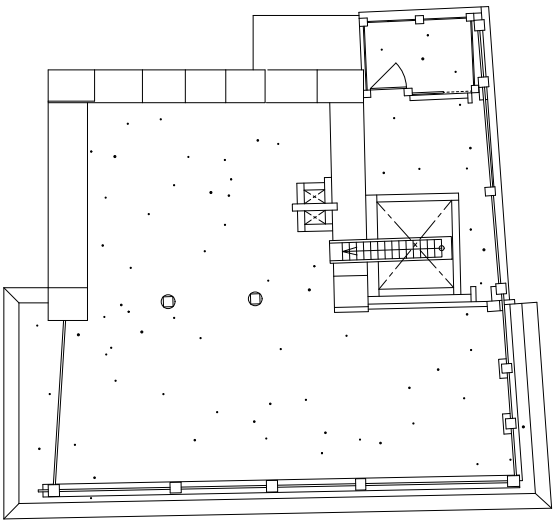
Extensions to the southern side were made throughout. In doing so, the existing location of the rammed earth wall on the western side was retained, while on the eastern side, the rammed earth wall was extended to the east end of the overhang to increase the width. In the north room on the ground floor, the old entrance on the south side was removed and a new entrance was constructed on the east side. In addition, the roof was completely refurbished to match the plane scale after this extension. Based on the differences in the rammed earth, the parapet was likely extended to raise the roof. As for the partition between the north and south rooms on the first floor, due to the incorporation of reused materials in some parts of the present partition, we cannot dismiss the possibility that the rammed earth wall had already been removed and modified to the wooden façade some time prior to the addition of the current southern half section.

Conclusion

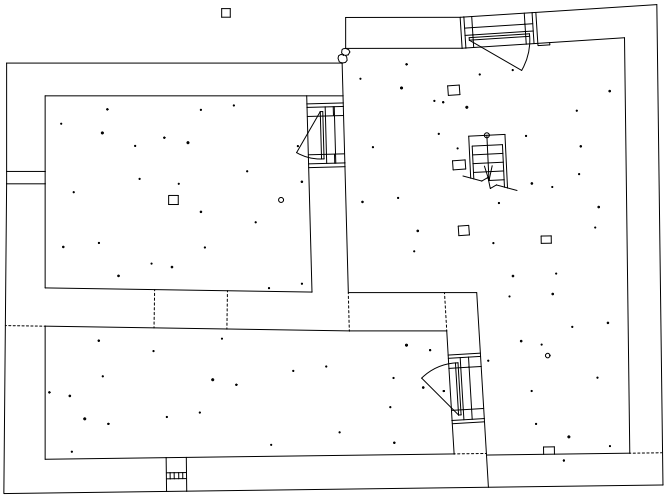
When it was built, the building was only the rear half of the current one, which was surrounded on four sides by rammed earth walls; its plane scale was very small, with a width of 6.8m by a depth of 5.3m. The original shape of the front face of the first floor is unknown due to subsequent modifications, but like the ground floor, it probably had a particularly enclosed appearance, with only a single wooden doorway in the centre of the front face. This is a valuable remaining example of a small, single-room house. (Tomoda Masahiko)



First floor plan 1:150

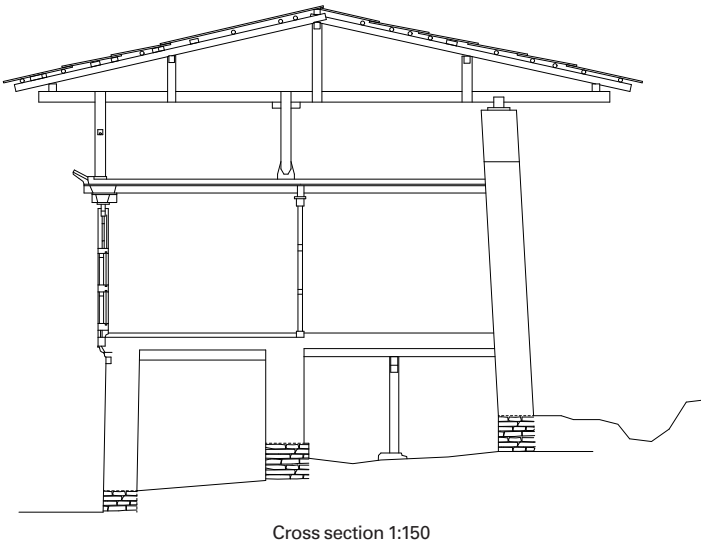


Attic floor plan 1:150



Ground floor plan 1:150

Attic space (rammed earth structure shows the four corners of original form)



Cross section 1:150

Pema Khandu House

DATA

Dzongkhag
Haa

Gewog
Samar

Village
Sharri

Settlement location
mountain

Settlement pattern
clustered

Coordinates: 27.2703, 89.3210

1 Front side view (from south)
2 Front view (from west)
3 Back view (from south east)

Location and summary

In Sharri Village in Haa Dzongkhag (approximately 12km south of the urban area where Haa Dzong is located), and on a high ground about 600m east of the main road, a small village formed on the eastern end of a broad swath of cultivated land. The village stands on ground sloping mainly westward, with a river running north to south through a west side valley.

The main building is one-storey, approximately 8.5m wide and about 10.5m deep, facing westward out of rammed earth with a shingled roof and a depth-side front. The building site slopes westward, confirmed by the uneven masonry foundation running beneath the building from west to east (both front and back). Wooden wall members with windows on the front of the first floor and towards the front on both sides jut slightly outward from the surface of the rammed earth on the ground floor. The wall on the south side is inclined slightly westward from the centre with a separation from the base, and clearly, the western wall member is new. The ground floor areas around the wooden wall on the front of the first floor and the first-floor section are extensions; the original house was extremely small. A balcony is located on the south side of the first floor with a ladder and an entrance. The north side presently has a construction similar in form, and touches a newly built adjacent house in which the ground floor is used as a living space.

The composition of each floor

The ground floor is used for livestock and is divided into two rooms to the east and west, both with earthen floors. An entrance is found in the middle of the south side of the west room, with a hinged wooden door

attached. An entrance to the east room is provided to the north in the partition wall between the rooms. Windows are set in two places on the west side of the west room, but there are no windows in the east room. A single pillar stands in the middle of the east room, and beams cross north to south with round joists. The eastern wall member is mostly masonry, as indicated by the exposed rocks at the bottom. The west room has round joists crossing east to west, and an old wooden floor.

The first floor is divided into five rooms and is used as living space. The interior is divided into two rows of rooms on the north and south sides. The two rooms in the southern row are for daily activities, while the three rooms in the northern row are divided between spaces for religious worship and storage. The east room in the southern row serves as a kitchen, and the western room is a living area. The northern rooms are arranged from the east in order of storage, an altar room, and a prayer room, respectively.

An entrance is provided on the west side of the southeast corner room, continuous with the south side balcony, as well as a relatively large wooden window on the east side. The window is built slightly recessed from the outer surface on the south side. This room is used as a kitchen, and kitchen equipment is found on its east side. An approximately 2m wide doorway is located on the west side of the kitchen, with a pillar erected in the middle; the north section serves as the opening of a sliding door, and an interconnecting member inserted into the south section acts as a wall, continuous with the southwest corner room. This room is considered a living room. The front west side and south side are wooden walls with windows in the middle of each with sliding shutters. The north face of the room is an *ekra* wall with an entrance doorway that opens eastward. The northwest corner room is a prayer room, which is contiguous with an altar room on the east side. The west side of the altar room can be opened for worship, as most altar rooms have a cabinet opening made of three sections separated by pillars. An altar is placed at the east end. The insides of altar rooms are normally decorated in an elaborate manner, such as having a vivid paint finish applied to wooden sections. However, no such decorations are found in this house;

4 East room on the ground floor
5 West room on the ground floor
6 Kitchen on the first floor
7 Entrance to the altar room on the first floor

even the altar is made of plain wood. The east side of the altar room is separated by an *ekra* wall and used for storage. An entrance doorway is provided on the south side connecting to the kitchen, and a small lattice window is located on the east side. The border with the kitchen is an *ekra* wall.

The attic floor serves as an attic and is reached by climbing an external ladder on the east side, and has an earthen floor used for storage. Wall members are partially erected on top of rammed earth walls like a parapet, with beams sitting atop bolsters and struts placed on top of these; the upper part of the wooden wall, formed by beams, is supported by standing struts.

The context of additions

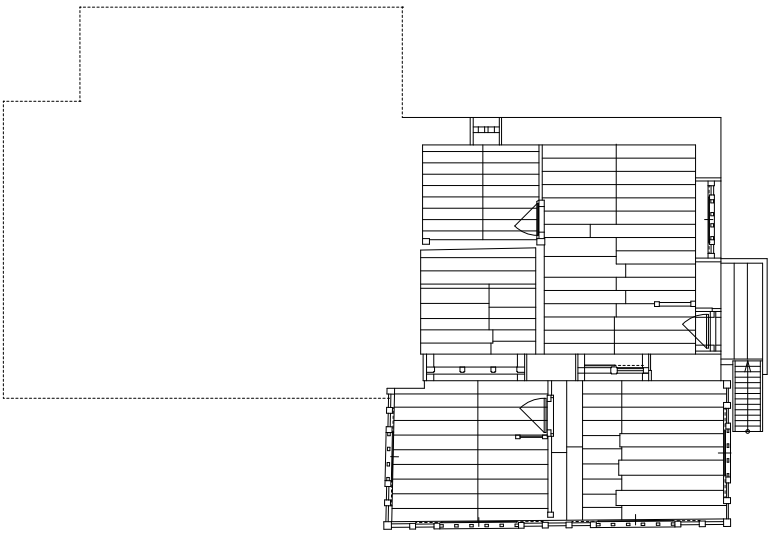
It is believed that the original building size was encompassed within the east rammed earth wall. While checking the south side of the present-day building, large cracks were found at places on the west side of the rammed earth wall that pass north to south through the current interior. The east rammed earth wall surface is tapered and was originally an outer wall. Hence, the two rooms enclosed by the west wooden wall are extensions. These wooden walls have little grime, and were therefore built later. The joists beneath the living room and prayer room on the west side, as well as the construction of the front entrance to the altar room, have little grime and were thus later additions.

There is not much mystery regarding the exact original openings in the building, but the following points may be considered. The construction of the contemporary south side entrance and east side window in the kitchen, as well as the material of the small east side window, are relatively free of grime, and as such were likely built later. The same goes for the two sections of the entrance doorway on the west side of the kitchen, which also have little grime. The front of the altar room is also a later construction, as its material is newer. Based on the above points, presumably there were originally no openings on the south side, two openings made on the west side of the rammed earth wall, and the entrance doorway and windows. There are no signs of alterations made to walls except for the present kitchen and altar room west entrance doorway; thus, it is assumed that there were originally openings on the west side of the altar room. The ground floor also had no room on the west side, and is believed to have been a single room enclosed by the rammed earth wall. The current interior entrance doorway was likely a ground floor entrance doorway. If the ground floor entrance doorway was on the west side, then the original first floor entrance was probably also on the west side. Presumably, there was a balcony outside of this entrance doorway. It is unknown if any of the northern and southern openings on the west side were entrance doorways, but if we consider that the present kitchen is on the south side, we may assume that the south side opening was an entrance doorway, and the north side one was a window. Additionally, the *ekra* wall (which divides the first-floor interior into north and south rooms) has little grime on the partition wall pillars or the material used in the entrance doorway, so initially, there was no central wall dividing north and south, and this was probably one room.

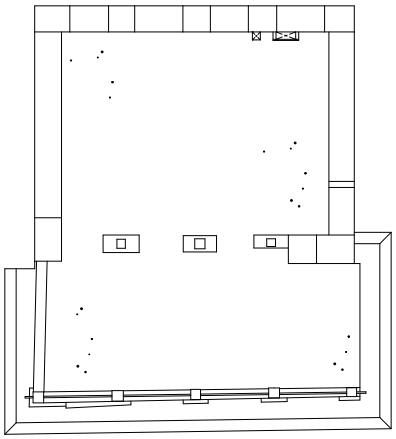
The attic space was once quite small. Today, there are roof beams running east to west (including the extension), so at some point the original beams were completely replaced with longer ones, and the attic space was redone overall. The neighbouring house has an iron shingle roof, but this house still retains its stone shingle roof.

Conclusion

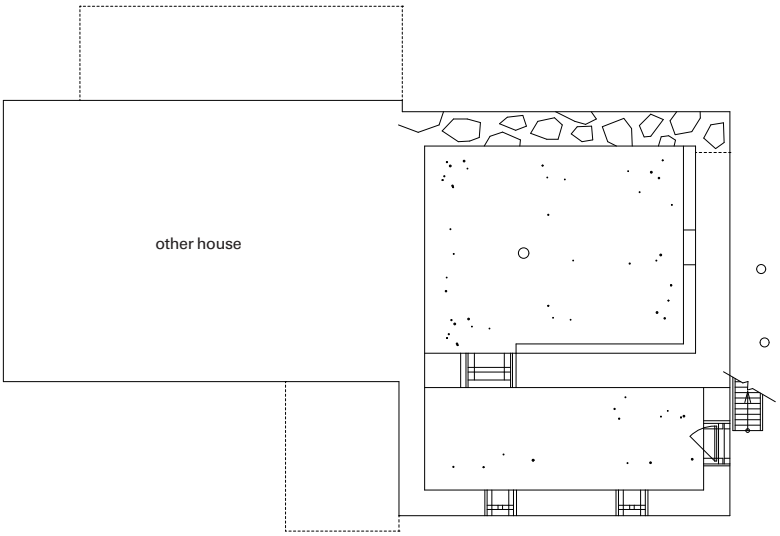
This building was likely a relatively small residence enclosed by a rammed earth wall. Thereafter, it was extended in the front. Specifically, a wooden wall section with a window was added to the first floor to improve the living environment, highlighted by the addition of an elaborate altar room along with a prayer room. It is conceivable that the many examples of altar room extensions with prayer rooms were due to the spread of Buddhism throughout Bhutan, along with expendable incomes. The development of such rammed earth residences is likely verifiable throughout Bhutan, and this residence is highly valuable for history in the way it preserves the typical form of this residential development. (Ezura Tsuguto)



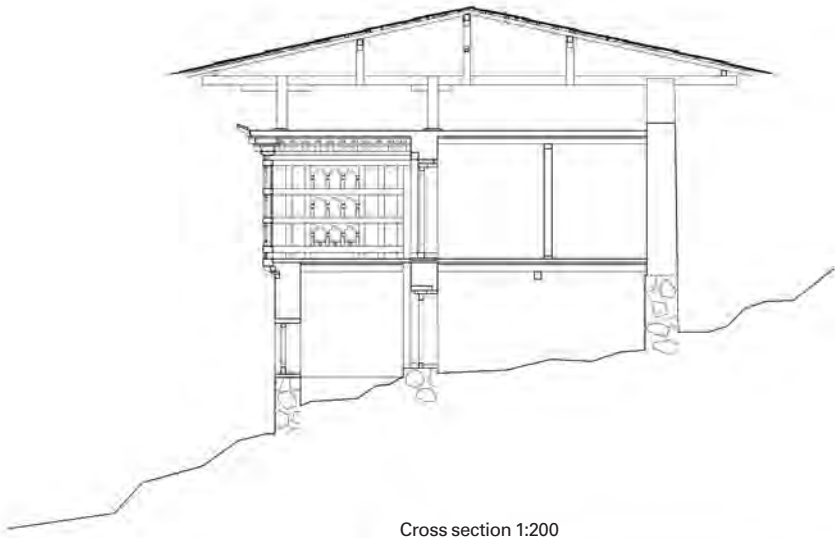
First floor plan 1:200



Attic floor plan 1:200



Ground floor plan 1:200



Cross section 1:200

Namgay House

DATA

Dzongkhag
Punakha

Gewog
Shengana

Village
Jazhinkha

Settlement location
tableland

Settlement pattern
clustered

Coordinates: 27.6076, 89.9286

1 Front view (from south)
2 Back view (from northeast)
3 Details of the entrance

Location and summary

This building, located in Jazhinkha, is supposed to be the oldest traditional farmhouse in the area and is over a century old. The main building faces south on a slope that descends towards the southeast. To the south of the main building is a rectangular yard that has been sectioned off with a rammed earth wall topped with stone slabs. Further south of the yard, there is an attached cattle barn with a wooden shed roof and no fittings. The three-storeyed building made of rammed earth and has a central gabled roof of corrugated galvanised iron sheets. A lean-to roof covers the northern side of the second floor. The plane scale has a width of about 12m, and a depth of approximately 9.5m. *Rabsels* are on the south in the first floor, the north half of the east and west sides of the second floor, and the overhanging sections of the north side of the second floor. *Rabsel* bay windows are also on the south side of the second floor, and the south half of the east and west sides. There is a small window on each side of the ground floor, and on the east and westsides of the first floor. The main entrance is in the centre of the south side on the first floor. There is a balcony at the front, and a staircase to the ground level in the east. The ground floor has its own entrance and an opening in the centre of the south side.

The composition of each floor

In the overall planar construction, a rammed earth wall passes east-west from the ground to the second floor, dividing the interior space, which is also enclosed with rammed earth walls, roughly in two. Thus, there is a room on the north and south of each floor, and on the first and second floors, each room has been subdivided

with partition walls.

On the ground floor, the room on the south is used for storage, and a grain chest was built with a barrier made of square pillars and planks. There is an earthen floor, and for the ceiling, rough finishing board from the upper flooring material has been laid over joists of unstripped round timber. The room on the north is used as a livestock shed. Located in the centre of the depth are three pillars aligned east–west, supporting the girders, but these appear to be later work. There is straw covering an earthen floor. The wall between rooms in the north and south was built on top of soot from the outer wall, so it is believed to be later work.

The first floor has a north-south hallway in the centre, and the room on the south is divided into east and west with wooden partition walls. Both are bedrooms. The room on the north is concave shaped, with the hallway extending to the centre of the depth. There is one entrance to the north room on the northeast side of the hallway. Inside, there are the remains of a grain chest in the centre of the north side, and there a smoke hole in the eastern end of the north wall. The room seems to have been a kitchen in the past, and is now used as a storehouse. Rooms on the first floor have the same finish. They are earthen, and for the ceiling, there are fascines and rough finishing boards for the upper floor's foundation laid on top of squared timber in an ax-scraped pattern.

On the second floor, the south room is divided east-west into three with wooden partitions, while the one on the north is divided by a hallway down the centre, with one room on the east and two on the west. Furthermore, north of the wall, there is a 2.4m overhanging wooden section. The east room on the north side is a kitchen, furnished with a fireplace and a chimney. The floor is earthen in the northeast, with boards laid in an L shape. Besides a hallway entrance, there are those to the southern east and centre rooms. The east room on the south side is a bedroom with an entrance to the southern centre room. The centre room is large, and other than a refrigerator, there are no permanent fixtures. Its north rammed earth wall is furnished with attached shelves. On its west wall, it has an entrance leading to the west room on the north side. The west room on the south side functions as an antechamber to the altar room located to its north. Inside the room, there is nothing except for an offering table. The three rooms on the south have the same finish with the floor laid with planks. The densely laid ceiling has evenly spaced squared timber joists along the depth. Over these are rough finishing boards placed along the width direction, but in the west room, they are placed in the depth direction. There is a mortise at the bottom of the seventh joist from the east in the central room, and the floor also shows differences in weathering, and thus, it is likely that a wall was once located here. The southwest room on the north is the altar room. An opening, leading to the south side's west room has a jamb with decorative paint finish and two pillars. The Buddhist altar, on the north, is not embedded in the wall and stands alone. The floor is earthen. The west room on the north is used for tableware and cookware and the only entrance is from the hallway. The north side's overhanging section is divided into three rooms from east to west with wooden partitions. The east room, perhaps a furnace in the past, has soot on the walls and ceiling. There is a water tank in the centre and a laundry in the west.

The floor of the attic is earthen, and it has walls on three sides, except the south. They stand as independ-

4 Livestock shed on the ground floor
5 Bedroom on the first floor

ent foundations at the ridge struts. Roof struts that process the end into a U shape, are built on the ax-scraped pattern squared timber roof beams, which are laid on top of the walls, with support from struts. Interconnecting members pass through the ridge struts in the width direction, while the upper roof ones pass in the direction of the beams. The lower purlins pass through the roof struts in the width direction. The axe-scraped patterned purlins and stringers are made of squared timber, and rafters of unstripped round timber. Over the rafters, there is corrugated metal plate roofing.

Considerations for restoration to the original state

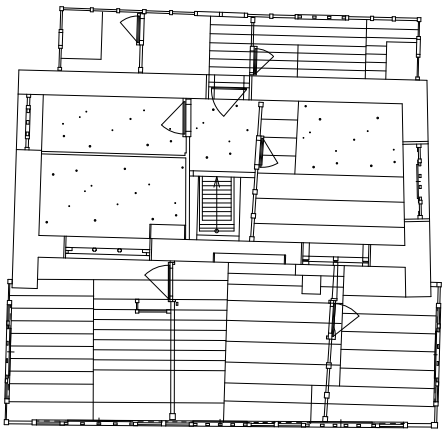
On the ground floor, there is a gap between the construction of the outer rammed earth walls and the rammed earth wall for the interior partition running east-west; the partition walls were determined to have been built later. A slight difference in outward appearance can also be seen between the ground and first floors in the way that the rammed earth walls on the west and south sides have been built up. Thus, it is possible that the original structure was abandoned when only the ground floor portion of the outer rammed earth wall remained, and it was then reused for the interior rammed earth walls or added on to rammed earth for the first floor and above. At the time of this modification, it is believed that structures such as the *rabsel* windows, *rabsel* bay windows, and interior altar rooms were built in their current form. The partitions in the centre room south of the second floor have been changed, but otherwise, there seem to have been no major alterations.

Meanwhile, the *rabsel* bay windows on the second floor and the *rabsel* windows on the first floor are not vertically aligned. Thus, it is possible to identify a time difference in the construction of the outer walls of the first and second floors; however, no particular evidence of differences in weathering can be seen on the materials, which are believed to be of the same period. The discrepancies in location are believed to result from the fact that on the second floor, there was careful consideration to the relationship between the joists and the *rabsel* windows, while on the first floor, the windows were put by using the rammed earth on both sides as a reference.

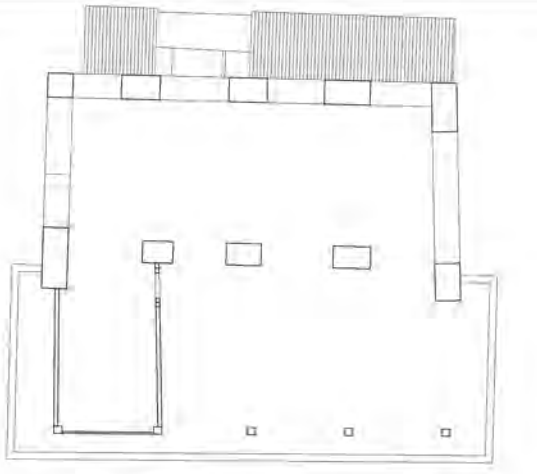
Conclusion

The date of construction cannot be confirmed, but oral surveys suggest that it was built over a hundred years ago. It is not known what the original building looked like, but since large-scale modification, it has continued to be used without any major changes. The overall state of preservation is good. (Maekawa Ayumi)

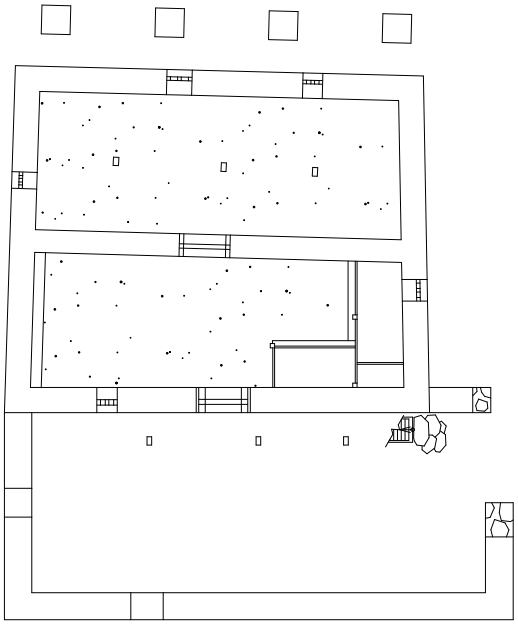
6 Kitchen on the second floor
7 Altar room on the second floor
8 Attic space



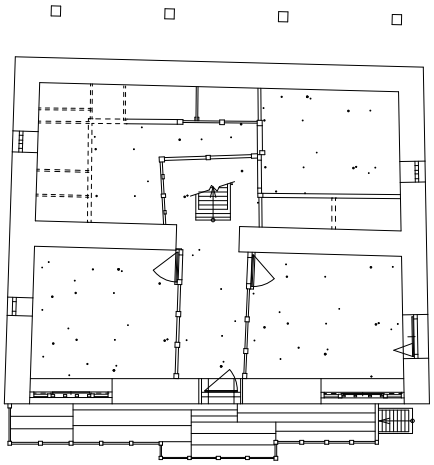
Second floor plan 1:200



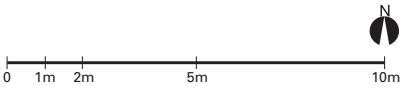
Attic floor plan 1:200



Ground floor plan 1:200



First floor plan 1:200



Cross section 1:200

Tshencho House

DATA

Dzongkhag
Haa

Gewog
Kartsho

Village
Ahatam

Settlement location
tableland

Settlement pattern
clustered

Coordinates: 27.3945, 89.2877

1 Front view (from west)
2 Back view (from south east)
3 *Rabsel* bay window on the back wall of the first floor

Location and summary

This structure is a farmhouse located on the east side of Ahatam Village (in Haa Dzongkhag), which formed on west sloping land spreading across a mountain on the east side of the Haa Valley, approximately 2.5km north of Haa Dzong surrounded by farmland. The Haa Chhu river runs north to southwest on the west side of the village.

The main residence section is a west-facing, two-storey rammed earth structure with a half-hipped iron shingle roof and depth-side front. The front and forward portions of both sides on the first floor are wooden walls with windows. These walls protrude somewhat in front of the surface of the rammed earth below and have *rabsels* installed. An extension is attached north of a north side entrance; it is a two-storey stone structure with a slanted iron shingle roof and is used as a kitchen and living space. Wooden walls with windows are used for three of the outer walls on the first floor (not including the south side) and have *rabsels* installed. A veranda extends from the west side, and a lavatory is built on the first floor. An inner court is located on the west side of the building, enclosed by a fence of rammed earth. The west side is covered by a roof to form a workspace, and a masonry storeroom is built in the southwest corner. This is a relatively large residence, which likely resulted from repeated additions in the past. Originally, it probably had the relatively simple layout of a single room.

The composition of each floor

The main building's ground floor is used for livestock. On the east end is a single room with a wide earthen floor, an entrance doorway with a wooden hinged

door on its west side, and a single high window on the south side. A masonry wall has been further erected inside the west rammed earth wall, with pillars standing in two places inside. The west wall is a thick double wall of rammed earth and masonry. Three pillars stand in front of the northern half of the masonry wall, supported by joists crossed by beams. On the west side is a long narrow room running north to south made of rammed earth walls, with a storage area created on the northern end partitioned by a wooden wall, and an entrance opening a part of the west side surface.

The first floor consists of five rooms used as living areas. Two rooms on the west side have wooden walls with windows on the front side surface, and three rooms on the east side are made by three rammed earth walls. In the northeast corner is the widest room, which was once a kitchen and is now a living space. It has a westward entrance on its north side, and a small vertical lattice window on its east side. An *ekra* wall is provided south of this, creating two rooms. The east side is a small living space with an entrance doorway on its north side, connecting it to the wide living space, and a large window on its south side. An altar room is found on the west side, with pillars standing on the west side forming the front of a three-sectioned Buddhist altar. A prayer room is located on the west side of the Buddhist altar, but this is usually employed as a living space. The north side is continuous with the living space, and a relatively broad opening is provided for the wide room at the northeast end. The floorplan is typical in which the area near the entrance serves as a kitchen and living area; an altar room is situated at the back, created by a front wooden wall and a back rammed earth wall. Each of the interior rooms is partitioned by the *ekra* walls.

The ground floor of the extension on the north side of the main building is a single earthen floor room used for livestock, with an entrance doorway on the west side and two small windows on the north side. The east side of the first floor is presently used as a kitchen, and the west side is used as a living space. There is an entranceway facing the entrance to the main part on the southwest corner, with four entrance doorways to each room. This entranceway is reached via a southward descending veranda and westward descending stairs. A lavatory is located west of the entranceway.

The attic rooftop is reached by a ladder from the entranceway and has an earthen floor used for storage. The top of its rammed earth wall has wall members erected like a parapet, some of which are raised like struts with bolsters and struts on top, and crossed by beams. The western half of the wooden wall is formed

4 Entrance doorway of the east room on the ground froor
5 Masonry wall in the east room of the ground floor
6 Roof structure

by struts that stand up on the earthen floor to receive support from beams. The frame members are a mixture of old and new materials. Corrugated iron sheets are used for roofing, even though old shingle roof materials remain underneath.

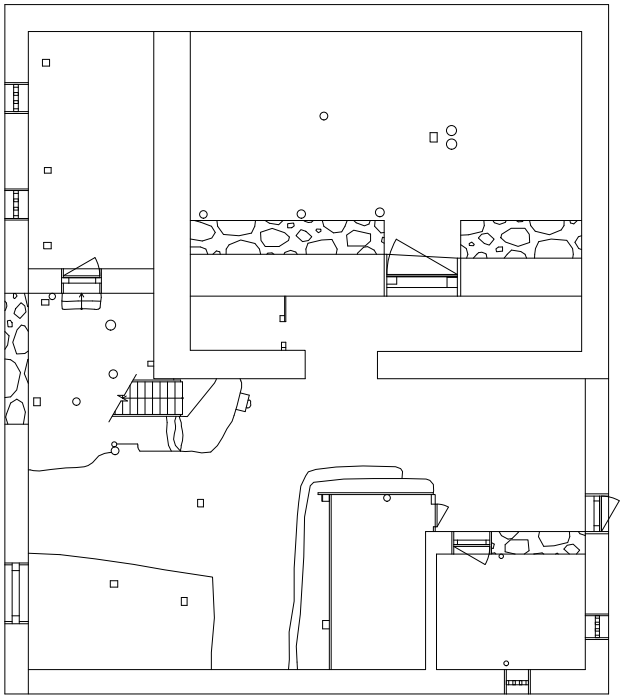
The context of additions

The original building size was likely encompassed by the rammed earth wall on the east side of the main building. Looking at the joining of the rammed earth in the east room and west room of the main part, we find that the west rammed earth wall was built later. If the ground floor was laid out with the east side serving as a room for livestock, then the section bound by the wooden wall on the west side of the first floor was also built later; the material of the first-floor wooden wall is newer. The rammed earth walls on both sides of the first floor of the main part differ in length, the north side being longer. The west end of the south side wall was probably shortened by damage, as the ground floor is reinforced with masonry and the first floor is crumbling. Additionally, the west end of the north side wall was likely not made via the masonry technique of stacking corner materials alternatively, but the south side of the tip was uneven where the wall was attached, and there are traces that indicate the wall reached the front. Therefore, it is possible that the rammed earth in front of the west side was removed, and two rooms on the front side of the west wooden wall were added to create a wall partitioning east and west. If the front was a rammed earth wall, then presumably there were openings for an entrance doorway and window on the front side. Moreover, a ceiling-high masonry wall was built to the west of the ground floor livestock room, adjacent to the east side of the rammed earth wall. This may have been built to support the wall dividing the first floor (east and west) from beneath, so that it could be slightly east of the rammed earth wall below. Further, the window at the eastern end of the south side of the first floor was an addition built later with newer materials.

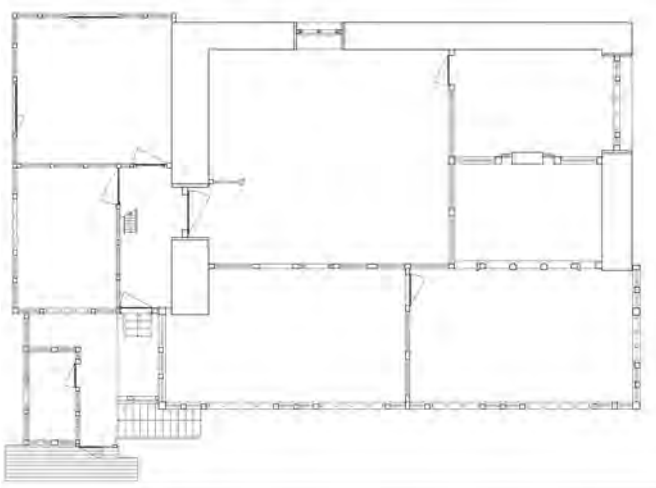
Currently, the kitchen has been moved to the north side extension, but there once was a furnace and earthen floor in the northeast corner of the rammed earth, first floor main building; this probably served as a kitchen. The window on the east side of this room was built later from newer materials. The outward projecting section (including the north side kitchen) is an addition, as the ground floor masonry is newer in terms of its condition, and the wooden members used for the first floor are still clean. This was likely built after the extension made to the west side of the main building.

Conclusion

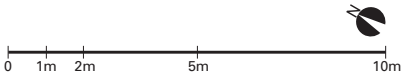
This building is a relatively large residence, and its present size is due to repeated additions. It shows signs of farming whereby the society expanded gradually and became prosperous. The process by which additions were made is typical of development in Bhutan starting with a small, residential design free of decorations surrounded by a rammed earth structure. The building's overhanging, wooden wall sections have *rabsels* on the front. The structure was transformed into a residence with extravagant wooden walls, with *rabsels* painted with a decorative finish. The *rabsels* walls eventually made their way not only to the front but the sides as well, showing off the building's gorgeous design in all directions. Further, although indoor space can always be increased by adding to the front of floor plans, the altar and prayer rooms also seem to be new constructions. As such, additions were motivated by new construction and the renovation of religious space. Although the exact date of such an occurrence is unknown, similar additions can be confirmed in many examples of residential extensions, so clearly, there once was a strong demand for the addition of altar rooms and places of worship. Moreover, the change in the location of the kitchen is thought to result from improvements and modifications made to the building's living space, showing that Bhutanese homes were now more prosperous, an indication of lifestyle development. (Ezura Tsuguto)



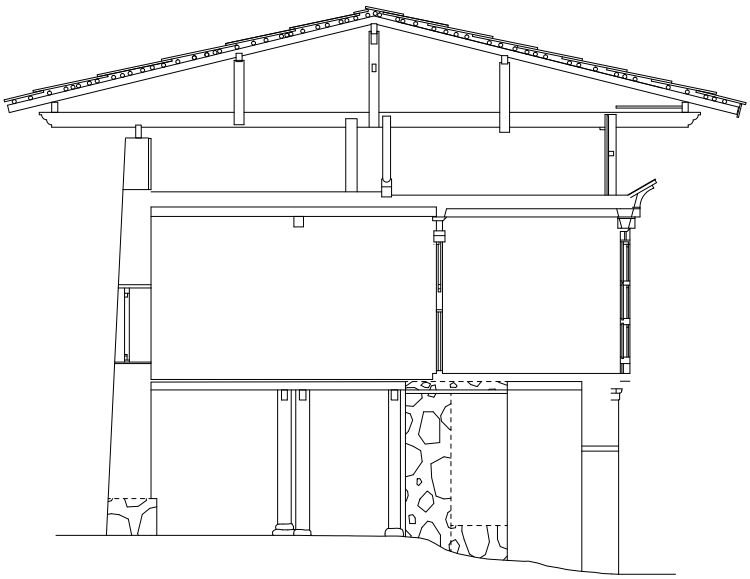
Ground floor plan 1:200



First floor plan 1:200



Stairway on the out side of the front



Cross section 1:150

Namgay Wangmo House

DATA

Dzongkhag
Punakha

Gewog
Shengana

Village
Tshosa

Settlement location
mountain

Settlement pattern
clustered

Coordinates: 27.5996, 89.9228

1 Front view (from north)
2 Back view (from southeast)
3 Side view (from west)

Location and summary

This building is located in Tshosa, a mountain valley village about 6km east of central Punakha, dotted with traditional farmhouses, and with terraced rice fields extending along the north slope. The main building faces north on land that slopes downward to the northwest. There is a lean-to roof on the west of the main building, which is used as a chicken coop. The building has two storeys and is made of rammed earth, with a gabled, stone-weighted corrugated iron sheet roof. The plane scale has a width of approximately 8.3m, and a depth of approximately 7.3m. As for outward appearance, there are *rabsel* bay windows on the first floor's north face, and the north half of the east and west faces. There are small windows on the ground floor's north, east, and south faces, and the first floor's east face. The main entrance is on the first floor in the centre of the south face, with a balcony on the front. The east end of the balcony is equipped with a staircase that leads to the ground level. There is a separate entrance on the west side of the ground floor.

The composition of each floor

There is an L-shaped rammed earth wall around the southeast part of the ground floor, dividing it into two: a livestock shed and a grain storehouse. Since investigations are not yet complete, the interior of the shed is not known, but its only entrance is on the east, and there is no passageway in the partition between it and the storehouse. There are wooden-grated windows on all sides of the building except the east. The storehouse can be accessed from the first-floor hatch with a ladder. The west side of the storehouse is furnished with a grain chest divided in two. The floor is earthen,

and for the ceiling, unstripped round timber joists have been laid over with the floorboards for the upper level.

The first floor has wooden partitions running east-west and north-south, dividing it into four square rooms. The southeast one is a kitchen, with an entrance on the south and a floor hatch in the northeast leading to the ground floor. The south entrance door is new, and there are no traces of old shafts or pivot-hinge holes on the header member. However, there are traces of joists on the top of the member of the outer wall; it is believed that there was a window here when it was built, and the entrance was done later. The northeast room has a Buddhist altar facing north in front of its south wall; the altar that is placed now is new. There is an opening with no door at the south of the west partition; however, the pillars show traces of interconnecting members, so this is thought to have originally been a wall. The northwest is a bedroom, the southwest is used as a storehouse, but the south half of the floor is earthen and there are traces of a furnace; it may have been a kitchen when it was built. There is also an opening with a door on the west, and traces of a balcony on the outer wall. This opening is thought to have been an entrance when it was built, but it is not currently in use. Except for the portion of the southwest room mentioned above, the interior of the first floor is all laid with wooden flooring. For the ceiling, wooden planks for the foundation of the upper floor are placed over axe-cut squared timber joists.

The floor of the attic space is earthen, with a parapet-style rammed earth wall of 15cm on all sides except the north. Furthermore, above the independent foundation, there is a rammed earth wall in one place along the ridge of both the east and west sides, one place at each end of the south side, and two places near the centre of the south side. The roof structure is somewhat unique, composed of roof beams, roof struts and ridge struts, assembled differently at each location. The roof beams at the east end pass through the rammed earth wall like interconnecting members at the south end and along the ridge, and the north ends are supported with struts. For the two roof beams near the centre, the south ends are laid on the rammed earth wall. Ridge struts pass through like interconnecting members, and the north ends are supported with struts. For the roof beams at the west end, the south ends are laid on the rammed earth wall and pass through the ridge like interconnecting members. The north ends are supported with struts. The purlins are supported by the roof strut joints above the roof beams that receive the member by processing the end into a U shape, and the stringer beams are placed directly on top of the roof beams. The ridge beam is supported by two centre ridge struts and flat struts placed on top of the east and west ends of the rammed earth wall. The purlins, stringer beams, and ridge beam are all squared timber with an ax-scraped pattern. Above this, there are rafters of unstripped round timber and roofing of corrugated metal plates with laths. Stones are placed on top of the metal plates.

Considerations for restoration to the original state

Each side and stratum of the rammed earth wall is continuous, and its form is thought to be similar to when it was built. The *rabsel* bay windows on the north side

4 Grain storage on the ground floor
5 Altar on the first floor

are also thought to be the same as their original form. There seem to have been no major changes to the building's outward structural appearance.

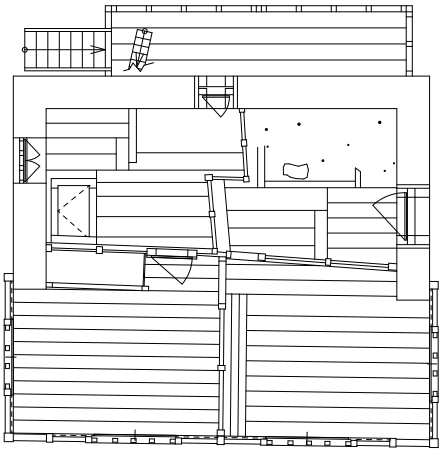
However, several changes can be noted in the interior. First, there is the wooden partition wall that runs north-south. As mentioned above, the partition that divides the rooms on the north did not have any opening when it was built; it appears to have been entirely a wall. Moreover, on the north of the partition that runs east-west, studs have been newly furnished in the wall, which itself is thought to be later work. Like the north-south partition on the south, the south side of the east-west partition also has newly furnished studs, so it is likely to be later work.

Next, with regard to entrances, as noted above, the one that is currently on the south was a window when it was built, and the opening on the southern end of the west is thought to have originally been an entrance. The north-south partition is believed to have been done later, based on the fact that there are traces of a furnace in the southwest room. The south side was one room, close to the grain storeroom on the ground floor, and is thought to have served as a kitchen. It is believed that no other major changes have been made to the outward appearance since it was built; however, there was originally an entrance on the south end of the west side, and the interior was divided into rooms in the north and the south, with partitions running east-west, when it was first built.

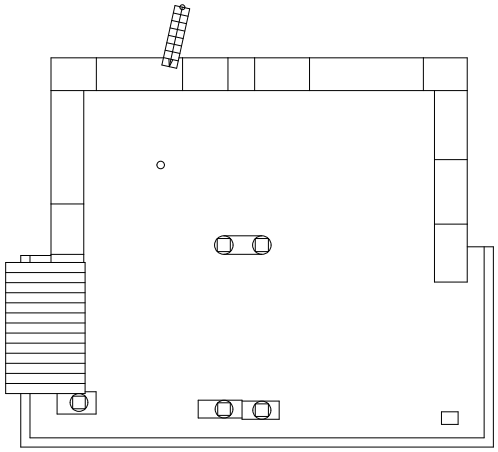
Conclusion

Although this building is small in scale, it maintains the same outward appearance as when it was built. It is possible to trace its renovation history, and to thus to restore it to its original state. The state of preservation is good. (Maekawa Ayumi)

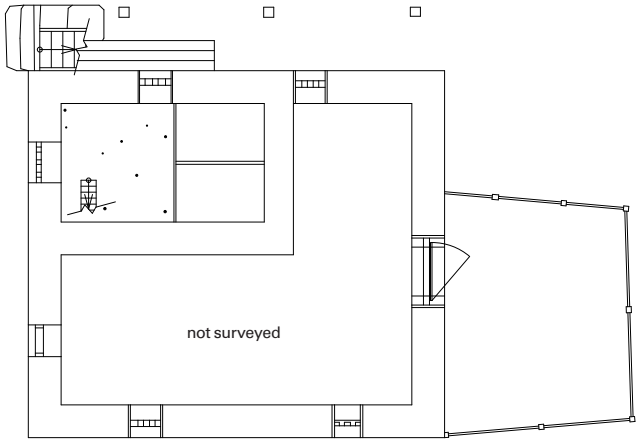
6 Bedroom on the first floor
7 Former kitchen on the first floor
8 Attic space



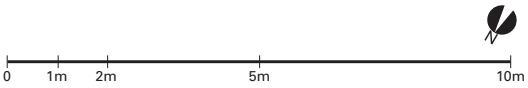
First floor plan 1:150

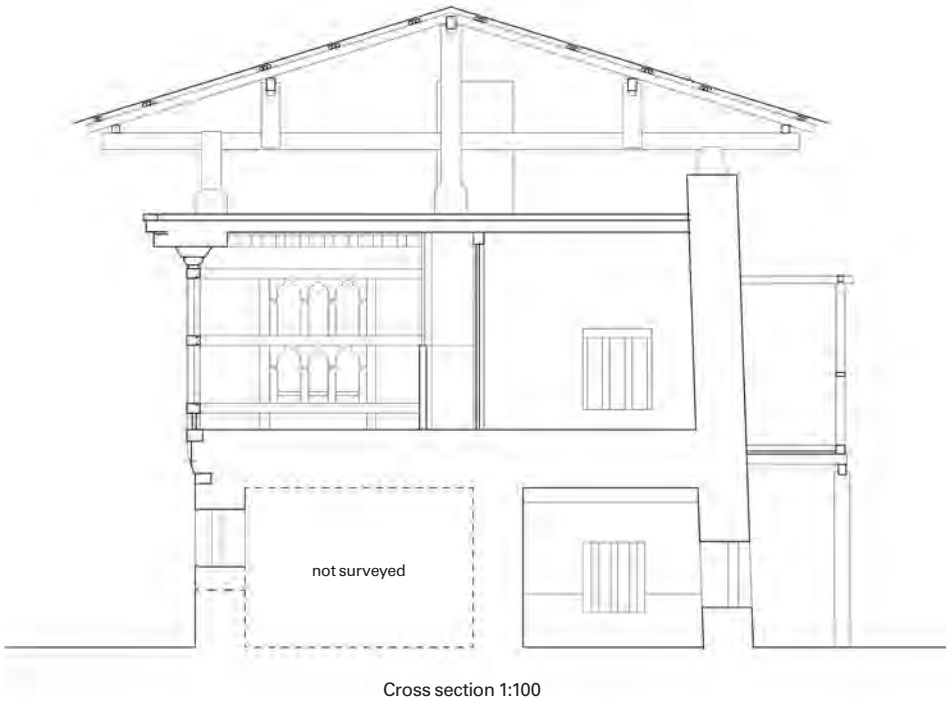


Attic floor plan 1:150



Ground floor plan 1:150





Cross section 1:100

Yonzo House

DATA

Dzongkhag
Haa

Gewog
Samar

Village
Pudhana

Settlement location
riverside

Settlement pattern
dispersed

Coordinates: 27.3037, 89.3136

1 Distant view (from northeast)
2 North side view (from north)
3 Back side view (from southwest)

Location and summary

Pudhana is located about 10km south from the centre of Haa Dzongkhag on the Chuzom-Haa Highway, which runs southeast. Yonzo House is situated on the west slope of a north–south valley, facing east toward the valley. The Puduna Lhakhang Temple is located to the south of the house.

Although the specific date of the house's construction is not known, it is considered four or five generations old. The current owner manages the building and the paddy fields, but lives elsewhere; guests occasionally stay at the house. The house provides free accommodation for travelers who stay for a few days, which is a custom in Bhutan to date.

The main building consists of two storeys, with a width-size front gabled shingled roof, as well as a rammed earth wall enclosing the outer perimeter of the southern and eastern sides of the main outdoor area to create a front yard. The first floor has an overhanging shed roof installed between the southern face of the main building and the rammed earth wall that lines the outer perimeter of the site. The scale of the main building plan is approximately 10.2m in width and 7.4m in depth for the exterior wall on the eastern face of the ground floor. The rammed earth wall is 62cm high and 93cm thick on the southern half of the ground floor, which is very thick. The taper of the rammed earth wall is approximately 88.7° on the rear side of the southern half and 87.7° on the northern wall depth, with a steep slope of approximately 1° on the rear side. The rammed earth wall also appears to have been constructed in stages at different times.

While the foundation is a masonry structure, the height from the interior of the ground floor is approx-

imately 30cm, and only the western side gains elevation: approximately 91cm. The house has an entrance at the front of the northern half of the ground floor, a *rabsel* bay window on the east front of the first floor and up to the front half of both sides, and another *rabsel* window on the western side on the southern half of the first floor. The overhang on the southern side of the first floor has a doorway on the eastern side, which is not currently used, and is accessed by a staircase directly below. There are no other openings; the ground floor is closed off.

In addition, six pillars were erected in the vestibule to create an outdoor space with a shingled shed roof facing outward from the east outer perimeter. These wooden members are relatively new and were probably added in a later modification. This space is now used for storage.

The composition of each floor

The ground floor of the main building is divided into two rooms on the northern and southern sides. The first floor consists of one room on the southern half and two rooms on the northern half on the east and west sides, with an overhang on the southern side of the first floor. The rammed earth wall in the southern half of the ground floor has been thickly constructed, indicating that it was completed here, and that the northern half was an extension. Currently, the entrance is located on the eastern side of the northern half. The ground floor may have served as a livestock shed in the past but is not currently used for any particular purpose. The ceiling is made of log beams in depth direction and joists placed width-wise covering the first floor. The western half of the house contains joists made from logs with bark, but in the eastern half there are joists made from squared timber and the weathering of the wooden flooring in the eastern half is somewhat new. I learned that the front side of the eastern half was renovated once. On the south wall, there are traces of a rammed earth wall near the centre that was filled in, suggesting that there may have been an opening on the south face.

On the first floor, a rammed earth wall remains on the western half of the rear on both sides, and a doorway is built facing the overhang on the south side. The overhang is not parallel to the main building, but swings approximately 20° to the south from the east to follow the rammed earth wall of the outer perimeter on the south face. As described previously, the eastern side of the overhang is used as a doorway, with an open balcony and handrail. Traces of stairs remain on the open balcony. The interior has a wooden floor with

4 Stairway in the overhanging section of the ground floor
5 Living room with kitchen on the first floor
6 Kitchen space behind the *rabsel* window on the first floor
7 Details of the *rabsel* window of the first floor on the back wall

a staircase in the centre as well as a direct staircase to the roof on the southern side of the staircase. The overhang is formed from earthen walls with no openings except for the entrance.

The southern half of the main building consists of a kitchen/living room, and a side wall is placed in the southwest corner and includes a furnace. In the northern half, the eastern side is used as a living room and the small room on the northern side is used as a storage room. Each room has a wood floor, and a part of the living room has a wide wood floor (approx. 52cm wide). Each room border contains a pillar and an earthen wall. A doorway is installed at the centre of the depth of the partition between the kitchen/living room and the north-half-east room, and a pillar is erected just to the west of the doorway to support a beam that extends to the rammed earth wall on both sides. A carving can be found under the beam on this pillar. This beam has molding on the sides only in the north-half-east room, enhancing the design. The wooden floor by the partition on the west side is also made from long wood planks, suggesting that a simple altar may have been installed there. For the ceiling, the ceiling boards are stretched from both east and west to the previously mentioned beam, with joists placed depth-wise.

On the roof, a rammed earth wall is erected at the centre of the depth on the western, northern, and southern sides where sleepers are placed and beams are hung. At the roof ridge line and the east end, struts are placed width-wise on the foundation to receive the beams. There are a total of five beams. Above the beam, roof struts are placed on the ridge line and outer wall line to support the ridge beam and purlin beam. The beam is covered with rafters from logs with bark and shingles that are thatched through small diameter wood roofing boards. On the ridge line, the interconnecting member passes through the ridge struts, and in the roof feathers, spacers are placed under the ridge beam and purlin. Struts are also placed along the ridge line between the interconnecting member and the ridge beam. The axe-scraped pattern of the shed beam is clear, and logs with bark are used for the rafters, but there is little weathering of the wood itself. Additionally, several rafters in front of the eaves have been added as reinforcement.

Considerations for restoration to the original state

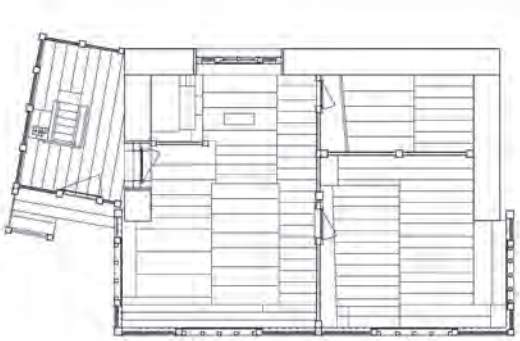
According to the house's floor plan, the southern and northern sides of the main building were extended 70–80 years ago. The rammed earth wall is thicker in the southern half of the present main building, and this is likely the original structure. The rammed earth wall on the northern side of the west elevation is a series of constructions from the ground to the first floor, while the rammed earth wall on the northern side of the first floor has traces indicating that it was added to the eastern half near the centre of the depth. In addition, numerous sections of the rammed earth wall on the first floor have been repaired, suggesting that the building had once fallen into a dilapidated state, which was subsequently restored and reconstructed.

Looking at the lower section of the bay window on the first floor, the rammed earth wall on the southern side was partially eroded, but appears to be well fitted on the northern side. Specifically, this *rabsel* bay window is believed to have been installed 70–80 years ago, when it was annexed to the northern side. The original front side of the southern half of the main building is unclear, as the nature of the traces of fittings cannot be confirmed. Based on the above, it appears that the current southern half of the building retains the building's original plan scale, indicating that the building has been repaired and reconstructed from a ruined building 70–80 years ago. The *rabsel* bay and standard windows on the rear side were introduced during this reconstruction, and the floor plan at that time is thought to be almost identical to the current plan.

Conclusion

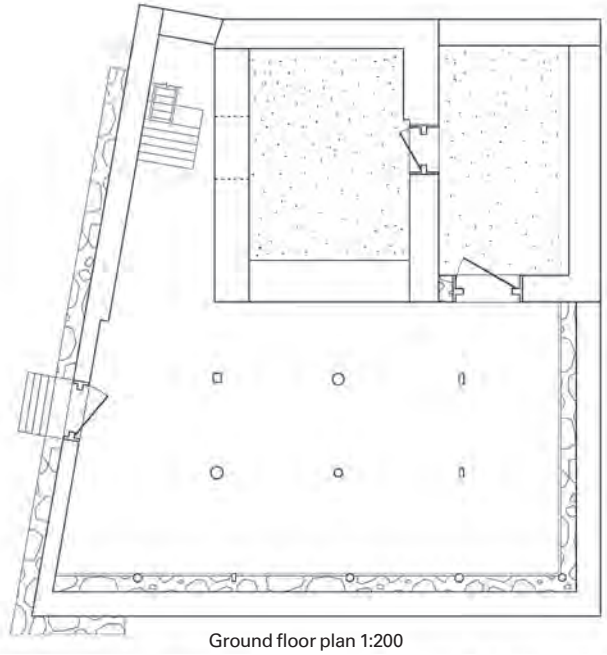
Yonzo House is a renovation of an abandoned building, and I learned that it is 70–80 years old. The house's current state was achieved through this renovation, and there have been no major modifications since then. The scale of the original plan is clear, the house is currently in a well-preserved state, and the period of the house's extension conversion is also clear.

(Fukushima Hirohito)

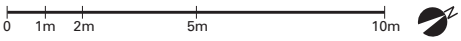


First floor plan 1:200

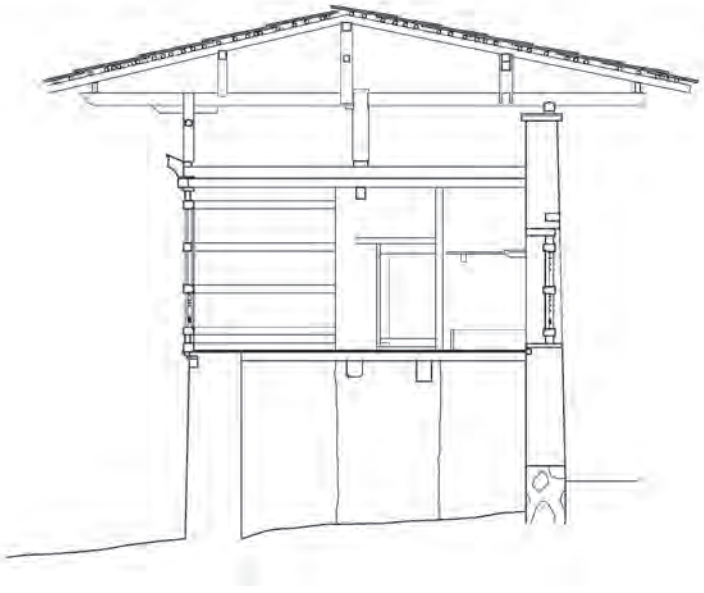
Rabsel on the east side of the living room on the first floor



Ground floor plan 1:200



Molding under the beam and a bracket with carving



Cross section 1:150

Non Formal Education Centre

DATA

Dzongkhag
Punakha

Gewog
Talo

Village
Nobgang

Settlement location
mountain

Settlement pattern
clustered

Coordinates: 27.5647, 89.8413

1 Whole view (from south)
2 Whole view (from east)
3 North side of the attached building

Location and summary

The Non Formal Education Centre is situated near the middle of Nobgang Village in Punakha Dzongkhag, stretching approximately 2km west of the Mo Chhu river (which flows southward from the *dzong*), and nestled amid the southwest mountains of Punakha Dzong. The building site is next to the north side of an east to west road surrounded by construction. The site faces east with the main building built on the west side, with a yard east of the building. The yard is dug in somewhat deeper than the surrounding area and paved with stones. Attached buildings are located to the north and south of the yard, with a rammed earth and soil-block fence built on the east side, with a northward entrance doorway. A somewhat wide vacant lot is found to the east of this entrance doorway.

The main building consists of a primary part and an attachment. The primary part is L-shaped, a typical layout in this region. The primary part is a one-storey building of rammed earth with an iron shingle roof. It is built on the west side of the site, approximately 14m wide and 12m deep, and faces east with a width-side front. The attachment has the same form as the primary part, around 15m wide and 7m deep, touching the north side of the main part with a ridge perpendicular to the east-west line. The primary part and the attachment together form an L-shaped floor plan. *Rabsels* are seen in both sections at the front of the first floor and on the east-half of the south side surface. Further, a small, one-storey, soil-block structure is built on the east side of the attached building. It is constructed of rammed earth approximately 16m wide and 7m deep on the south side of the yard and—together with the attached building—has a gabled, iron shingle roof.

The composition of each floor

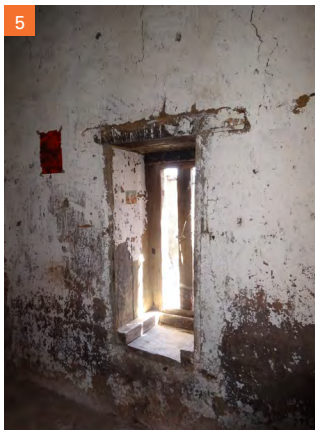
A partition wall of rammed earth divides the ground floor of the main part into northern and southern sections. The southern section is used as a room, a wooden door entrance is placed in the centre of the north wall, and a small, wooden, oblong vertical lattice window is situated on the east wall. The north section is a stairwell with stairs inside and a wooden, inward-opening entrance door on the east side. The ceiling has joists running east to west across both rooms with short intervals in between, and narrow round timbers laid on top of them and covered with soil. The ceiling in the southern room has noticeable grime on it. An *ekra* wall divides the ground floor of the northern attachment into eastern and western rooms. A chimney is located in the southwest corner of the western room, and a wooden, vertical lattice window is installed on the north side, suggesting that this was originally a kitchen. The eastern part of the south side of the eastern room is an exposed wooden wall, with an outward entrance doorway on the west end. The eastern part and its attachment have no entrance doorway on the ground floor, allowing for direct passage between them.

The first floor of the main part has the *ekra* walls, with *rabsels* on its east side and the eastern half of the south side, and open windows on each side. Wooden walls divide it into four rooms in a two-by-two square, and all rooms have wooden floors and joist ceilings. The joists are laid east to west, with a relatively fine level of precision and ingenuity and have a wooden floor on top of them. The southwest corner is reserved for an altar cabinet, the actual altar being carved out of the surface of the west wall itself and a table placed in front of it. The cabinet is of simple construction, with side walls at both ends extending eastward, an opening in the middle, and no door. The east side is continuous with a prayer room, which reveals the cut ends of brackets on the top of the partition wall between the rooms; the prayer side is painted with a decorative finish. However, the altar cabinet side is plain and unpainted. A stairwell is found in the northeast room. The northwest room is used for storage, with a ladder leading to the attic. An entrance doorway is situated on the north side, leading to a lavatory overhanging via a cantilever beam.

A wooden, pillar-exposed wall divides the first floor of the attachment into eastern and western rooms. Wooden walls with *rabsels* are situated on three sides of the eastern room (not including the west side) and have windows in them. An entrance doorway is at the west end of the south side of the eastern room, connecting to the stairwell of the main part. The western room has a small window on the north wall and a flue passing through the southwest corner. Both rooms were likely used as living areas. Walls with *rabsels* extend outward from the wall surface in both the main part and the attachment, indicating a new form.

The attic of the main building has a completely earthen floor and can be reached from the first-floor stairwell via a ladder. The top of the rammed earth is raised like a parapet and has wooden bolsters meant for standing struts and placing beams on them. The half-hipped roof, ridge beams, and rafters are new; they were probably repaired and replaced when the iron sheet roof was hung.

The one-storey structure in the northeast corner of the yard has an oblong, wooden lattice window on



4 Bathroom at the northwest corner
5 Details of the window on the front wall of the ground floor
6 Details of *rabsel* window at the south east corner

its north side and a wooden, pillar-exposed wall on its south side, with an entrance doorway at its eastern end. A wooden wall divides the one-storey structure at the south side of the yard into eastern and western rooms. There is no entrance doorway in the wooden wall, thereby separating the two rooms. Both structures have wooden exposed-pillar walls on their north side with inward-opening entrance doorways and vertical lattice windows on their south sides.

Considerations for restoration to the original state

This building was likely originally built as a small Buddhist temple, consisting only of the primary part of the main building. The attachment is presumably an extension built later. This is understood based on how the rammed earth was assembled. Additionally, the ground floor ceiling was built according to different specifications. The main part has round timbers for the tops of the joists, but the attachment uses bamboo. Originally, the first floor of the main part had no stairwell, and is likely divided into eastern and western rooms. The present eastern wall of the altar cabinet and storage room (which divides the main part into east and west) is integrated into the *ekra* wall that divides the floor between north and south, which means that it is new. The front of the current altar cabinet is formed simply, with no door. It is believed that the front of the original altar cabinet was reworked into its present form. Although there are *rabsels* on the southern and eastern sides, they are newer than the material of the windows on the eastern side of the ground floor, and are therefore deemed additions. The joists and other parts of the first-floor ceiling are new, and are hence believed to represent major renovations. Based on its restoration, the original temple was small, so the wooden wall sections with *rabsels* may have originally been rammed earth walls. The wooden walls of the main part and attachment are possibly from almost the exact same period, so it is probable that replacement with wooden walls was done when the east side attachment was added. The attachment was likely added to provide the Buddhist temple with living space. The partition wall on the ground floor of the attachment was also built later; at the time of expansion, the ground floor was just one room. This was apparently divided into two rooms to provide a separate kitchen on the west side. It looks like a chimney was added to the kitchen, and there was once a stove. The first floor was also thought to have been one room. Later, the building was used as a learning facility, and the one-storey structure to the east was added due to a lack of rooms, followed by the one-storey structure to the south. These additions were almost the same in width as a single room. Similar room environments were made by adding a single window.

Conclusion

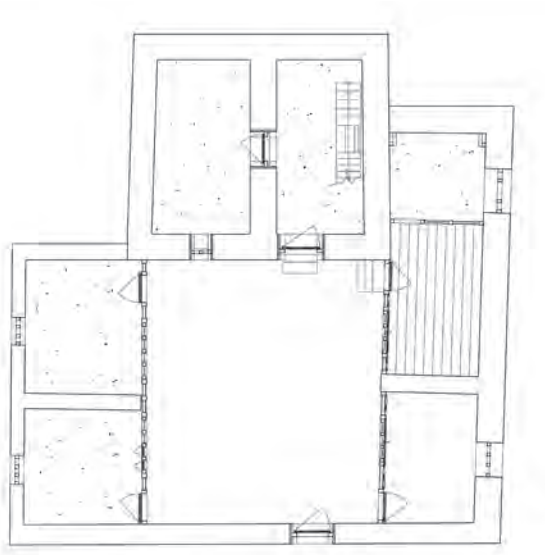
In this region, homes are characterised by an L-shaped site plan, a form still used in buildings today. Buildings are erected with almost square-shaped facing yards, with rectangular structures attached to their sides. It is unclear whether this L-shaped layout was originally used here, but this building provides one example, hinting that attachments were added to the sides of small buildings as changes were made. This makes the layout extremely valuable when discussing the development of regional residential structures. In addition, there are many small Buddhist temples like this in rural areas; gathering information about their old form is highly valuable.

(Ezura Tsuguto)

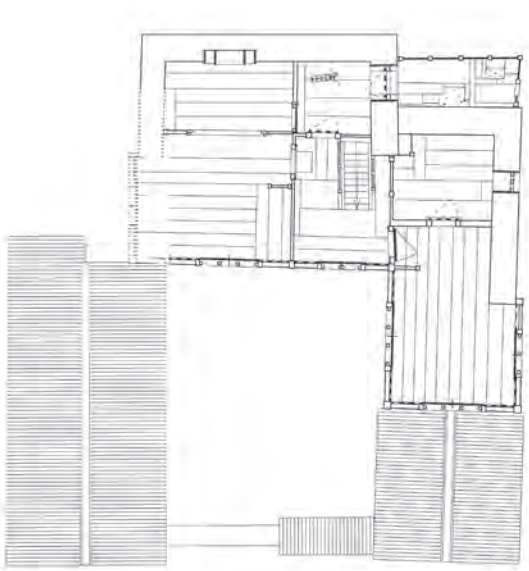
7 Details of the ceiling in front of the stairwell
8 Entrance of the altar room

Nobgang village and Non Formal Education Centre (front left) in 2015

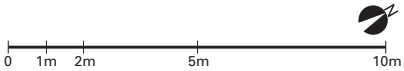
Nobgang village in 1905
(Photo by John Claude White/Royal Geographical Society via Getty Images)

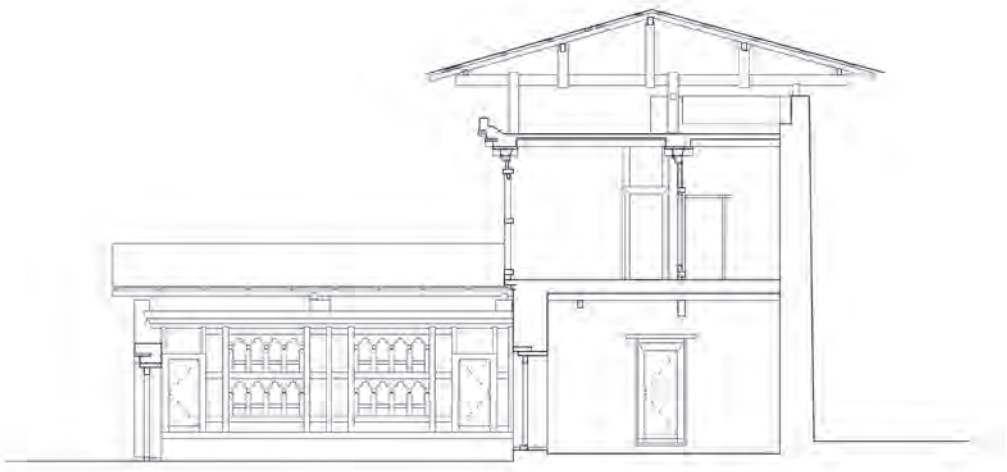


Ground floor plan 1:200



First floor plan 1:200





Cross section 1:150

Sonam Choden House

DATA

Dzongkhag
Punakha

Gewog
Talo

Village
Nobgang

Settlement location
mountain

Settlement pattern
clustered

Coordinates: 27.5657, 89.8386

1 Front side view (from southeast)
2 Side view (from south)
3 Details of rammed earth wall on the front side

Location and summary

This building is located in Nobgang, a village in a mountainous region about 4km southwest of central Punakha and dotted with a few traditional farmhouses. The main building faces east on land that slopes downward to the east. In the southeast corner of the L-shaped main house, there is a rammed earth wall that surrounds a courtyard. The east side of this wall is located precisely at the place where the plot drops a step lower; this wall has been built on top of the stonework for the retaining wall. Northwest of the main building, there is a single-storey livestock shed with a roof, and there are yards east of the main building on level ground. The two-storeyed building is made of rammed earth and has gabled corrugated iron roof weighted with stones. It is composed broadly of three spaces. There is the north-south ridge building (henceforth, the south building), with a width of 8m and a depth of 5.6m; north of this, is the east-west ridge building ("the north building"), with a width of 6.4m and a depth of 2.9m; and east is the single-storey east-west building ("the east building"), with a width of 5.2m and a depth of 4.2m. All together, they have an L-shaped planar form. As for its outward appearance, on the first floor, there are *rabsel* bay windows on the east of the south building and the east and south sides of the north building. The north side of the north building has a small window. On the ground floor, the east side of the south building has wooden-grated windows; the south side of the north building has *rabsel* windows; and the east and south sides of the south building have small *rabsel* windows. There is an entrance to and from the yards on the south side of the rammed earth wall surrounding the courtyard, and the building's main entrance is on the east

of the south building. There are separate entrances for the ground floor of the north and east buildings.

The composition of each floor

On the ground floor of the south building, there is a rammed earth partition wall running east-west, dividing the space into two rooms, north and south. The north one has an entrance on the east, and in the northwest corner there is a staircase that leads to the first floor. There are traces of a furnace on the west side. There is an opening with a door to the east of the partition wall, but this was done later; it is believed that there was no opening when it was built. The south room has a bed. There is a wooden-grated window on the east, and stones were later laid into the windowsill. There are two shaft holes in the header members, and entrance bottom-edge planks remain in the lower part, along with a shaft hole. Thus, it is thought that this was an entrance when it was first built. Both rooms have earthen floors, and for the ceiling, the floorboards for the upper level have been placed on squared timber joists. Both the joists and the floorboards are new and appear to have been manufactured. There is one part in the northeast of the north room whose joists and floorboards appear to be original.

The ground floor of the north building was used as a kitchen; the east and north sides have L-shaped rammed earth walls, and everything else is built with wooden mud. The floor is all earthen, but on the east, there are floor planks laid on top of the earthen floor. For the ceiling, the fascines of the foundation for the upper floor are placed on joists. The ground floor of the east building, which was a living area, has a stove in the middle of the room. There is wooden flooring, and for the ceiling, roofing boards were placed on top of machine-made squared timber purlins.

The first floor of the south building, like the ground floor, is divided into two rooms, north and south, by a rammed earth partition wall running east-west. The north room was used as a living area, and there is an opening in the partition wall with double doors. The south room was the altar room, and there is a Buddhist altar on the west. At present, there are no openings on the south face, but there are traces that an opening in the outer wall has been patched up and blocked.

4 Room on the north side of the ground floor
5 Altar room on the first floor of the south building
6 Room on the north side of the first floor, the south building
7 Room on the first floor of the north building

Thus, it is believed that there was an entrance earlier on the south. There are *rabsel* bay windows on the east face of the first floor of the south building. At the east end of rammed earth partition wall, both the north and south rooms have wooden frames on three sides, so it is possible that there were *rabsel* windows in these locations when it was built.

The first floor of the north building was used as a bedroom. On the south there is an entrance that leads to the south building, and a *rabsel* window. There is a balcony with a handrail outside. The floors are wooden, but between the second and third pillars from the west, there are studs and a vertical frame; the area to the west is earthen floor. There are traces of interconnecting members on the studs, so it is possible that there was a wall once. In the rammed earth wall to the west, there is a shelf built into a hollowed-out section of the wall; however, it is surrounded with a frame structured like an entrance, so it seems that this was once an entrance leading to the south building.

The attic space has earthen floors; in the south building, the three sides excluding the east have 85cm high rammed earth walls. A portion of it on the north was removed for entry to and from the north building.

For the roof structure of the south building, there are four roof beams running east-west, and above these are roof struts and ridge struts which support the purlins and the ridge beam. The roof and ridge struts are not connected with interconnecting members and stand alone. There are laths above the rafters, and corrugated metal plate roofing. For the roof of the north building, the east half is gabled, and the west is a shed roof which passes under the gabled roof of the south building. For the roof structure, three roof beams run north-south at floor level; above this are the ridge struts which receive the ridge beam. There are stringer beams on top of both ends of the roof beams; these are covered with rafters and laths, and corrugated metal plate roofing.

Considerations for restoration to the original state

It is possible to trace the history of the building's modifications. In the first stage, only the south building existed, with two entrances on the east. The interior of the ground floor was partitioned with rammed earth walls with no openings; the north room was a kitchen equipped with a furnace and the south room possibly a livestock shed. The first floor was probably structured much the same as it is now; however, it is believed that the *rabsel* bay windows on the east side were not there, but they were there in the rammed earth wall on both sides. In addition, on the outer wall of the south, the board grooves for the grain storage chest on the ground floor still remain, and on the first floor and ceiling levels, there are traces of small holes, seemingly from joists, as well as traces of the small opening mentioned above. It is thought that at one time, there was a grain storeroom on the south side of the ground floor, with another room at the top. The time relationship between this and the addition to the north is unclear.

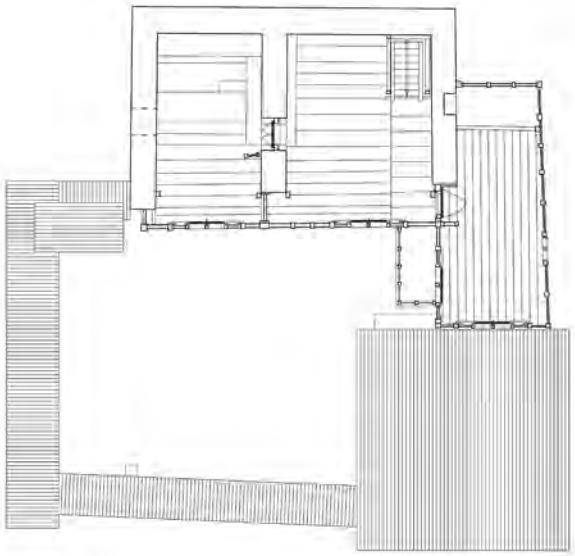
In the second stage, the north building was completed. It is believed that at this time, the outward appearance of the east side of the south building was modified to include *rabsel* bay windows integrated with the north building. As mentioned above, to the west of the first floor of the north building, there are traces of a wall running north-south, and on its west, traces of an entrance leading to the south building. Thus, it is possible that at one time, there was an entrance here leading to the south building via the outside balcony.

The third stage was marked by the addition of the east building. It is unclear when the L-shaped rammed earth wall surrounding the courtyard was built, but it would have been after the second stage. Furthermore, the height of the north-south wall is different from that of the east-west one of the courtyard, and since the latter attaches to the side of the former, it is believed that north-south wall was constructed first.

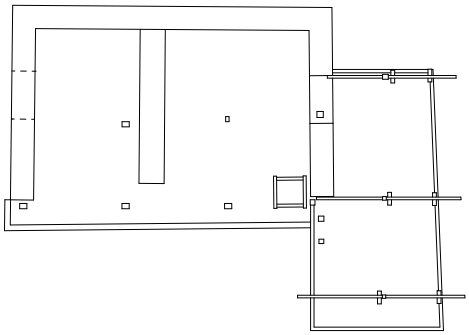
Conclusion

This building began as a simple main building, and after modifications, took a unique, L-shaped planar form. It is possible to deduce the details of this modification process. It is not clear when the structure was built, but it is an important site to understand the method by which such L-shaped planar forms took shape; and there are several such structures in the area.

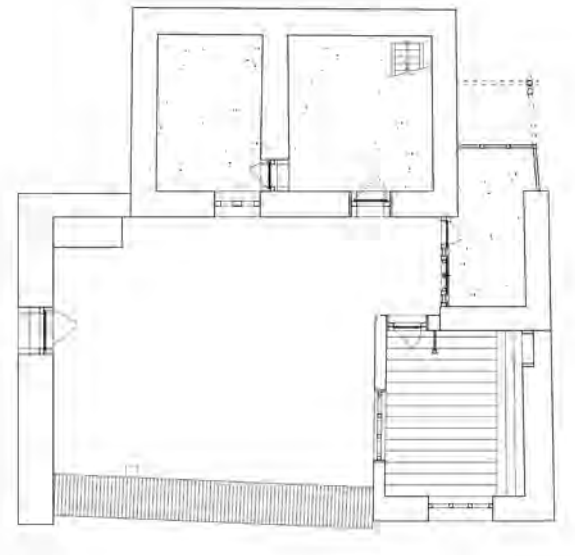
(Maekawa Ayumi)



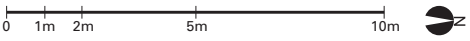
First floor plan 1:200



Attic floor plan 1:200



Ground floor plan 1:200



Cross section 1:150

Tshering Dema and Pema Lham House

DATA

Dzongkhag
Punakha

Gewog
Talo

Village
Nobgang

Settlement location
mountain

Settlement pattern
clustered

Coordinates: 27.5641, 89.8427

1 Front side view (from southeast)
2 Back view (from northwest)
3 Details of the front side

Location and summary

This building is located in Nobgang village, approximately 500m southeast of Sonam Choden house. The main building stands facing east on a southeast downward slope, and there is an attached building on the L-shaped main building's northeast side. There is an L-shaped rammed earth wall around the southeast corner of the main building, and a rammed earth wall between the main building and the attached building to form a courtyard. According to informal interviews, the main building was constructed in the 1940s. The main building is two storeys, made of rammed earth (including a portion made of wood), with an upper gabled roof of corrugated iron. It is composed primarily of three structures. The north building has a width of approximately 7.3m and a depth of approximately 4.9m; south of this is the south building, with a width of approximately 6.0m and a depth of approximately 3.5m; and west of this is the west building, with a width of approximately 4.9m and a depth of approximately 2.4m. The attached building has a width of approximately 9.4m and a depth of approximately 4.9m. As for the outward appearance of the main building, the first floor has *rabsel* bay windows on the east, north, and south sides, and another separate *rabsel* bay window in the southwest corner. The rest is a rammed earth wall with a white plaster finish. As for the outward appearance of the attached building, there is an L-shaped *rabsel* window in the southeast corner, and a wooden-grated window on each of the north and south sides. The rammed earth walls have a white plaster finish. Each of the main building's three structures has its own independent entrance, and the entrance to the west building, unlike the other two, is from the outside

rather than through the courtyard. The entrance to the attached building is also only from the outside, rather than through the courtyard.

The Composition of each floor

The ground floor of the north building has a rammed earth partition wall, dividing it in to two rooms, north and south. The south room has an entrance on the east side and a winder staircase on the west side which leads up to the first floor. On the north side, there is an opening that leads to the north room. The north room is currently being used for storage, but there is a *rabsel* window on the east side. Compared to the floor above, the wind erosion on this *rabsel* window is advanced. Both rooms have earthen floors, while the south room has a joist ceiling, and the north room has a coffered ceiling.

The ground floor of the south building is a single room with no partitions; it is used as a living room. There is an entrance lead to the outside on the north, and a small *rabsel* window on the south. There are joist-shaped joint holes on the horizontal structural member for the bottom edge of the upper floor's *rabsel* bay window on the upper part of the east wall, so this appears to be diverted material. There is wooden flooring, and for the ceiling, the floorboards of the upper floor are laid over joists.

The first floor of the north building has a cross-shaped wooden partition wall, dividing the space into four rooms. For the partition wall that runs north/south, the location of the *rabsel* bay window matches the height of the pillars and the position of the header members, but for the partition wall that runs east/west, these do not match, so it is believed that this wall was added during a later modification. The northwest room is the altar room, with a Buddhist altar on the west wall. The northeast room is an anteroom to the altar room, with *rabsel* bay windows on both the east and north sides. The southeast room is like a large corridor, and is not used as a living area. There is an opening in the south wall that leads to the south building. Each room has wooden flooring and a joist ceiling; however, in the southeast room, the height of the joists is different, so it is believed to retain the same structure as when it was first built. In the southeast corner, there is a storage space and a staircase. There is an opening in front of the staircase on the partition wall that runs north/south, but there are traces of wall on the studs, so it is believed that it was closed off when it was first built.

The first floor of the south building is a single room, and it is used as a living room. There are *rabsel* bay windows on the north, south, and east walls. There is an opening in the rammed earth wall on the west side which leads to the west building. The interior has wooden flooring and a joist ceiling. The first floor of the west building is divided with a wooden partition running east/west into two rooms, both of which are used as storage rooms.

The attic space has an earthen floor, and the rammed earth walls from the north building's north, south, and west sides rise up to approximately 60cm. The south building's south and west rammed earth walls rise up parapet-style approximately 15cm, and the west wall rises up approximately 60cm to the level of the roof beams with an independent foundation. The edges of

4 Room on the ground floor of the north building
5 Room on the ground floor of the south building

the east side's rammed earth wall are in good condition, so it is believed that the rammed earth extended to this point since it was first built, and the bay windows also likely retain the same shape.

As for the roof structure, there are six roof beams running east/west, with roof struts and ridge struts on top which receive the purlins and ridge beams. The centre has a gabled roof; above the ridge beam and purlins, there are also ridge struts and roof struts which receive the ridge beam and purlins. The roof beam along the ridge is made of two pieces of timber. There are traces of an axe-scraped pattern on the roof beams, purlins, and roof struts, so it is believed that these are reused materials diverted from other buildings. The south and west buildings each have a shed roof covering their east and south sides.

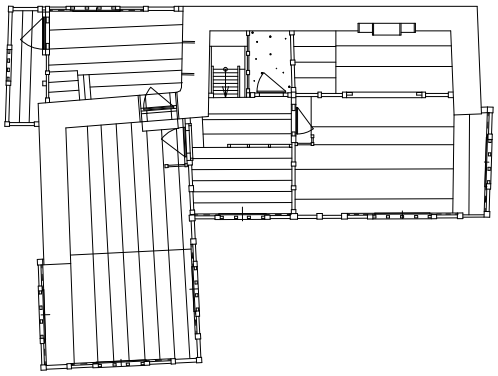
Considerations for restoration to the original state

The modification history of the main building can be divided broadly into the following three stages. At the first stage, only the north building was built. As mentioned above, since there is no wind erosion on the east end surface of the rammed earth wall, it is believed that there was once a *rabsel* bay window here. Meanwhile, the window on the ground floor is a flush *rabsel*, different in shape than the one on the first floor, and also shows greater wind erosion than the bay window on the first floor. Thus, it is possible that when it was first built, the first-floor window was a flush *rabsel* window like on the ground floor. It is believed that the first-floor interior had no partition running east/west on the east side, and was used as a single altar room. Based on its plane composition, it is possible that when it was first built, it was used as a facility like a lhakhang rather than as a residence. Further, it appears that the staircase was in a different location when it was first built, but this location is unclear. At the second stage, the south building was added. It is believed that the *rabsel* bay windows on the first floor have been there since it was first built, and they are the same shape as those in the north building. At the third stage, the west building was added, and its outward appearance is believed to have undergone extremely minimal changes since the time it was built.

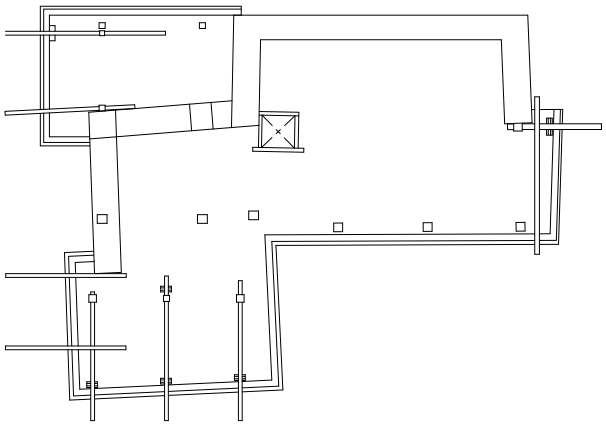
Conclusion

This building, like Sonam Choden House, is valuable for understanding the formation process of the L-shaped planar constructions that remain in this region. The shape of the *rabsel* windows differ as a result of the modification process. Furthermore, although this has not been confirmed, the building is said to date from the 1940s, so it also represents an important case in terms of chronology. (Maekawa Ayumi)

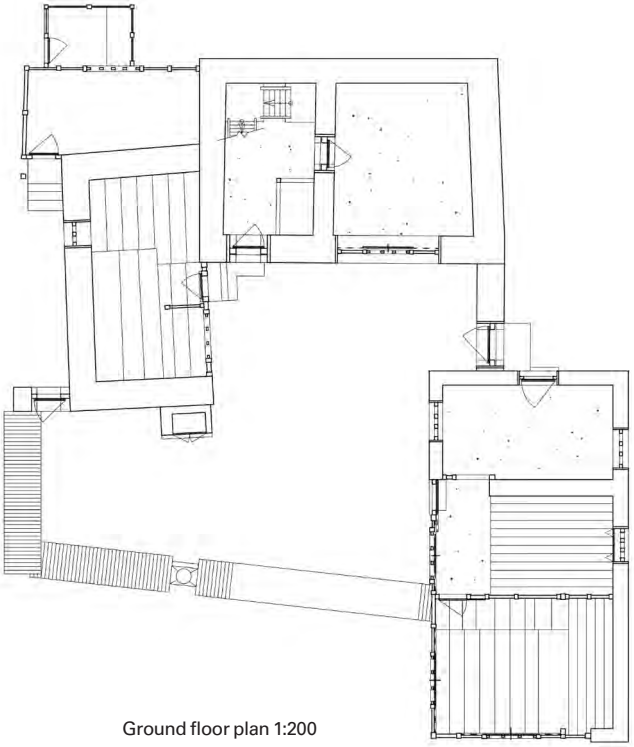
6 Room in front of the altar room on the first floor of the north building
7 Room on the first floor of the south building
8 Attic space



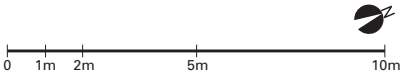
First floor plan 1:200



Attic floor plan 1:200



Ground floor plan 1:200



Cross section 1:150

Sangay Lham House

DATA

Dzongkhag
Haa

Gewog
Bji

Village
Hatay

Settlement location
tableland

Settlement pattern
clustered

Coordinates: 27.4194, 89.2190

1 Whole view of the back side with *rabsel* window (from west)
2 Side view (from northwest)
3 Front view (from east)

Location and summary

This house is in Hatay Village in Haa Dzongkhag, some 7km northwest of the municipal town centre and west of the Haa Chhu river, where the village spreads out to the north of a tributary feeding the river from the west. A relatively dense collection of homes is built on the outskirts.

This building is a very small, two-storey dwelling consisting of a two-room living space and no additions. Facing east out of two floors of rammed earth, a gabled shingle and stone-weighted roof covers the top. The foundation was carefully constructed out of masonry, with the rammed earth stacked on top. The south side of the building touches a neighbouring house, and although it runs east to west lengthwise, the ridge of its roof runs north to south assuming east-west rainfall. The entrance is on the east side. Most rammed earth dwellings in Bhutan have their entrances in the lengthwise direction, but this one has an entrance on its width side; further, it highlights a unique form, including a wooden wall with *rabsels* having a window at the back. The reason for this is unknown, but an alley runs along the north and west sides, which may be due to site conditions. At the time of surveying, the building was unoccupied.

The composition of each floor

The ground floor is a single room believed to have

been used for livestock, but now serves as storage. A wooden entrance was built in the middle of the east side with an inward-opening door. There are no windows, so the space is fully enclosed.

The first floor has a veranda on the east side in front of the entrance and stairs on the north side. An entrance doorway is situated on the southern end of the east side, with a wooden, inward-opening door. The inside of the first floor consists of two rooms running east to west, divided by a wooden wall with an exposed wooden pillar slightly east of centre, and a doorway at its northern end. The east room is a kitchen, and the west room is a living space. The east room has a wooden floor on its southern half, but an earthen floor on its northern half. Two earthen stoves were built in the northeast corner, and a board was removed from the eastern end of the ceiling to serve as a smoke vent. A small, vertical lattice window is in the middle of the north side. Joists run from east to west. The west room is formed between boards, with beams placed in the middle running north to south, and straight joists across the beams running east to west. A wooden wall was built on the west side, extending the width of the room, with frames installed for two sliding doors. A niche was made in the surface of the northern wall toward the east, providing space for an altar room; a shelf reserved for the Buddha was found. Furniture believed to have been used as an altar also remained inside the room.

The attic floor, which serves as an attic, has a raised floor surface like a parapet both the north and south sides, upon which a wall was partially erected to support beams. In the middle are struts, crossed by beams from east to west, creating a ridge extending from north to south. The materials are relatively new, and a rammed earth wall on top of pillars, on top of the parapet-like wall, is of newly piled soil. Initially, the ridge may have gone from east to west, and the roof was redone. The attic floor has no trapdoor for access from the building's interior; a ladder made from a hollowed-out log was installed on the south side.

The context of additions

This is a small dwelling with no additions, making it a rare example of a dwelling that has retained its original size. The first floor entrances on the east side are believed to have been the same as when they were originally built, but the wooden walls on both sides of the rammed earth on the west side are newer materials and were made later. When we checked the western ends of the north and south rammed earth walls, we observed that both were made by alternately stacking corner materials, and originally wrapped around the west side. The first floor is already missing its early walls, so it is unknown whether those walls had windows. However, it seems that the wooden wall running from east to west in the middle of the first floor is made of newer materials and was built later. The east side is extremely grimy, but there are still parts of the west side with hardly any grime. When the first

4 Details of the *rabsel* window on the west wall
5 West room on the first floor

floor consisted of only a single room, it was a small, old-fashioned rammed earth dwelling. Its openings were almost all on the front; it is highly likely there were none on the back. The present-day back side may have once been an entrance, but there are no traces of additional work in the rammed earth on the back of the ground floor. Based on previous examples, it is unlikely that only the first-floor entrance was on the back. The window on the north side of the kitchen appears to be composed of newer materials and was made later.

Additionally, this wooden wall is held up by the surface of a rammed earth wall. There are no parts of the wall surface poking out. The newer *rabsels* mostly protrude outward, but long ago fit into the wall surface.

The building touches a neighbouring house to the south, flush with the rammed earth on the neighbouring house's eastern side. However, the window members and rammed earth on the north side of the neighbouring house are quite new, meaning that it is an addition. The house built further to the south of this addition is large, but the west surface of the addition is further to the east of the west surface of this building, leaving space on the west side for stairs and forming an entrance. Further to the west of this entrance is a gate. The neighbouring house creates a kind of entrance adjacent to the building. Consequently, this building was some distance away from the neighbouring house and built independently from it.

Conclusion

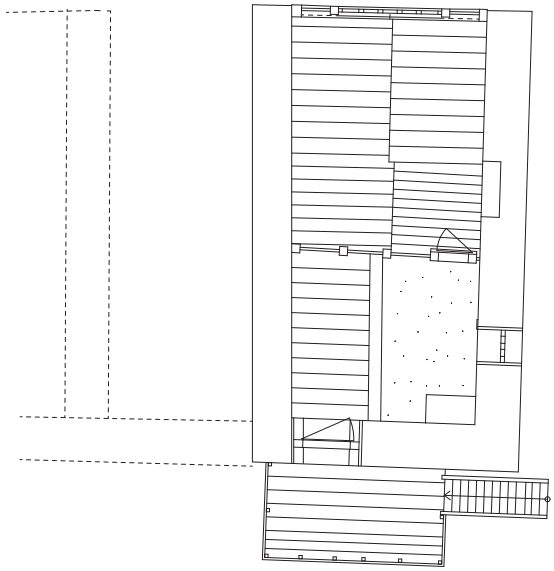
This building was once a small, independent dwelling made of rammed earth, and was presumably a closed structure with a single entrance in front and no windows all around. Most rammed earth dwellings have horizontal (or almost square) shapes when viewed from the front, but this building has a unique vertical shape. The reasons for this are unknown, but it may have been due to the local topography. There is a road running north and west, so this building needed to be built on a narrow strip of land facing this road to the north. The building's east-to-west length matches the shape of the building site. Moreover, it is possible that an entrance was made either the north or south side, although in Bhutan, entrance directions are apparently predetermined for each village, and most face in the direction of rivers. This building likely had an entrance on the east side in the direction of the Haa Chhu river.

This building is valuable in providing an understanding of how rammed earth dwellings were formed a long time ago. It is a small dwelling with a ground floor once used for livestock, and a narrow, one-room living space on the first floor. Further, it may have contained a highly enclosed indoor environment with only a front entrance. Additionally, the entrance orientation was apparently not determined based on functional building conditions, but rather regional conventions; this is an important consideration when discussing the history of Bhutanese architecture, rendering this building with outstanding cultural value. (Ezura Tsuguto)

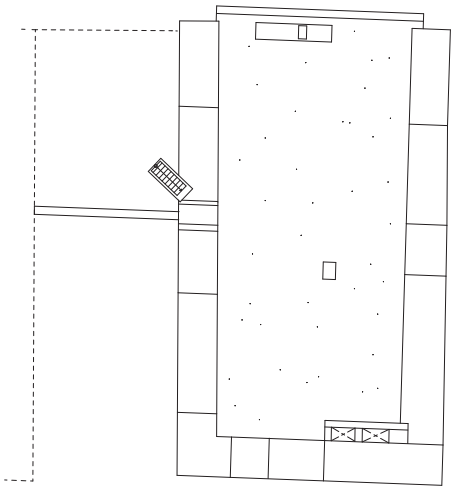

6


7

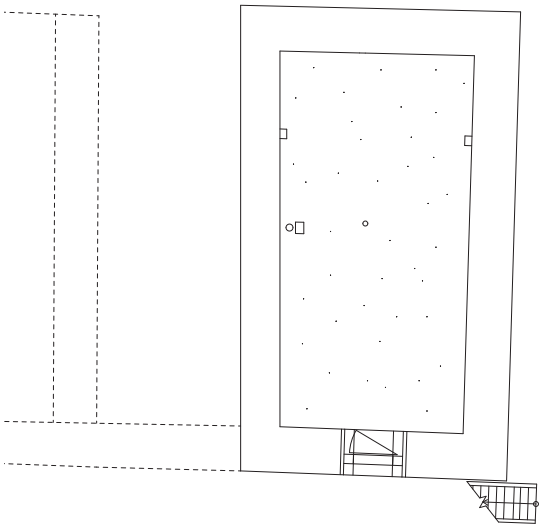
6 East room on the first floor
7 Roof structure



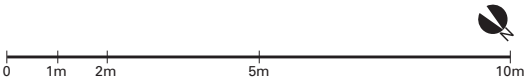
First floor plan 1:150

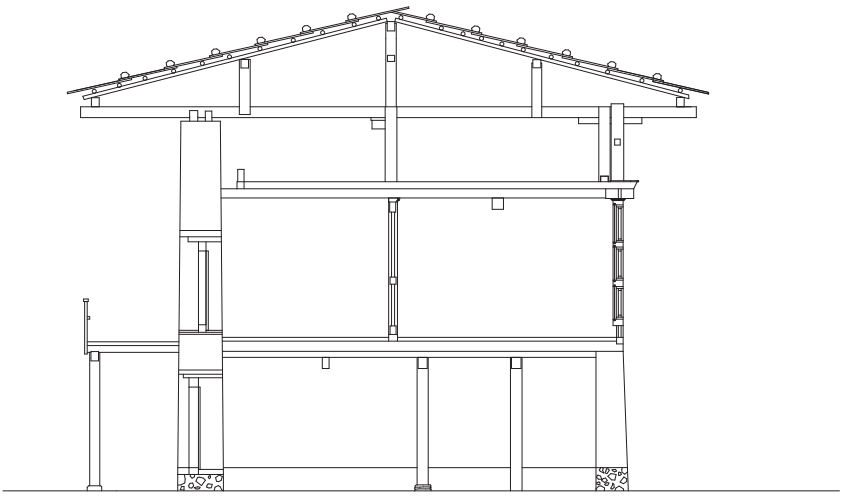


Attic floor plan 1:150



Ground floor plan 1:150





Cross section 1:150

Lhaden House

DATA

Dzongkhag
Haa

Gewog
Uesu

Village
Domchug Cheka

Settlement location
riverside

Settlement pattern
clustered

Coordinates: 27.3612, 89.2976

1 Front side view (from east)
2 Back side view (from southwest)
3 Front entrance of the ground floor

Location and summary

This building stands clustered together with a several others on a river terrace on the right bank of the Haa River, near the southern edge of the town of Haa.

The building faces east, has two storeys, and a gabled, corrugated iron sheet roof. There is a stone-paved narrow yard enclosed by a low stone wall at the front of the house, with a covered gate opening at its north end. The plane scale of the building's main rammed earth section is 12.3m wide (east side) by 9.6m deep (south). The exterior walls are plastered in white on the front side only, while the remainder are left as bare, rammed earth walls. A wooden *rabsel* is attached to the front edge of the rammed earth wall on the front face of the first floor. An overhang is attached to the south side of the first floor.

The main entrance to the ground floor is on the east side, but the first floor is accessed by an external staircase to the balcony on the building's west side through under the attached part on the south side. It is unusual to have the main entrance on the rear side in this manner.

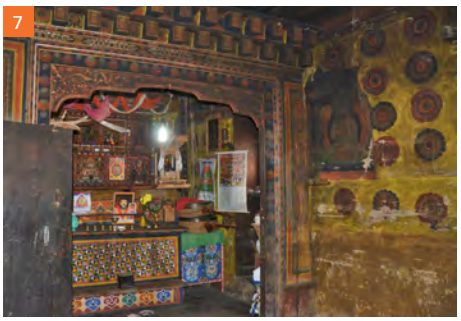
The composition of each floor

The ground-floor interior is partitioned into three rooms by a rammed earth wall. There is an open entrance without fittings at the centre of the east side. Upon entering, there is a long, narrow front room-like space spanning the full width. The left and right areas are currently separated by temporary partitions, serving as a storage space for potatoes and animal feed. The outer wall on the east side is thin on both sides of the entrance and has a higher foundation masonry structure. As such, the width of the opening was likely three times larger in the past than it is at present. At

the back of the front room is a livestock shed. The entrance doorway on the east side has lost the original fittings. Both sides of this entrance have different wall specifications from the others, suggesting that the width of the opening was reduced, moved to a different position, or that other changes were made. There is a large beam running north-south along the width of the room through the centre of its depth, supported by three free-standing pillars. To the south of this room is a small room separated by a rammed earth partition wall; this is not accessed from the interior, but rather from an entrance directly beneath the overhang on the building's south side. The room is a granary, with a rice chest fixed along the northern partition wall, which also seems to have undergone modifications, as its specifications vary between the westward two-thirds and the rest of the wall.

The external staircase leading to the first floor at the southern end of the rear, together with the open balcony it leads to, are both made of comparatively new timber. The southern end of the balcony connects to the overhanging attached part on the building's south face. There is a long, narrow room running east-west surrounded by an *ekra* wall (the upper part of which is a wooden grating). However, this room is not currently used for any specific purpose. There is a large opening running to the floor in the south exterior rammed earth wall facing it, and there appears to have been a doorway in the eastern half, a stud in the centre, and a spandrel wall and window in the western half, though these are now closed up from inside. The present entrance to the living area faces the west-facing balcony, and there is a ladder leading up to the attic on the northern side. The first floor living area is divided into the west and east sections by a north-south rammed earth wall, each of which contains three rooms separated by *ekra* walls. All of the floor surfaces are wooden. The southwest room with the entrance is the largest living space as well as a kitchen, and there are traces of the earthen floor for a furnace which having been covered in the southeast corner. The windowless west-central room is a storage space, which leads to the northwest altar room. In the altar room, most of the eastern rammed earth wall is taken up by an opening that connects to the northeast room. On the eastern side of the rammed earth partition wall, the northeast is a front room which continues from the altar room above, the east-central room is a kitchen, while the southeast room is a bedroom. Each room has a *rabsel*-type window and walls on the eastern side, with no openings on the north and south exterior walls.

While the roof structure is reused material, the rafters and the above were very recently replaced, accompanying reroofing with CGI sheets. In doing so, a short



4 Livestock shed on the ground floor
5 Overhanging section on the south wall of the first floor
6 Southwest room on the first floor
7 Altar room on the first floor

strut was erected above the rafters and the purlin, a modification added to raise the centre of the roof structure one level higher. A similar alteration to raise the centre of the roof can be observed in many traditional farmhouses in the neighbourhood, and has become a fashionable trend in the area.

Considerations for restoration to the original state

Based on observations of new and old materials and signs of modifications in each part of the building, it can be inferred that the history of modifications to this building is roughly as follows:

The size of the building when it was first erected was that of the current building's western section, with the rammed earth partition wall running north–south being the original eastern exterior wall. This wall has a fairly strong tapering toward the west, and the chamfering on the corner of the old exterior wall is clear when viewed from the northern side. The ground floor was likely a single room without partitions. In light of typical practices, the entrance was probably on the eastern front face, but its location and width may have been different from its present form. The first floor was also likely a single room when it was built. Of the openings on the first floor, only the closed-up doorway on the south face retains its original materials and shape, though there were also probably a doorway on the north face, and windows or doorways at two locations on the east face. Each of these correspond to the locations of existing openings that have since been remodeled, and the external entrance is believed to have been on the east or south side. Traces on the exterior wall indicate that there was an overhanging attached structure not only on the south side, but also to the north.

Although it is unclear whether it came before or after subsequent modifications, a rammed earth partition wall was added to the ground-floor interior, and a modification was made by adding another entrance to the south side to separate the space into two rooms.

Extensions were made to the eastern side across its entire width. Rammed earth walls were added to the north and south of the two storeys, while on the east side, only the first storey is a rammed earth wall. However, the rammed earth wall on the front face did not connect in the middle, and so the northern and southern sides were completed separately. At this time, the first floor could have been supported by pillars in the middle. Further, during this extension, the rooftop parapet was altered to increase the height of the roof, raising it by two layers.

The present form of the eastern façade was achieved through modifications. The central entrance on the ground floor was narrowed, and a *rabsel* on the second floor was attached to the front end of the side walls. The first-floor extension consists of two rooms in the north and south. At this time, the opening of the former eastern exterior wall was altered to its current form in the southeast room. Around the same time, the original first-floor room was partitioned into two rooms (north and south).

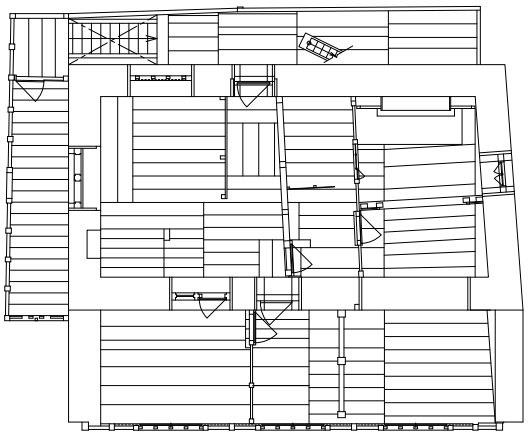
The south room in the first-floor extension was further divided into two rooms (a southeast room and an east-central room). An entrance to the latter was added to the old eastern exterior wall.

The south side entrance to the southwest room on the first floor was closed up, and a new window and an entrance doorway were installed on the west side. The furnace in the same room was moved from the southwest to the southeast.

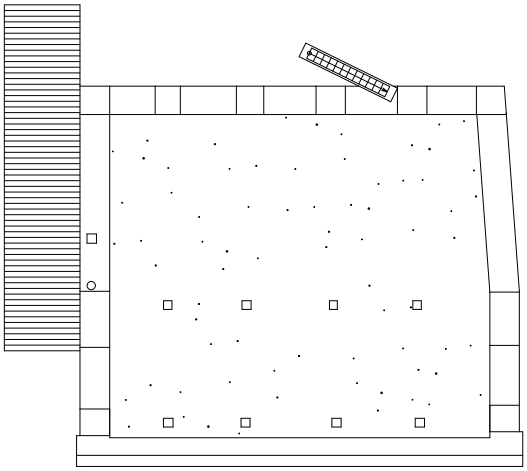
The northwest room was separated into two rooms (north and south), and a major portion of the rammed earth partition wall (the former east exterior wall) between the northeast and northwest rooms was removed. A new altar room was built to the west.

Conclusion

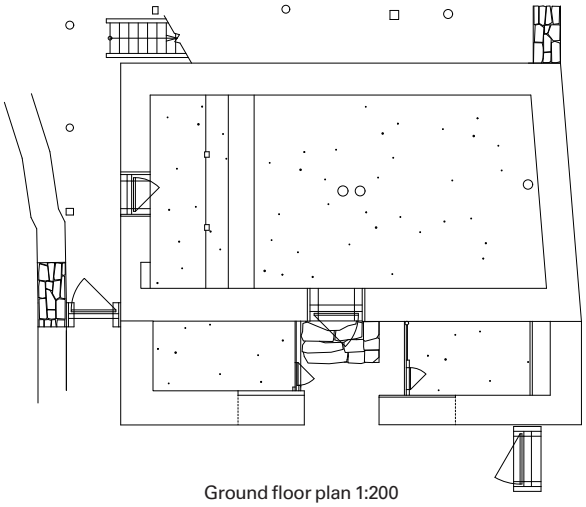
With the exception of having a first-floor entrance at its rear, this building displays the typical architecture of traditional farmhouses in the Haa region. It is valuable as the process of transformation up to its present state can be clearly seen. An open doorway with no fittings on the front face of the ground floor is a form that can be found in the neighbouring villages of Ahatam and Ingo, although this is not common in other parts of the country and is unique to this region. With regard to the semi-outdoor space at the front, it is highly interesting to see the process by which it originated in the form of support for the wooden front section of the first floor with free-standing pillars. (Tomoda Masahiko)



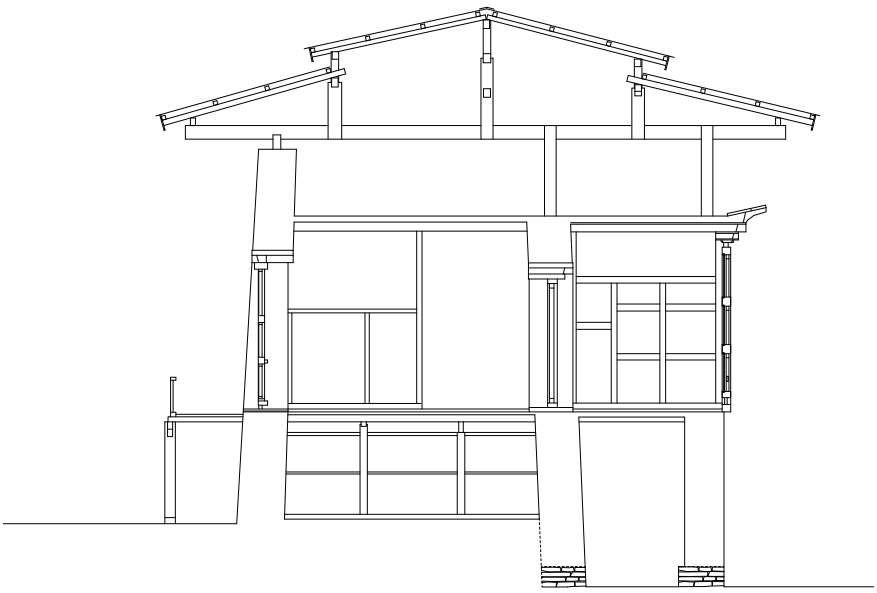
First floor plan 1:200



Attic floor plan 1:200



Ground floor plan 1:200



Cross section 1:150

1

Ugyen Choden House

DATA

Dzongkhag
Punakha

Gewog
Dzomi

Village
Changjokha

Settlement location
riverside

Settlement pattern
clustered

Coordinates: 27.5815, 89.8690

1 Whole view of the front side (from northwest)
2 Whole view of the back side (from southeast)
3 Front entrance of the ground floor

Location and summary

Changjokha village is in the centre of Punakha, across the river from Punakha Dzong, and is one of the villages that migrated seasonally with a group of monks. There is a close connection between the village site and Punakha Dzong. The construction of Punakha Dzong is reported to have occurred around 1638, which is the latest limit for the establishment of Changjokha. Samuel Davis' sketch from 1783, which depicts several houses on the riverbank opposite to Punakha Dzong, resembles the present-day landscape of the village and houses of Chanjokha. Tandin Zam House and Peldon House are located to the west of this building. Traditional farmhouses are lined up adjacent to this building southwards, across the road, and northwards.

The building is a two-storey rammed earth building with a gabled roof made of corrugated metal. The plane is not perfectly rectangular but is slightly open to the front. The total width of the outer wall on the ground-floor is approximately 7.3m and the depth is about 6.0m. The front of the building is to the west, and it has a front yard that is surrounded by a rammed earth wall. The entrance to the site is at the centre of the wall. The front yard wall is thinner than the rammed earth wall of the main building, and they differ in construction method as well, which suggests that it is a later addition.

In terms of the outward appearance, there are two north-south entrances on the west face of the first-floor front; on the first floor, there is a *rabsel* bay window between the north and south rammed earth side walls, and at the northern end, there is an overhanging veranda with an entrance. White plaster remains on the north and south rammed earth walls, but not on the

east and west sides.

This building is unlike the neighbouring Tandin Zam and Peldon Houses, which are tall structures, with respect to its plane scale. Other than the *rabsel* bay window on the side wall there are few entrances, which highlights the old style.

The composition of each floor

On the front side of the main building is a front yard that is surrounded by a rammed earth wall, which appears to be the rammed earth wall of another building existed on the site before, and the north-south walls rises to the height of the first floor. The rammed earth wall surrounding the yard has largely collapsed, especially the western side of the wall.

The ground floor of the building is surrounded on all four sides by a rammed earth wall, and there is an east-west rammed earth wall about halfway width-wise that divides the interior into two rooms, north and south. Both rooms have a single door on the west side face. The southern room has an earthen floor. It is a grain storehouse with an earthen grain chest installed. The ceiling is placed along the ridge with a sleeper beam of square timber that has an axe-scrapped pattern, on top of which are the joists of surface-coated logs (back side) and an axe-scrapped pattern (front side). The sleeper beam divides the joist into two materials to the east and west, which are not joined but shifted along the north-south direction, and the two materials are placed separately. The fascine is set on top of it.

The room in the north is not connected to the south. The entrance cannot be opened at present, so it is not possible to enter it.

There is a *rabsel* bay window at the front, west of the first floor, while the south, east, and north sides are rammed earth walls, and the interior is divided into two rooms along the north-south direction. Unlike the ground floor, the partition is wooden. The first floor has a wooden floor, except the southeast corner of the south room that has a furnace, which has an earthen floor. The south room is a living room with a small window that opens to the east. There are remnants of earthen floor in the northeast of the northern room, which may have formerly been an altar room. The ceilings of both rooms have a similar structure, with a sleeper beam along the ridge and a thick pillar in the centre of the two rooms that has an interconnecting member at the top end. The sleeper beam is a single piece of lumber with an axe-scraped pattern that serves as an interconnecting member through the two chambers. There is a joist on the top of the sleeper beam that has a fascine laid on it. Like the ground floor, the joist differs from front to back;

4 Grain chest on the south side of the ground floor
5 Living room on the south side of the first floor
6 *Rabsel* bay window on the front side of the first floor

the rear uses the vertical cross-section of the lumber, whereas the front utilises the horizontal cross-section.

The attic space has an earthen floor, and a parapet of stacked sun-dried bricks has been set up at the front end. Rammed earth wall is used everywhere except the front face, but the top 40cm section of the rammed earth wall is made by stacking sun-dried bricks as well. The roof beam is supported by struts only at the front, while the back is supported by a rammed earth wall. The roof struts are attached to the roof beam by a tenon joint, and the purlin is set into the top of the roof struts as an interconnecting member at the top end of the pillars. The axe-scraped squared lumber under the purlin displays a large degree of weathering, which indicates their age. The rafters are made of machine-sawed square timber with a fascia board at the tip, both of which are recent.

Considerations for restoration to the original state

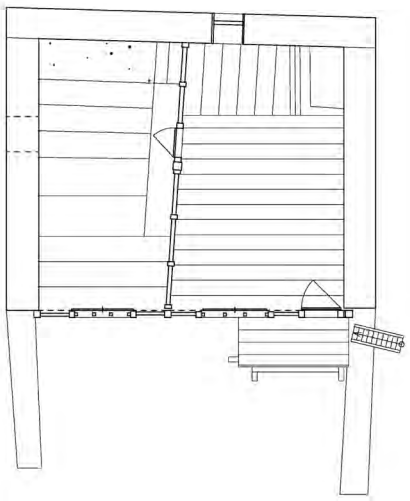
Modification is limited to the *rabsel* bay window on the first floor of the main building, and though large modifications are scant, some traces of modification can be seen. First is the ground floor, which is divided into two rooms, and the degree of weathering of the header member at each entrance indicates that the southern entrance is a later addition. Further, the rammed earth wall dividing the north and south sides is also later work, suggesting that it was once a single room.

In terms of the modifications on the first floor, the doorway at the south end is older than the *rabsel* bay window and seems to retain its pre-modification form. It seems that the earthen wall of the north-south partition between the rooms was constructed when the *rabsel* was changed to a bay window and that the first floor also possessed a single room structure before that. Some windows of the *rabsel* are constructed from old materials, and it appears that they were installed flush with the side walls before they were made into a bay window. The enlargement of the front bay windows can also be seen in the difference in the form of joists on the first and first floors. It is believed that the construction of the *rabsel* bay window on the first floor caused an increase in width, making the joist length insufficient. As a result, the joist was cut in half and newly installed on the front side. Thus, the configuration of the front of the first floor prior to making the *rabsel* windows flush on the side walls is unclear, but it is possible to restore it to its original state as a single room space.

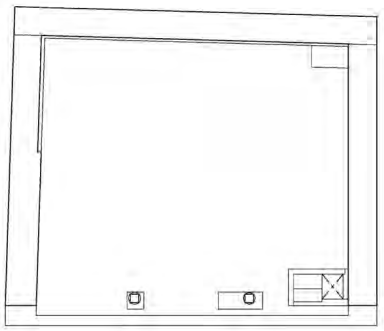
Conclusion

This building is surrounded by a rammed earth wall and overall has few openings, and the first floor with its side walls and *rabsel* bay window is significant because it retains the old style. In particular, the fact that the structure of the building differs from that of the nearby Tandin Zam and Peldon Houses indicates that various architectural forms were in existence in the region and substantiates the uniqueness of the Tandin Zam and Peldon Houses. Further, the limited overall modification and the impressive preservation of its original form is also highly commendable. It is in a good state of preservation, and it is desirable to continue its maintenance and management. (Unno Satoshi)

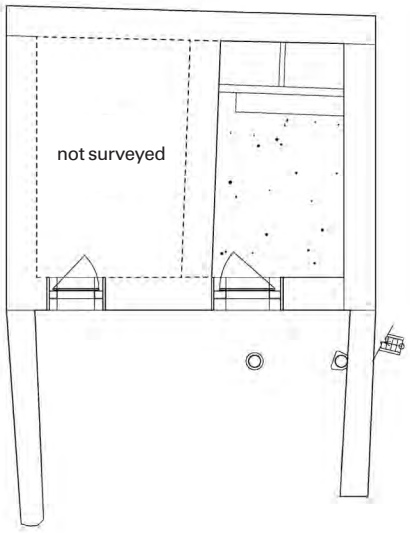
7 Living room on the north side of the first floor 8 Attic space



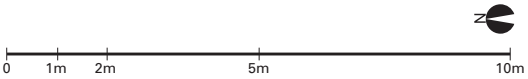
First floor plan 1:150

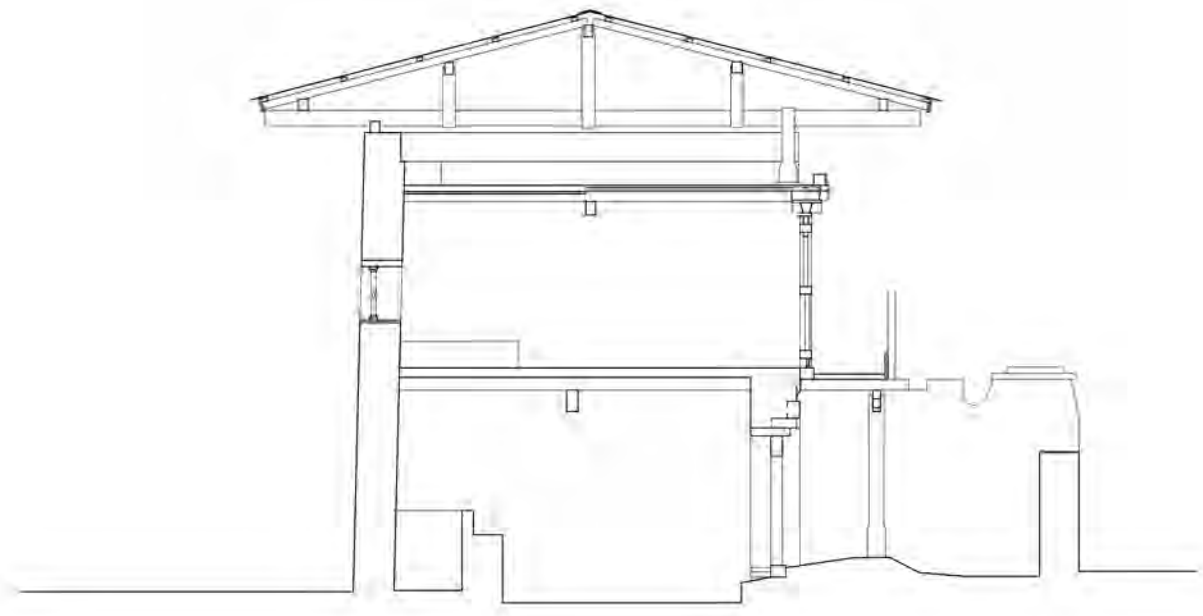


Attic floor plan 1:150



Ground floor plan 1:150





Cross section 1:100

Namgay Bidha House

DATA

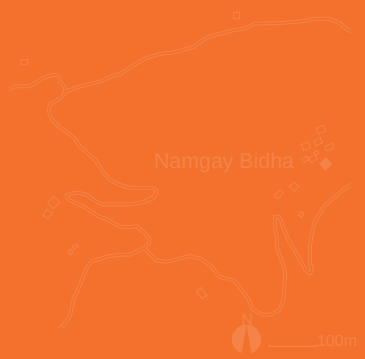
Dzongkhag
Punakha

Gewog
Shengana

Village
Tshosa

Settlement location
mountain

Settlement pattern
clustered



Coordinates: 27.5993, 89.9227

1 Front view (from west)
2 Back side view (from southeast)
3 Side view (from north)

Location and summary

Tshosa is located about 6km east of Punakha Dzong in a valley with terraced rice paddies on the lower part of the valley. The village is situated on the upper part of the terraced rice paddies with a mountain forest in the background. Namgay Bidha House is located on the southern slope of this valley. According to the interview transcript, the house was built in the present owner's grandmother's lifetime.

The main building is a three-storeyed structure constructed from rammed earth that has a width-sided front gabled lantern roof and a corrugated sheet metal roof. The main building faces southwest but will be described herein as facing west for purposes of simplicity. The width of the main building is approximately 10.8m at the front west side and approximately 10.3m at the rear, slightly narrower in the width at the rear side at the ground floor exterior wall. The depth is about 8.5m, and there is a rammed earth wall on the western side of the ground floor. The roof of this exterior is earthen, and sheet metal is placed in the area outside the large roof eaves. The northern and southern walls of this exterior have a shingled roof structure.

The foundation is a masonry structure, and a rammed earth wall is constructed on top of it. The height of the rammed earth wall is approximately 60cm at the base of the northern end of the eastern face. The thickness measures 71cm on the partition of the ground floor of the main building, 68cm on the west front of the first floor, approximately 72cm on the southern face of the second floor, and 71cm on the roof. Regarding the house's outward appearance, a *rabsel* bay window is installed in front of the second floor on the north side facing the valley. There are no openings on the east side.

On the south side, there is no opening to the first floor, and the veranda extends to the second floor.

The composition of each floor

The ground floor of the main building is divided into two sections, east and west, with the overhanging section in the west front. There is a doorway on the northern side of the overhang, and a staircase leading to the side of the main entrance on the first floor. There is also a doorway on the western side of the main building. In the overhang on the western side of the ground floor, two pillars are set up near the centre of the room: the one on the southern side is a round pillar and the other on the north side is a squire pillar. In both cases, the beam is affixed to bracket arms at the column head. The squire pillar has clear axe-scraped pattern traces, and small holes remain at the foot of the pillar. The floor from the north doorway to the round pillars is paved with stone, and the rest of the floor is earthen, the originally constructed overhang is about 160cm wide from the west wall of the main building up to this wooden floor, and the part to the west is a later addition. Regarding the ceiling, only the front of the southern entrance on the first floor, which is the part that existed when the house was built, has a log joist ceiling covered by a fascine, further covered by straw and soil. The first floor on the overhang is earthen.

The two rooms on the ground floor of the main building are separated by a rammed earth wall, with the centre of this partition containing an opening, and four header members of squared timber are placed on top. A squire pillar is erected on the natural stone base as support for the header member, and a short horizontal timber is placed on top of the pillar. The northern end of the header member is supported by a masonry structure rather than the rammed earth wall, and some kind of remodelling has been added. The ceiling is made up of 17 log joists in the depth direction, a wide fascine, and is further covered by straw and soil. The ground floor has a doorway on the western side and small openings on both sides of it, and there are small windows on the northern side of the eastern half of the plot. The ground floor is thought to have been a livestock shed when it was built.

As with the ground floor, the first floor is divided into eastern and western sections by rammed earth walls, for a total of three rooms. In the western half, two entrances are built on the western side, and earthen wall partitions are built with pillars to further divide the rooms to the north and south. The room on the northern side of the western half has an earthen floor on the northern side and a wood floor on the southern side, with a storage room with wooden walls in the northeast corner. There is also a staircase to the second floor along the east partition. There is an opening in the centre of the rammed earth wall that divides the east and west. For the wooden members of this opening, two shaft sliding holes can be seen in the header member while only

4 Room under the west overhanging section of the ground floor
5 Storage on the east side of the first floor
6 Altar on the second floor

one shaft sliding hole can be seen in the bottom-edge plate. In addition, some of the rammed earth above the header member has been reconstructed. The room on the southern side of the western half has a wooden floor, and only the northeast corner has an earthen floor. The southern end of the partitioned rammed earth wall is cut off and connected to the eastern half of the room as an opening without any fittings. There was a staircase to the second floor in this room in the past. The eastern half of the building has an earthen floor with a small window on the north wall and a storage room on the eastern side toward the north. The wooden wall traces remain in the same line as the earthen wall in the west half, and the first floor was likely used in the north–south direction after the building was sold by its initial owner. The ceiling is covered by a joist ceiling spanning depth-wise as well as a fascine, while only the northeast corner of the second floor under the prayer space is covered with a joist ceiling spanning width-wise.

The second floor is a living space divided into four main sections, with the northern and western sides opening to *rabsel* bay windows, as described previously. The stairs from the first-floor lead to the kitchen and living room space in the southwest corner. The space has wooden flooring and there is stone embedded in the floor at the top of the stairs. This spot is said to have been used as a pot stand to keep pots and pans warm. The partition of the southeast corner room is divided by pillars into five bays, and the centre three bays are open. Part of the room in the southeast corner has an earthen dirt floor along the east wall, and the rest has a wooden floor. This earthen floor space served as an altar in the past. The two rooms in the southern half have openings in the south wall: the eastern half is used for cooking and the western half is used as a washroom. The room in the northwest corner has a wooden floor. The room in the northeast corner is used as an altar and antechamber. The floor is made of wood and the walls and ceiling are finished with decorative paint. The border between the altar room and the antechamber has a large opening, and the decorative paint finish displays have beautifully intricate artisan detailing. On the second floor, joist ceilings are hung depth-wise at 30–40cm intervals, while the joist ceilings in the prayer space and antechamber are hung width-wise. In addition, the ceiling panels in the northern half of the room are artisanally placed in the same direction as the joist ceiling to avoid revealing the joints of the ceiling panels.

The attic space has a staircase with an elevated entrance on the eastern half of the veranda. While beams are affixed to four struts, the central two struts are not extended to the ridge line, and the central two ridge struts stand independently. The roof is only the space created between these ridge struts.

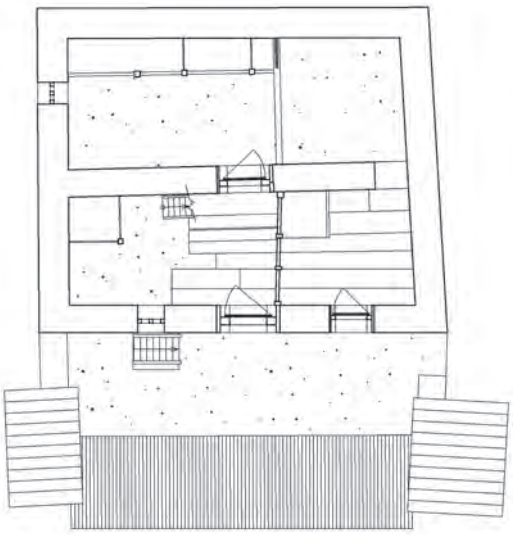
Considerations for restoration to the original state

When this house was built, the southern entrance on the western side of the first floor was used as the front door, and an elevated staircase was built in the southwest corner room.

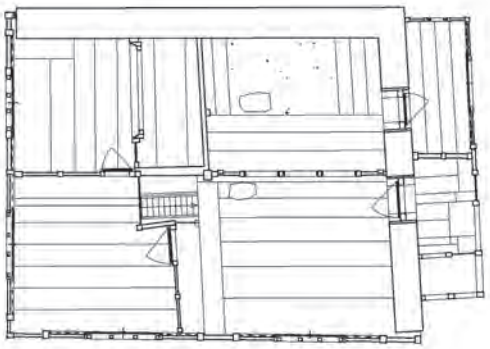
The altar room on the second floor was located in the southeast corner of the room when this house was built. During the remodelling of the altar room, some of the rammed earth from the first-floor partition was rebuilt. While the floor and joist ceiling of the altar room as it currently exists are oriented width-wise, this is to match the *rabsel* bay window on the north face. Meanwhile, the front room has bay windows on both the northern and western sides, but only the western side in the depth direction uses a joist, and the northern side on the gable side uses a bracket inserted into the wall to form a *rabsel* bay window. We learned that the installation of the first-floor earthen wall partitions, the main entrance, and staircase coincided with that of the second floor *rabsel* window as a large-scale remodelling project.

Conclusion

The altar and antechamber rooms are richly adorned with decorative paint finishes and are designed with joist ceilings and ceiling panels oriented in the same direction. The stone used for the flooring in the second-floor kitchen and living room is rare, and remains as evidence of the lifestyle of those who occupy the house. Although the series of remodelling projects related to the installation of the *rabsel* window on the second floor were large in scale, the overall degree of preservation of the house is good, and the structure is highly valuable as a case study revealing the history of its renovations and the changes in the prayer space. (Fukushima Hirohito)

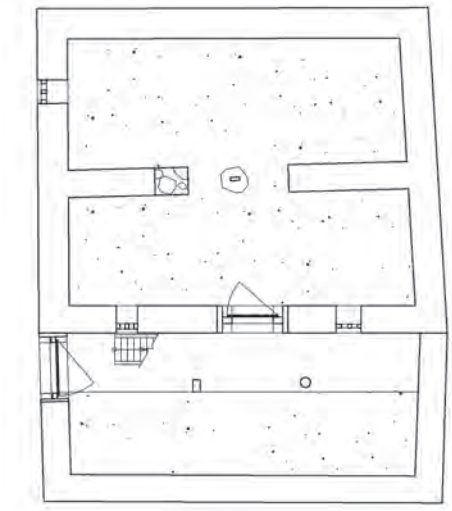


First floor plan 1:200

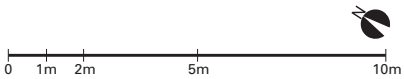


Second floor plan 1:200

Overhanging section on the south of the second floor



Ground floor plan 1:200



Cross section 1:150

3-7 Various Modifications and Alternations

3

Aum Baytum and Bakhum House

DATA

Dzongkhag
Paro

Gewog
Lungnyi

Village
Woochu

Settlement location
riverside

Settlement pattern
dispersed

Coordinates: 27.3920, 89.4270

1 Side view (from north)
2 Front view and the entrance ladder (from southwest)
3 Side view (from south)

Location and summary

In Woochu Village in Paro Dzongkhag, approximately 500m south of Paro International Airport, the Paro Valley lies to the east, and a stream runs to the south. This small settlement is formed across the stream and close to its northern end. On its outskirts stands a home with a vast farm on the north side reaching the Paro Valley. The lot has a yard on its western side, and is surrounded by stone walls with a main entrance on the north end, and a simple rear entrance on the south end. To the northwest corner of the yard is a work shed with a wooden shingle roof and large exposed rocks on the south side.

The main building, approximately 16.5m wide and 8.5m deep, is a two-storey, rammed earth structure with a wooden shingle, gabled roof facing west and a width-side front. The layout includes an addition to the west of the rammed earth main structure, which runs north and south lengthwise. The ground floor of this addition is made of soil blocks and rammed earth. The first floor is built of wood, with three sides enclosed by wooden walls and *rabsels*. The east side, to the rear of the first floor, is composed of an overhanging, cantilevered wooden section. A landing is situated close to the middle of the west-facing side of the second storey, which is accessed via a ladder. A small wooden storeroom is built in the northwest corner, which is completely covered by a roof. Initially, this was a two-family house. It was then used by only one family at one time and significantly remodeled, but is now used by two families.

The composition of each floor

The ground floor is earthen and intended for livestock, while the space within its rammed earth walls is divided into northern and southern rooms. Both rooms have

wooden entrances in the middle of their western walls. The southern room is a little wider and has an antechamber on its west side, enclosed with blocks of soil approximately 4m deep, which is further subdivided into two rooms by interior walls made from similar blocks with a wooden, inward-opening door in the middle of its western face. The front of the north room is constructed of rammed earth, while its south-facing wall provides a soil block wall for the south side antechamber. The front of the west side leads to two standing pillars.

The first floor contains the northern and southern rooms, which are divided by a rammed earth wall on the building's main rammed earth wall body; a wooden hinged door is located on the wall body between the rooms. Partition walls divide both rooms into northern and southern sections. The southern room is an altar room, with the altar at the east end and a window opening onto the southern face. On the west side, there is a row of four doorways, each with a hinged door; the doorway on the north end opens onto the north room. The north room is a kitchen, equipped with a stove on its east end. The south side of the north room is a living room, with two doorways opening onto its western face. The north side is a storage room.

The wooden wall section in front has an entrance way at the back of the front landing, and a hinged door leading to the northern and southern rooms. Northern and southern, long narrow rooms are provided, each with windows opening onto their western face. A ladder for reaching the attic floor is situated in the entryway. These rooms differ in length from west to east; the north room sticks out somewhat westward. The east side's overhanging section at the rear is divided into northern and southern parts, both supported by cantilevers. These small spaces, which are longer in the north to south direction, are both used for storage. The south part is partitioned into three rooms from north to south.

The attic floor is completely earthen and has two storage rooms in the northwest corner. The upper part of the rammed earth wall is raised up like a parapet, and the wall body is raised in a columnar shape, with beams placed on bolsters or struts on top. The upper part surrounding the wooden wall is formed with raised struts that support beams. The purlin and ridge are arranged north to south, laying roof beams across west to east.

4


5


6


7


4 Back side view (from northeast)
5 Overhanging section on the south side of the east wall
6 Furnace of the former kitchen on the first floor
7 Entrance of the altar room on the first floor

Considerations for restoration to the original state

The initial building consisted of a two-room area surrounded by a central rammed earth wall, and was likely a long, two-family dwelling running from north to south. In other words, the building was erected as a single structure with no cracks or other breaks in the surface of the east-facing wall. Both doorways between the two first floor rooms also show traces of a surrounding wall that was torn down, and are later work.

Further, both of the first floor wooden sections built on the west side were probably later additions. This means that the rammed earth in both corners on the west side of the rammed earth wall is the result of a masonry technique involving alternate stacking of building materials, and initially formed the corners of a wall. On the west side of the ground floor, the southern room was composed of blocks of soil; the rammed earth wall at the north end was also stacked differently from the centre. Both of these were apparently made later.

In addition, the wooden section on the west side differs in its west side projection. The north side part protrudes slightly to the west, and was likely not a simultaneously integrated structure. The doorway on the south side of the entryway was originally a wall. Through-holes remain in the pillars on both sides. Consequently, there is a place with two adjacent pillars dividing the attic into northern and southern rooms, but not projecting from the entryway into the northern room. In other words, it seems that the northern and southern rooms were once covered by separate roofs. The northern room was first extended to the west side, and roofs of different widths were separately hung upon them. Then, a wall was apparently built on the west side of the southern room on the ground floor out of blocks of soil, extending the wooden part of the first floor. This first floor addition of the south side wooden part may have been done for the rammed, earthen walled, the northern room to serve as an altar room. As previously described, four hinged doors remain on the western face of the southern room, rammed earthen walled room. The wall presently partitioning the southern room north and south seems quite unnatural amid these four hinged doors. There are traces remaining of a wall that was attached to the existing east-west partitioning wall, approximately 3m north of the wall body, and four doorways are found in the southern room. In other words, at the time the wooden room was added on the west side, the south part of the southern room likely served as an altar room, and the four doorways were built on the front. A long time ago, the north-south partition wall was located on the north side of the eastern entrance. If this was the case, then it would have entered and exited the eastern overhang from the altar room, which is also unnatural. Presumably, there was a storage room or other chamber to the east and back of the altar room, as seen in other rooms of this type.

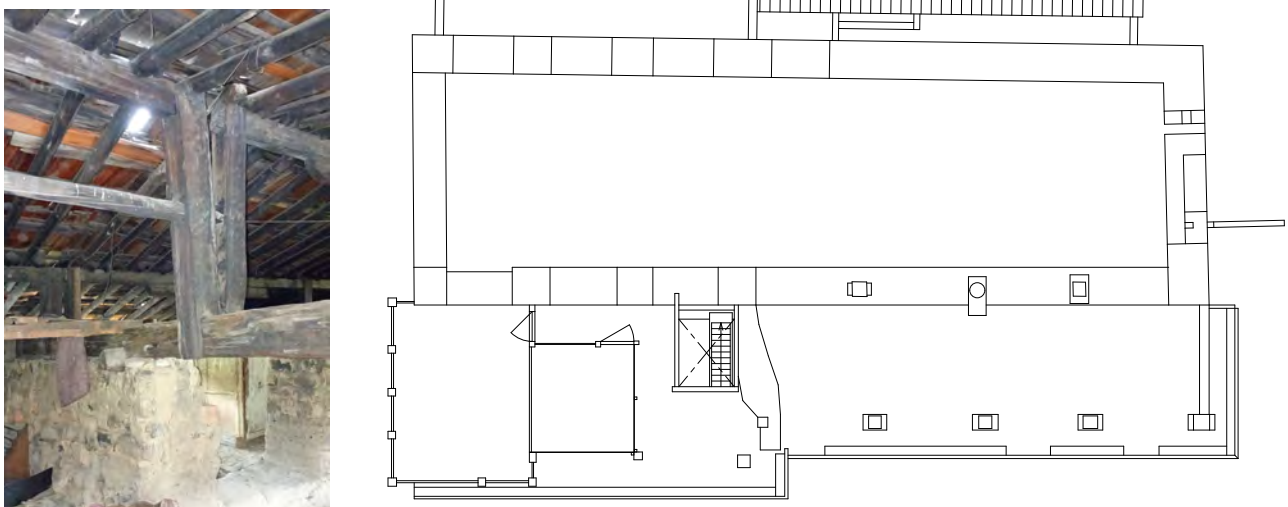
The eastern overhang is thought to have been added later. Its material is somewhat newer, and it may have been an extension to move part of the kitchen to the overhang. It does not show many signs of aging, and was probably used as a kitchen, and part of it may have been used as a lavatory.

From the study of the restoration above, the rammed earth section was likely first constructed as a two-family dwelling; there was no east-west wooden part. Thereafter, the eastern overhang was added for use as a kitchen and lavatory needed for daily activities, and used by both households. Later, the western section of the north side dwelling was added, and both dwelling spaces were inhabited by a single family. Passageway doors were provided on the central wall, and the eastern, north side section was added to build an altar room. As a result, the north side of the northern room was partitioned, and was apparently used for grain drying.

Conclusion

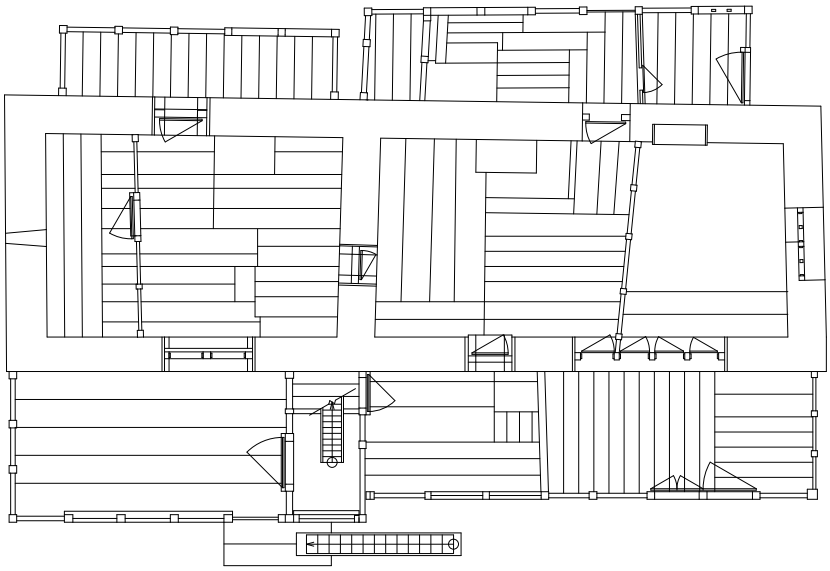
This building may have been erected as a type of two-family dwelling often seen in Bhutan. It was later used as a single-family dwelling and underwent several extensions to enhance the living environment. Its importance lies in how it illustrates the development of dwellings in Bhutan. Further, since it was uncommon to build lavish altar rooms as they do today, this building indicates that at some point, it became customary to build separate altar rooms and for them to take on an elaborate appearance. Thus, it should be thought to have a high cultural value as an object highlighting one point in the historical development of homes in Bhutan.

(Ezura Tsuguto)



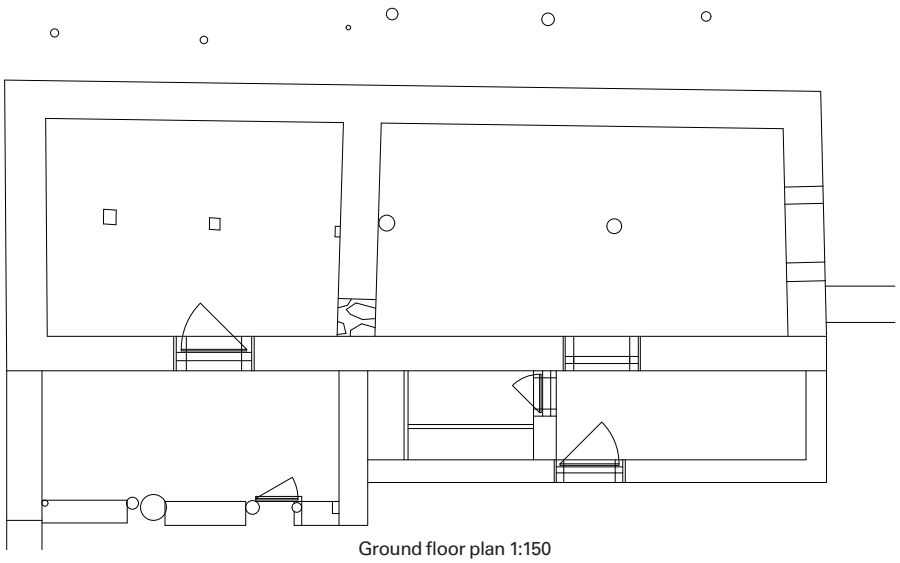
Attic floor plan 1:150

Attic space

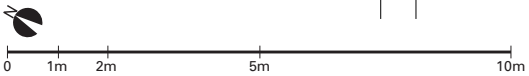


First floor plan 1:150

Details of the west façade
(from north)



Ground floor plan 1:150



Damcho Zam House

DATA

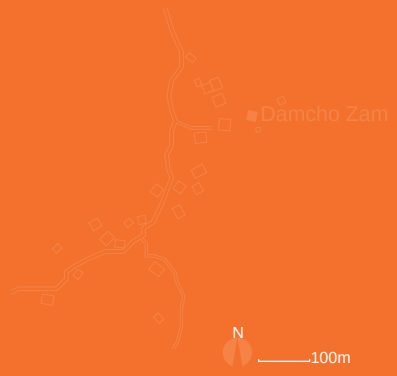
Dzongkhag
Haa

Gewog
Kartsho

Village
Ahatam

Settlement location
tableland

Settlement pattern
clustered



Coordinates: 27.3943, 89.2883

1 Front side view (from southeast)
2 Back side view (from northeast, photo taken in 2016 before modification of the toilet)
3 Side view (from west)

Location and summary

This building sits in the foothills in the uppermost part of a village, located in a valley bordering the eastern part of the town of Haa. An old route to Paro running through the mountain pass once went through this valley. The building is a two-storey, south-facing structure with a gabled, stone-weighted shingle roof. The rammed earth structure comprises a main structure 13.2m wide and 7.8m deep, and an overhanging section 8.7m wide and 4.7m deep that is attached to the western side of the building's front face. There is a wooden attached part (first floor balcony) on the east face of the main structure, with a toilet attached to its north end. A *rabsel* of the first floor runs from the front half of the western side of the main structure, around the three faces of the overhanging section, and up to the east end of the south face of the main structure; the rest is surrounded by rammed earth walls. The exterior rammed earth walls are bare, except for the south face of the main structure, which is painted in white plaster. There is a yard enclosed by a low wall made with piled stones that runs from the eastern side of the building to the south face, with a simple covered gate opening up at its southeast corner.

The composition of each floor

On the ground floor, the main structure has three rooms, with an additional room in the overhanging section, all of which have earthen floors. One large room on the eastern side of the main structure has an entrance only on the south side, and is not connected to the other rooms. The other three rooms run north to south, with an exterior entrance on the east face of the overhanging section. There are only two windows

on the south face of the p overhanging section. The east room of the building's main section is used as a storage room for animal feed and potatoes, but was probably once a livestock shed. The other three rooms are storage rooms with an unusual interior staircase leading to the first floor in the northeast corner of the overhanging section.

The main approach to the first floor is the east-facing attached part from which one enters the main part of the building. The interior of the main section is divided into three spaces by wooden partition walls, starting from the east with the kitchen, living space and altar room, all with wooden floors; the altar room is further divided into a front room and an altar room. The south side of the living room leads to the front room in the northeast part of the overhanging section, with one living room in the south and one in the west. The indoor stairs mentioned above lead to this front room. There is no access between the west room of the overhanging section and the altar room to its north. With regard to exterior openings, there are windows in the *rabsel* in the altar room's front part, the exterior sides of each room of the overhanging section, as well as on the south face of the kitchen. Besides these, the north side rammed earth wall has a large window in the living room and a small window at a high position in the kitchen.

A ladder leads to the attic from the east-facing attached part, as well as directly from the ground level at the rear of the building where the ground is raised; this is used as a space to dry rice straw.

Considerations for restoration to the original state

At the time of the survey, a new toilet was being built at the north end of the attached part; the staircase attached to its south, and the form of the open space above the spandrel wall between the other pillars, also resulted from this modification. At the time of the previous survey in September 2016, the east face of the attached part was entirely sided with wood, apart from the recently added south end, but the old latrine was at the north end (where the current entrance is), with stairs at the south face. The entrance (before the abovementioned extension) was also on the south side where the old doorframe with pivot-hinge holes remains.

This building was expanded in 1985 (based on interviews with the homeowner), with the overhanging section added on the south face to give it its current form. Notably, the existing portions of the building have been left mostly unaltered. The ground floor rammed earth wall is butted up against the western side of the existing section, and the entrance is on the east face of the new construction. On the first floor, the bay window of the extension connects to two-thirds in the western side of the existing section, leaving the *rabsel* (attached to the front edge of the side wall at the east end)—which runs from the southern half of the west face of the existing section all the way across its south face—unchanged. Hence, the outside corner of the bay window in the existing section remains on the west face, including the angle rafter. The old and new bay windows are basically the same in terms of design and their dimensions in the vertical aspect. However, the eaves' molding is slightly higher in the extension than in the existing section, and was increased from two tiers to three to protect the connecting section from rain. The roof was extended by adding rafters to the old south-facing eaves, being treated as a downward-pitch roof with the same slope. The existing section (including the rafters) uses the old material, but the

4 Room of the ground floor under the overhanging section
5 Kitchen on the first floor

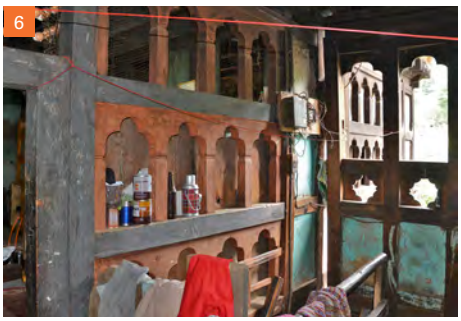
specifications of the extension—from the hatchet-finished wood of the roof structure and vine-tied, round timber rafters to the stone-weighted shingle roof—are the same.

In the ground floor of the main section, it is clear from the differences in the specifications of the rammed earth walls and traces of old corners (the masonry technique of sticking corner materials in an alternating pattern, with chamfering)—which remain on both the north and south faces—that when the house was built, the east room marked its limit, and the western section was added to the original structure. Nevertheless, even in the original section, only the western end of the south wall has a different aspect, and there is the possibility that it incorporates a ruined wall. The area around the entrance to this room, the pillars, beams, and joists all have old material, but the backboards are relatively new. On the other hand, the rammed earth wall that partitions the western two rooms in the intermediate stage extension is new, and the surface of the existing wall has been trimmed to accommodate its tip. The doorframe in this partition wall, as well as the joists and backing boards in the upper parts of the two rooms, are fairly new and do not date back much further than the extension in 1985.

On the first floor, the original section comprised two rooms in an east-west direction (the kitchen and living room). The intermediate stage extension is made up of two rooms running north–south (the altar room and its front room). Three other rooms are from the 1985 extension (the stairwell and two living rooms). With the exception of the former south-facing *rabsel*, partitions are basically *ekra* walls. Only two parts—the boundary between the stairwell and the adjacent room to the south, and the southern half of the boundary between the kitchen and the living space—are wooden board walls. The former is a recent addition, while the latter appears considerably old, with the exception of the part around the sliding door. The extent of weathering at the doorway in the boundary between the living room and the stairwell is comparable to that of the surrounding former *rabsel*, suggesting that it was already an external entrance prior to the 1985 extension. The interior staircase can also be considered as a similar remnant. There may have been a time when the east end room was a separate dwelling partitioned by a wooden wall.

Only the northern end of the boundary between the living room and the altar room is a rammed earth wall. This wall should be made of rammed earth in a whole if it was the west exterior wall when it was built, but for some reason, most of its southern side has been removed, and the edge is now uneven. The same situation can be observed for the rammed earth wall to the west face of the altar room, where the southern half of the wall has been removed to reveal an uneven surface at the end. This modification likely occurred at the same time as the old bay window was installed. The flooring around the altar room and its front room is newer. Alterations making the current altar room, together with the rammed earth partition wall downstairs, came after the installation of the old bay window, but prior to the 1985 extension (according to interviews with the homeowner).

Incidentally, the first floor section of the east wall of the original section does not employ a masonry technique of sticking corner materials in an alternating pattern at both the north and south ends. The lift height of the rammed earth is also lower than that of the ground floor, so this may have been rebuilt at an intermediate stage. There is no evidence that the south end of the wall turned to the west, and it seems that when construction began, the plan was to have the south

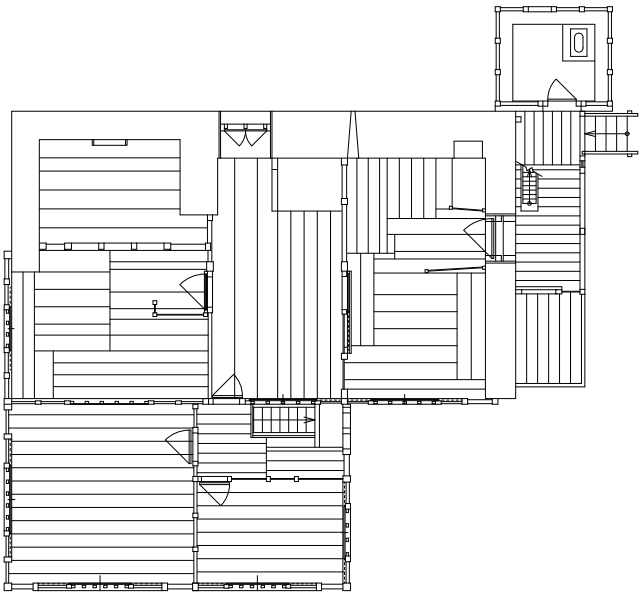


6 Former façade taken into the interior
7 Former exterior walls of the altar room taken into the interior

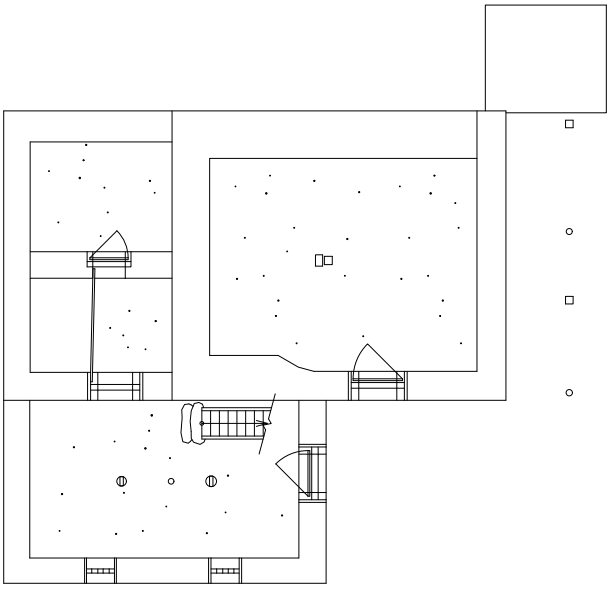
face as a wooden structure, but it is difficult to imagine that it was built in the same period as the existing old *rabsel* in its current form. Although this *rabsel* goes around to the west face removing the rammed earth wall, the eastern side comes to the end where it meets the side wall, from which it is reasonable to assume that the east-facing, rammed earth wall already existed at this point. The date of completion of the exterior appearance prior to the 1985 extension is unclear, but based on the extent of weathering, it does not seem as though the old bay window in the present interior section has been outdoors for all that long. Prior to its current form, where the bay window is installed on the front face of the rammed earth wall, there may have been a period in which the front end of the side wall was flush with the *rabsel*.

Conclusion

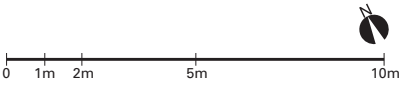
This is an interesting case in that it is possible to clearly follow the history of modifications, especially in recent years, including construction at the time of the survey. Although the building's original form is not entirely clear, each stage of its transformation provides ample clues with which to consider the direction of development of traditional farmhouse styles. (Tomoda Masahiko)



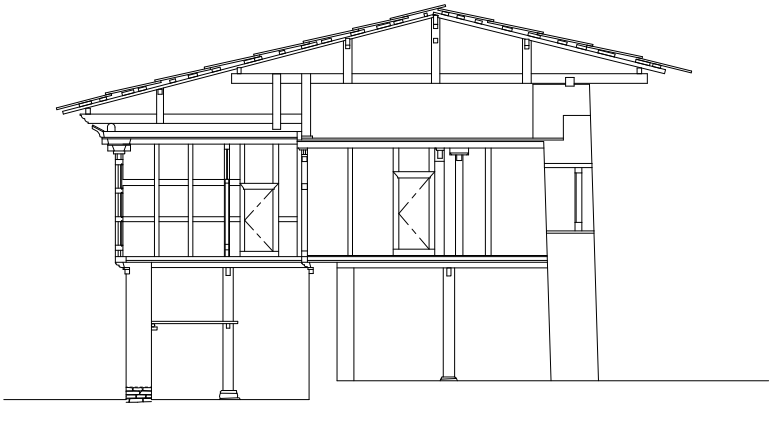
First floor plan 1:200



Ground floor plan 1:200



Roof structure extended to the extension section



Cross section 1:200

Tshering Zam House

DATA

Dzongkhag
Haa

Gewog
Samar

Village
Sharri

Settlement location
mountain

Settlement pattern
clustered

Coordinates: 27.2702, 89.3214

1 Distant view of the village (Tshering Zam house is in the centre)
2 Front view (from south)
3 Backside view (from northeast)

Location and summary

This building is located in a village on the eastern fringe of Haa Dzongkhag, on the border with Paro Dzongkhag, where a few traditional farmhouses are clustered together on a steep slope facing south on the Haa River's left bank.

The main section of this three-storey (partially two-storey) building faces south and does not have a walled yard. The plane scale of the part of the structure with rammed earth construction is 19.1m wide (south face) by 7.0m deep (west face) along the ground-floor exterior wall, while the extension to the building's rear measures 8.2m by 4.2m. The building's composition is quite complex. First, from the western side, the building's front face is holistically formed by a ruined section (A), which is presumed to have been a two-sided *rabsel* running from the front face of the second floor to the front half of the west face; a house unit (B) that has greater width and a plane style *rabsel* on the front face of the second floor, and a house unit (D) where a *rabsel* runs from the front face of the second floor to the east face with a two- storey wooden structure (E) attached to the eastern side. In addition, another house unit (C/F/G) connects the rear side of the eastern half of B and D. C is rammed earth construction, while F/G are wooden structures. However, the upper floor is a series of *rabsels* running from the north face to the south face of F in the eastern end. Note that while C/F/G has two floors, due to the topography, the upper floors are the same height as the second floor of A/B/D. The roof is comprised of gabled, corrugated iron sheets on B, slanted to the north on C, slanted east on D, F, and E, and slanted west on G. All of these slanted roofs have stone-weighted wood shingles.

These four houses join together to form a single com-

plex, but one of the houses at the west end was abandoned due to relocation within the village three or four years ago, making it into dilapidated state with much of its timber removed.

The composition of each floor

The ground floor of house A is enclosed by a rammed earth wall, except for an entrance doorway in the centre of the front face. The first floor has a doorway and a large window on its front face, with one window on the west face. On the second floor, in addition to the *rabsel* described above, on the eastern side, there is a blocked-up doorway in the centre of the rammed earth wall that separates it from house B. The layout of each floor is unknown, yet it is possible that simple wooden partitions existed on the first and second floors.

Besides an entrance doorway in the centre of its front face, house B also has an enclosed livestock shed and storage area on its ground floor; the round timber joists of the upper floor are supported by a large beam on top of a thick round pillar in the centre of the room. Upon entering the entrance door on the front face of the first floor, there is a long, narrow corridor with an earthen floor, partitioned on either side by an *ekra* wall, with the eastern side serving as a granary and the western side as a kitchen. Both rooms have wooden floors, and a furnace sits in the northwest corner of the kitchen. The second floor features a stairwell in the centre of the back side partitioned by a wooden wall, and the southern side is partitioned from east to west by an *ekra* wall to create a kitchen and living room to the west, and a simple altar room and bedroom to the east. The rear of the altar room belongs to another house. A doorway from the stairwell leads to an outdoor area at the rear. At present, there is only a ladder to the attic space, but there are still traces of a balcony at the rear side of A. Note that the first-floor entrance balcony of B extends to A and appears to have been used jointly by both houses.

The lower floor of C is a storage area enclosed by a rammed earth wall with an entrance on the east face. Its upper floor encompasses a joint kitchen and living room, with an adjacent altar room (F) behind a wooden wall on its east side, a storage room behind the second-floor altar room of house B, and a small room (G) with a separate entrance on the northwest side of C. These four rooms comprise a single house.

D features rammed earth construction up to its first floor; its ground floor is a former livestock shed. A wooden wall encloses the subfloor section of E on its front east side, which functions as firewood storage, while a staircase leads from here to the joint kitchen and living space on the first floor of E, the storage room on the first floor of D, as well as the stairwell and altar room on the second floor of D.

Considerations for restoration to the original state

The history of transformation of this building can be assumed as follows;

From the specifications of the rammed earth walls and their layout, the eastern half of the ground and first floors of house A at the western end, as well as its east wall on the second floor, are believed to be the earliest erected. Further, these walls have a particularly strong

4 Interior of house A
5 Livestock shed on the ground floor of house B
6 Kitchen on the first floor of house B

taper. The western half and majority of the second floor of A were likely built by reusing the above following its temporary abandonment. Part of the remaining first-floor southern wall seems to have been removed at that time. A wooden *rabsel* bay window runs from the south face to the southern half of the west face of the second floor. From the openness of its construction and the extent of weathering of its surviving parts, the building in its current form does not seem particularly old. In addition, the western half of the rammed earth wall has a very slight taper.

Using the east wall of A, B was added to the eastern side of A at the same depth. As a result, both the northern and southern walls of B are restricted by the taper of A, but since the east wall of B, (which is unrelated to this) also has a strong taper, this implies the strong likelihood that B is much older. From the perspective of structural stability, the east wall of A is assumed to belong to a building preceding A that existed at the time of B's construction. The front face of the first and second floors of B bear signs of a surrounding rammed earth wall, which was removed about 30 years ago and rebuilt with the current façade. The majority of the timber used in B is new; it appears that the wooden parts of this building (including the floor structure) were renewed during this renovation.

C was added to the rear side of B, sharing the eastern half of its north wall. From the testimony of the current owner's mother (who died in 2008 at the age of 68), this was built when she was a child, so it is estimated to be around 70 years old. The first floor of C and the second floor of B were once connected internally, but were later partitioned by a wooden wall, and the room on the southern side of the bordering rammed earth wall (currently a storeroom) was transferred to C. The old kitchen (G) attached to the northwest end of C and the east end room (F), were added using a wooden structure around 1980.

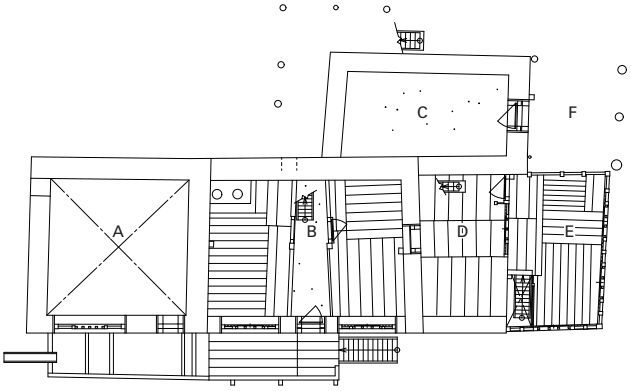
The date of D's construction (which was added using the east wall of B and the east end of the south wall of C) is not known in detail, but C precedes it based on its fit with the southeast corner of C. When D was built, its east side faced the outdoors, but was later made into an interior by the construction of the front face of the ground and first floor sections (E). Judging from the fit of the rammed earth wall separating C and D, the construction date of E precedes that of F.

The chronological relationship between the reconstruction of A and the additions of C and subsequent modifications is unclear. However, given the appearance of the rammed earth walls, they were likely built within a relatively short span of time.

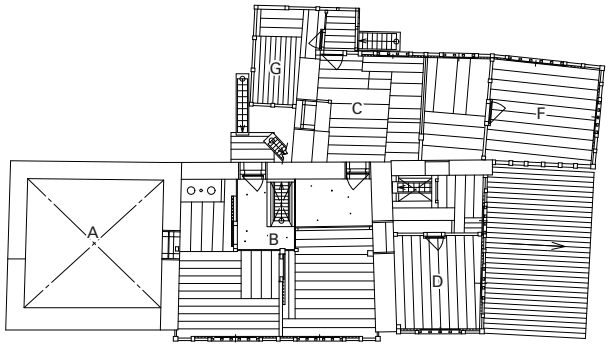
Conclusion

This is an example of a traditional farmhouse that has been repeatedly extended to take on a very complex structure. Despite the frequent reuse of old rammed earth walls and extensions to increase the size of the interior space in all regions, this seems to be especially common in the Haa region, where multiple houses often share side walls, joining them together as houses. When residents were asked about the reasons for this, despite hearing theories such as land constraints due to steep slopes and savings on taxes levied on individual buildings, they were not always clear. In this building, including the ruined section, there is evidence that it was once possible to move between houses internally, but today there is no such family relationship among the houseowners. It would be more convincing to think that the parties were more closely related at the time the extensions were added because of the succession of family headship or the branching of a family, but this is a topic for further examination. (Tomoda Masahiko)

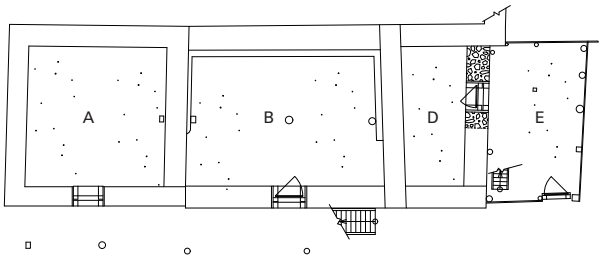
7 Kitchen and living room on the second floor of house B
8 Kitchen on the first floor of house C



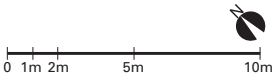
First floor plan 1:300

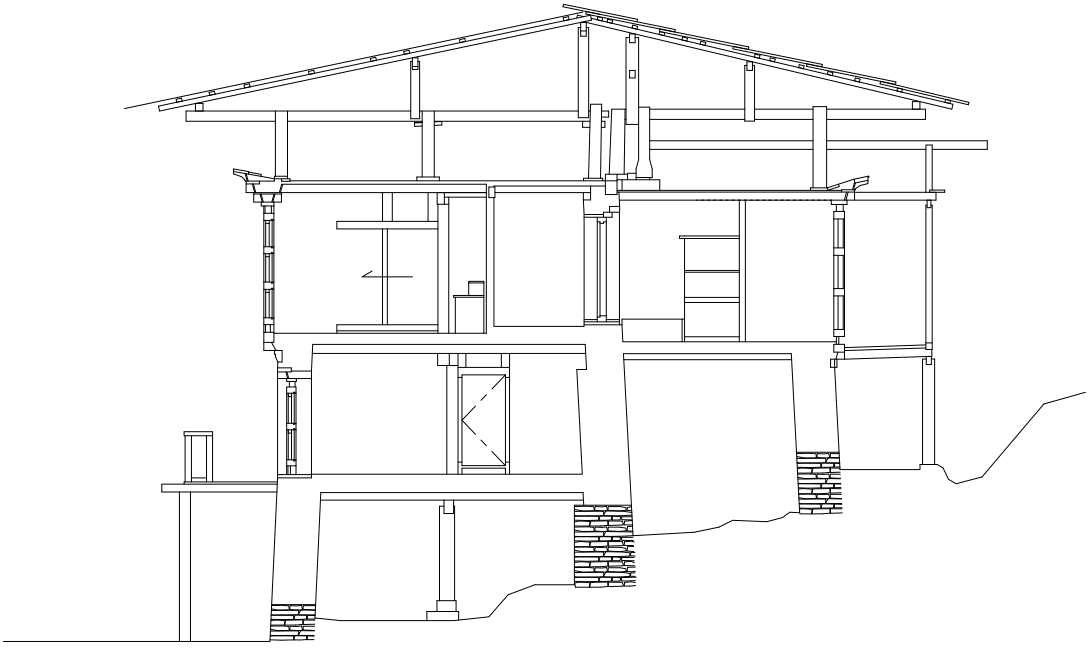


Second floor plan 1:300



Ground floor plan 1:300





Cross section 1:150

Yang Zom House

DATA

Dzongkhag
Paro

Gewog
Lungnyi

Village
Woochu

Settlement location
riverside

Settlement pattern
dispersed

Coordinates: 27.3921, 89.4222

1 Front view (from southeast)
2 Side view (from southwest)
3 Back view (from north, the right end is the extension)

Location and summary

Situated in the first village on the right side of the Chale La national highway from Paro to Haa, the house sits on a gentle slope at the mouth of a valley, surrounded by paddy fields and fruit trees. There are views of Nagtshang to the south.

The western side of the south-facing building is the current dwelling (herein termed the main building), while to the east lies an abandoned, rammed earth structure. There is a yard surrounded by a rammed earth wall at the front of the main building, with a covered gate to the eastern side, and a semi-outdoor storeroom and workshop at the right angle between the southern and western sides. These have stone-weighted shingle roofs.

The main building is a three-storey, gabled, corrugated iron sheet-roofed building, with a plane scale at the ground-floor exterior wall of about 10.2m wide (the south face) by 11.3m deep (the west face). The exterior walls of the ground and first floors are basically rammed earth walls, although on the eastern side, the area ahead of the front wall of the eastern ruin is sunbaked brick. The same area on the second floor is an *ekra* wall, and the entire surface from the south to the west face is covered by a *rabsel*; the rest is rammed earth wall. Traces of the application of plaster to the exterior of the rammed earth wall remain, yet much of it has flaked off. There is a wooden overhang attached to the centre of the rear of the second floor with a shingle roof.

The composition of each floor

The ground floor consists of five rooms, all of which are separated by rammed earth walls. Entering through the entrance at the centre of the front face, there is a narrow room, to the rear of which are two doorways

leading to separate rooms, with a room for each at the far end. Adjacent rooms to the north and south open to one another without fittings, but there is no access between the east and west rooms. All of these are earthen floored livestock sheds, with the upper part revealing the round timber joists and unfinished floor of the level above. In the western half of the west room (the second row from the front), sunbaked bricks are stacked up to the middle of the interior's height. Viewed from outside, an opening is created by crossing a square timber beam over part of the west exterior wall foundation, forming a basement-like space surrounded by a stone masonry structure at the back. It appears to have been built at the same time as the rammed earth wall, but its purpose is unclear. There are identical wooden-grated windows on the eastern side of the front entrance to the south room, on the west face of the west front room, and on the west and north faces of the west back room. In contrast to this, in the two rooms on the eastern side, there is only one small opening on the north face of the back room, without any exterior openings on the east face. There is one small opening on the west face of these two rooms (i.e., in the wall partitioning them from the west row of rooms).

An exterior staircase runs along the eastern side of the front exterior wall, leading to an open balcony with a balustrade running from the front of the central entrance on the first floor to the west end of the building. The layout of the rammed earth walls on the first floor is the same as on the ground, but the south room is partitioned into the east and west by a wooden wall, comprising six rooms in total. This floor is a storage space, with wooden floors and a square timber joist ceiling. The first room doubles as an entrance and stairwell to the second floor. A doorway in the rear wall leads to a granary with a rice bin, where the doorway leading to the north-adjoining room was only recently closed up with sunbaked bricks. There is another closed-up doorway on the south wall directly opposite this old entrance, but this is much older work. To the west of the entrance room is a storage room, which leads northward to the two rooms in the west row. Both of these are larders, and a rice chest is built along the wall of the back room. There is a narrow, cryptic opening in the east wall of the same room, which leads to the east back room. This is also a granary with a rice chest, but it has fallen into disrepair. There are wooden-grated windows in two places on the eastern and western sides of the south entrance, and in one location on the west face of each room on the western side. There is a small opening on the north face of the eastern back room, but no openings on the east face.

The second floor is a living space consisting of seven rooms and has a complex floor plan. A staircase from the first floor leads to the southeast end, where it forms a stairwell together with a ladder to the attic space. The room on the western side of the wooden partition is a living room, which forms an L-shaped plane by wrapping around the first half of the western side of the floor. The northeast side of this room is the southwest corner of the rammed earth wall; behind a double opening at the west end of its south face is a kitchen. A doorway at the east end of the rammed earth wall at the back of the kitchen leads to a storage room, and a doorway at the west end of the back wall of that storage room leads to the overhang on the north exterior wall. Its interior was not surveyed but is presumed to be an old latrine. The northern side of the living room is a wooden partition wall, and a doorway at the east end leads to an altar room. The southwest corner of the altar room is separated by a plywood partition, a very recent construction. On the eastern side of the altar room is an altar behind a triple opening. There is a doorway in the north wall of the altar room that leads to the overhang, which is probably separate from the adjoining overhang to the east and may be used as a latrine or anteroom for the altar room. Each room on this floor has wooden flooring, while the interior face of the *rabsel* and the ceilings in each room are covered with new plywood. The south face of the *rabsel* has two double-paned windows, while the west face has two triple-paned windows. There is also a window on the north face of the altar room. Like downstairs, there are no openings on the east face.

As for the attic space, roof beams sit directly on top of the rear face of the rammed earth wall, and sunbaked bricks are stacked at the upper end of the east-facing wall, and on the rammed earth wall at the boundary between the rooms on the lower floor, beside

which roof struts are erected, to support the beam. Old material is used for the rafters and below, containing the diverted material. The central section of the roof was modified to raise it one level higher during a recent roof replacement.

Considerations for restoration to the original state

The building's current state is due to complex changes. Clarifying these requires considering the ruined part to the east as well. In short, the building's shape (when it was erected) was a four-room area in a grid consisting of two front and rear rooms each on the northeastern side of the main building and the northwestern side of the ruins. Since there are no openings in the central partition wall to allow east-west access, the building was likely a row house with two dwelling units comprised of three floors, each with two rooms in the front and rear.

The most reliable basis for determining extensions is that the rammed earth specifications and thickness of the outer north wall differ from the vertical joint at the east end of the west room; and the rammed earth wall uses a masonry technique of stacking corner materials in an alternating pattern at the original building's northwest and southwest corners. The exterior rammed earth wall to the west of the above joint shows the same specifications with that on the current building's west and south faces. The fact that the northwest and southwest corners of this wall section were built using the masonry technique of stacking corner materials in an alternating pattern suggests that it was built in a series. However, the east end of the south outer wall is unnaturally stacked with sunbaked bricks, and it is obvious that the rammed earth wall continued further east. On the other hand, a two-storey, rammed earth wall is attached to the original building's east face, and part of its eastern wall on the ground floor ends near the extension to the east of the south exterior wall described above. Thus, these two walls were likely initially part of a series, and the extension was probably built to surround the original building on three sides. On the first floor, the rammed earth wall of the eastern extension ends by folding to the west to be attached to the original building's southeast corner, but there are traces of the rectangular hole to insert a wooden horizontal member on the south face of the external corner. As such, it is highly probable that some outer wall continued further to the south. The *ekra* wall at the east end of the second floor of the south-facing extension was apparently an interior room partition. Moreover, because there are signs of cutting horizontal members and wall plate-bearing grooves on the easternmost pillar of the front *rabsel*, undoubtedly, there was a *rabsel* further to the east. It seems plausible to assume that the two-unit row house was extended in an integrated manner, and that only the eastern unit was abandoned in a later period.

The building's initial floor plan (when it was erected) is the same as current state of the corresponding section; its eastern half also has one entrance on the south face. On the first floor, the blocked-off opening on the south wall of the present-day granary may have been the entrance when it was constructed, and the opening on the west wall of the back room seems to be an expansion of the old window. On the second floor as on the first floor, there is an old, blocked-off opening in the south wall of today's kitchen area, and the triple opening between the Buddhist altar and the prayer room is

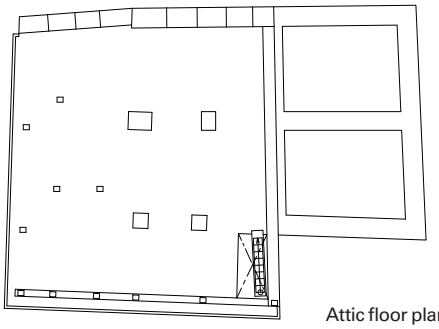
4 South room on the ground floor (the right end is the southwest corner of the original structure)
5 Living room on the second floor
6 Stairwell on the second floor

an intermediate stage modification. It is thus assumed that the opening positions of the building's western half (when it was erected) were basically symmetrical to those on its eastern half. The external appearance of the original building can be restored as follows; with two doorways at the front of each floor, only small windows on the sides and rear of the ground and first floors, two windows on each side and two doorways on the rear of the second floor. The rest of the building has a very enclosed appearance with its rammed earth walls. Further, there remain square holes in the front wall of the first and second floors where the cantilever beams supporting the outer balcony were inserted. There are similar square holes at the back of the second floor, suggesting that the front and rear of the eastern half had overhangs when the building was constructed.

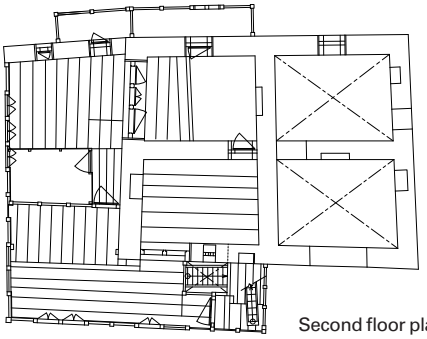
Conclusion

When it was erected, the building had a plane scale of 11.9m in width and 9.3m in depth. The layout of each floor was in a grid shape, divided into four sections by rammed earth partition walls. In previous surveys, we found a single example of a similar plane structure for a large-scale residence, but this is the only example of a two-unit row house. The familial relationships between the adjacent dwelling units are also of interest.

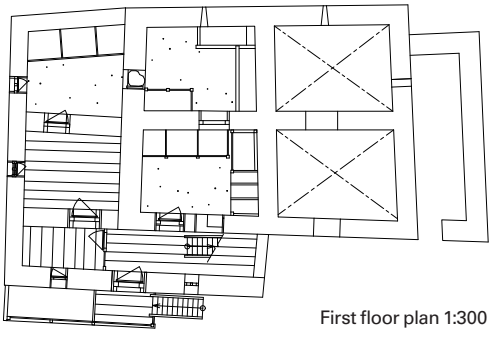
Further, the building's appearance following expansion and modification is unique. If the *rabsel* on the second floor wrapped around to the east face, the exterior walls of the top floor barring the rear would have been entirely made of wood, which is also exceptionally rare. There are photographs of a three-storey traditional farmhouse with a similar exterior appearance that once existed in Paro province, so there may be some manner of regional connection. (Tomoda Masahiko)



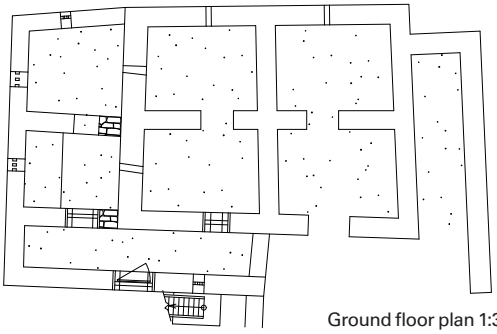
Attic floor plan 1:300



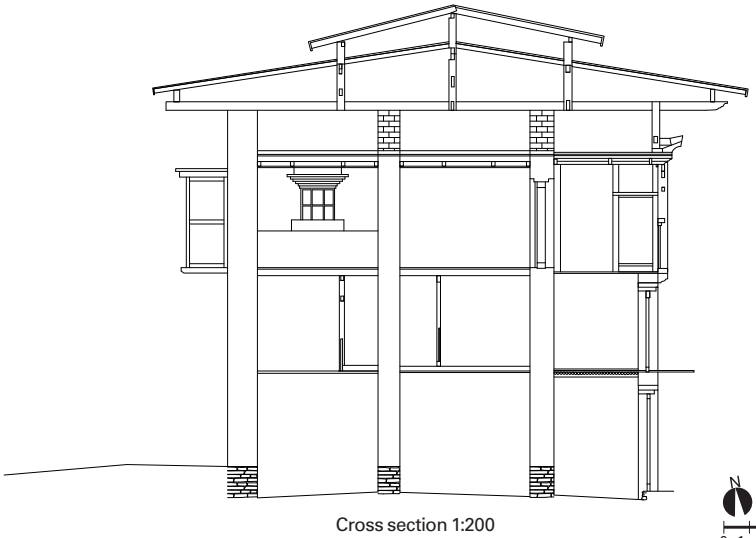
Second floor plan 1:300



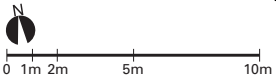
First floor plan 1:300



Ground floor plan 1:300



Cross section 1:200



Norbu Tshering and Gyeltshen House

DATA

Dzongkhag
Haa

Gewog
Samar

Village
Balamna

Settlement location
tableland

Settlement pattern
linear

Coordinates: 27.2897, 89.3093

1 Whole view of the front side (from southwest)
2 Side view (from north)
3 Abandoned part on the south side

Location and summary

Balamna village is located on a slope near Haa, and this building is constructed on a terraced site. Since it is on a cliff, each step is narrow, which makes any expansion of the depth difficult. Thus, it is a long building along the direction of the width.

The front of the building faces the valley on the west. The building has undergone complex modifications and has three large sections (northern, central, and southern), but the southern section has been abandoned. Only the rammed earth walls up to the first floor remains in the south, but the floor has not survived. Therefore, two families currently live in the remaining northern and central sections. The two sections are not connected internally. A rammed earth wall surrounds the southern section from the west side, forming a yard. The rammed earth wall circles the west and north faces in the northern section, but it does not surround them, thereby creating a gap. The entrance to the site is at the northeast corner, and the building can be entered from the yard on the west side. The abandoned southern section has an entrance on the south side.

The building is a two- storey rammed earth structure. It does not have a rectangular surface plane, and the added rammed earth walls are irregular in shape. The roof is divided into two parts—the central section has a stone shingle roof, whereas the northern section has a gable roof of corrugated metal. The plane is not rectangular, but the front has a width of about 20.8m and a depth of about 8.7m on the ground floor, excluding the southern ruins.

The outward appearance is characterised by a small lattice window on the west side of the central section of the ground floor, which has an entrance on the south side rather than the front. The first floor has fittings

between the side walls in the west. It has a doorway at the southern end, beyond which there is a *rabsel*. In the north section, there is a door in the centre of the ground floor and a small lattice window opens on the north face. On the first floor, there are *rabsel* bay windows on the west and north sides, an overhang on the northeast side, and a *rabsel* bay window on the overhanging section along the roof. There are few openings on the rear east side, and a small window opens on the first floor.

The ground-floor building entrance in the northern section is attached to the centre of the west face. In the central section, the entrance is to the south. The entrance to the first floor in the northern section is through the staircase connected to the overhanging section attached to the north side; in the central section, this entrance is through the staircase on the west side.

The composition of each floor

The ground floor in both sections has livestock sheds that have earthen floors, and the northern section consists of a single room with an entrance in the centre of the west side. The central section consists of three rooms (north, southeast, and west), which are divided by rammed earth walls. The rammed earth wall on the east (rear) face does not pass through, which suggests that it is later work. The total width of the northeast and southeast room is different from the room in the west, which is smaller. Therefore, the south side of the west room is not a living room but an outdoor space and contains an entrance. The two eastern rooms are both connected to the western room, but they are not connected to each other. The abandoned southern part of the building is divided into two rooms—east and west. The western room does not share its north wall with the south wall of the central section.

The first-floor plane shows that the northern section has a room to the north of the rammed earth wall that can be accessed by the stairs and a side entrance on the north wall. There is also an overhanging room attached to the northeast part of the building, which is used as a living room. The interior of the rammed earth wall is divided into four rooms by wooden walls, and the western half of the west and north sides have a *rabsel* bay window. An altar room is placed in the centre of the south side, and in front of it is a triple opening with two

4 Room at the north-east overhanging section of the first floor
5 In front of the altar room on the first floor of the north side
6 Central room of the first floor remaining its original state
7 Roof structure remaining the old style at the central part

middle pillars. There is a closet behind the altar room, where a small lattice window opens. This is the only room with an earthen floor; the rest have wooden floors.

The rammed earth wall separating the rooms on the ground floor of the central section does not continue to the first floor, which is made of the rammed earth walls of the outer circumference. The interior is separated using wooden walls. It is divided into six rooms, which includes the small room at the top of the stairs, and the altar room is in the centre of the north side. A triple opening with two middle pillars is to its front. The two rooms on the west side in front of the altar are fitted with a *rabsel* flush with the side wall. The floorboards go across the wooden partition to both these rooms, indicating that the partition wall is later work. On the rear side, the southeast room is furnished with a furnace and a small window with a lattice opening. The back of the altar room is a storage room, and a small lattice window opens from this room as well.

The configuration of the southern section of the building is similar to that of the ground floor, with the furnace being placed in the northeastern part. The north wall facing this furnace has turned red-black due to the heat exposure.

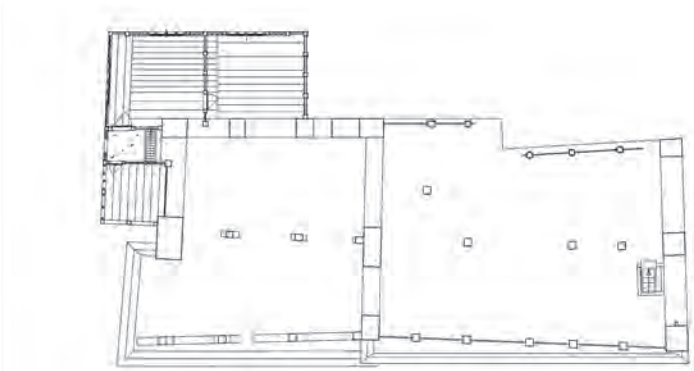
Attic space remains only in the northern and central sections. In the northern part, the same rammed earth as the first floor rises partly in the form of a square pillar. In the central section, on the other hand, the rammed earth rises on the south face, partly in the shape of a square pillar. The rammed earth wall on the east side does not continue upwards. The roof structure is erected on a pillar in the north section, with a bracket arm that drops onto the top of the pillar, upon which the roof beam is set. The pillar has interconnecting members running along the width-wards. The roof struts have been tenon jointed to the top of the roof beam. The central part of the building retains much of the original material, and some of the roof struts are round columns. The pillars are erected, the interconnecting members pass width-wards, the roof beam is dropped onto the top of the pillar as interconnecting members at the top end of pillars, and the roof beams are connected along the ridge. A bracket-arm has been inserted at this connection joint between the pillar and the roof beam. The roof struts are tenon jointed on top of the roof beam. A purlin is passed over the roof struts through a penetrating tie beam at the top end of the pillar, thereby forming a shingle roof.

Considerations for restoration to the original state

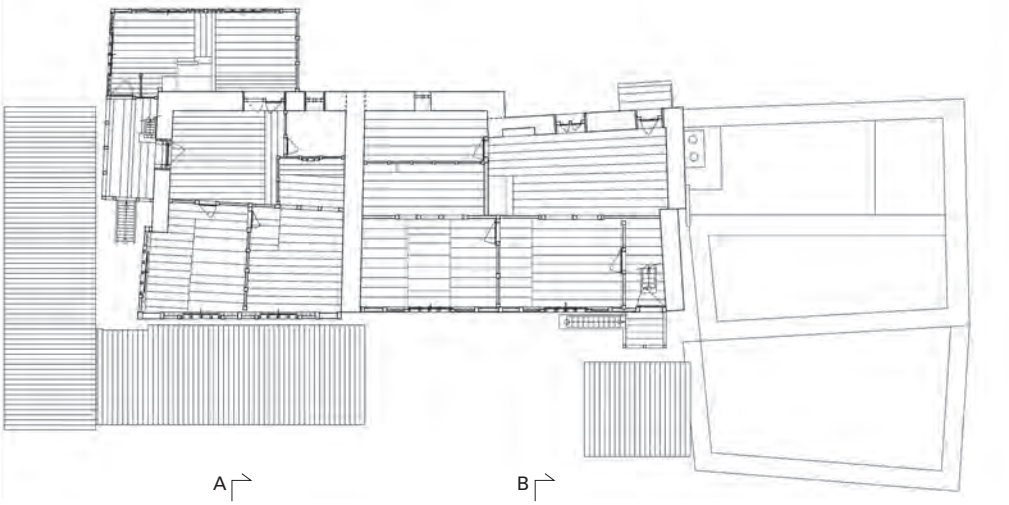
The traces of the rammed earth wall allow us to infer the original size of the structure and the process of its expansion. The oldest parts are the small part of the central section that is surrounded by rammed earth in the southeast, the rammed earth wall (except for the entrance) on the ground floor, and the open-front first floor that has a closed structure at the rear and the small, latticed window opening on the back. The north side of the original building and the east side of the now-abandoned southern section were extended next, but the order of this extension is unclear. As it is a series of walls, the addition on the front (west side) was probably built simultaneously. The front of the central section on the west was probably added next with rammed earth walls. It appears that at this time, the pillar on the first floor was erected between the rammed earth walls there, and a *rabsel* was added there as well. As the north wall in the southern section was constructed separately from the rammed earth wall at this time, it is possible that the deterioration of the southern section had started at this point. Finally, the rammed earth wall of the northern section was extended, and the overhanging section of the northeast was constructed. This part is used for the *rabsel* bay window, which shows that it is newer in age than the *rabsel* which is flush with the side walls of the central section. The relationship between the expansion of the northern section and the abandonment of the southern section is unknown.

Conclusion

With its great width, this building shows the characteristics of a traditional rammed earth farmhouse built on a cliff. In addition, we can infer the transition between the expansions, and the form of the *rabsel* inserted flush between the side walls is valuable in indicating the characteristics of the Haa region. Further, the structure was originally a very small, rammed earth section with a closed configuration, which is important for understanding the configuration of old style traditional rammed earth farmhouses. (Unno Satoshi)



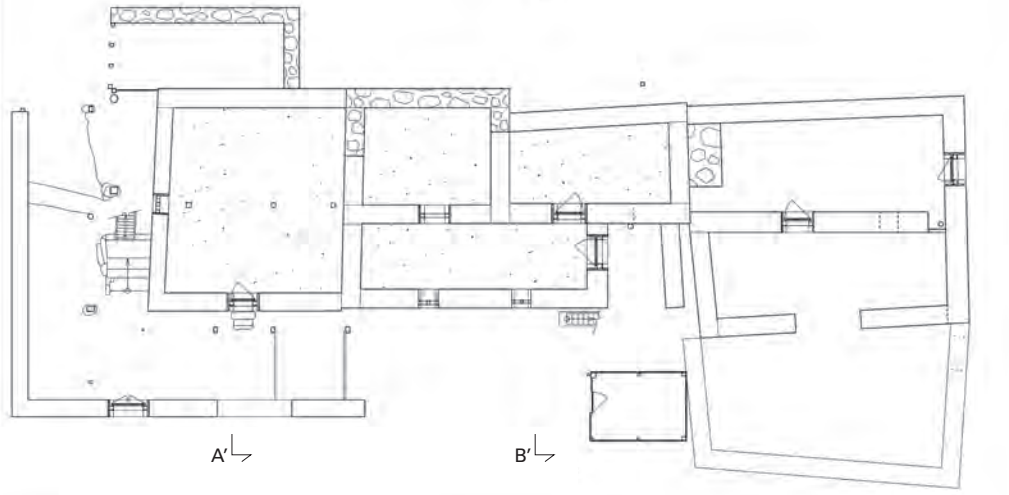
Attic floor plan 1:300

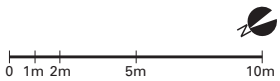


First floor plan 1:300

A

B

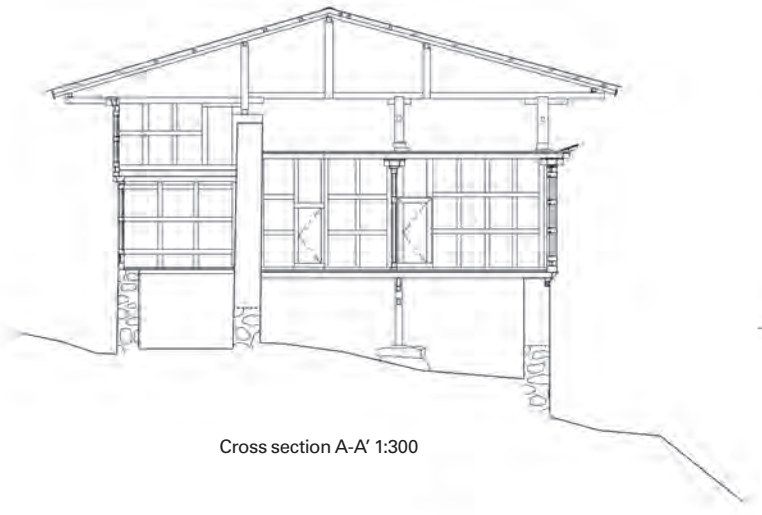




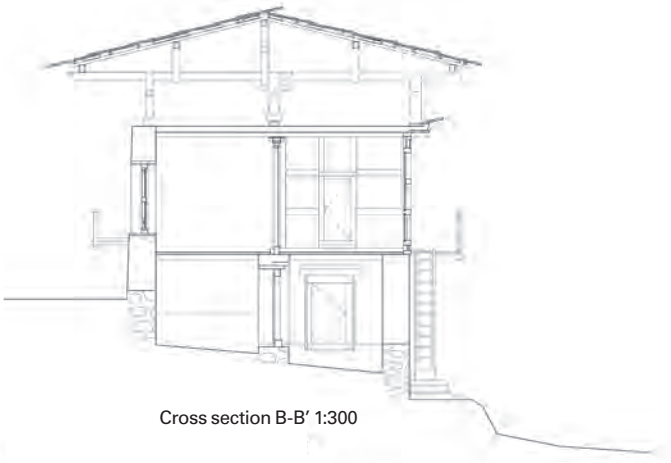
Ground floor plan 1:300

A′

B′



Cross section A-A′ 1:300



Cross section B-B′ 1:300

Kinley (Apkimey) House

DATA

Dzongkhag
Punakha

Gewog
Dzomi

Village
Changjokha

Settlement location
riverside

Settlement pattern
clustered

Coordinates: 27.5819, 89.8688

1 Front side view (from southwest)
2 Front view (from west)
3 Back side view (from northeast)

Location and summary

This house is in Changjokha, a village near Punakha Dzong in the centre of Punakha. The structure faces west on the east bank of the Puna Tsang Chu, which flows east. Built on a river terrace with fields surrounding the house, it offers a panoramic view of the Punakha Dzong across the river. The house is around 100 to 150 years old and was built in the late 18th century.

The main building has a masonry foundation, three storeys, and a shingled gabled roof. In terms of the building plan scale, the frontage of the outer wall on the first floor is approximately 12.6m, with a depth of about 7.3m on the north side and 7.8m on the south side, for a slightly trapezoidal layout. The main structure of the house is divided into a rammed earth wall running from north to south, and a rammed earth wall with a masonry foundation extending into the western front of the southern half of the ground floor. There is also a rammed earth wall on the southern side of the ground floor of the main building, which may have once been a house but is now used as a livestock shed.

Regarding the house's outward appearance, there is an open balcony and an entrance on the first floor of the western façade, a staircase at the northern end of the open balcony in the northern half, and a staircase at the southern end of the open balcony along the south outer wall in the southern half. There is also an open balcony in the centre of the western face of the second floor, which serves as the entrance to the third floor and is accessed by stairs from the open balcony on the second floor of the northern half. There are no independent eaves on the front open balcony, and the eaves of the main building roof are displayed promi-

nently. The rammed earth wall was constructed in units about 60cm high and 75cm deep in the northern half and about 65cm high and 75cm deep in the southern half, with some differences. The taper of the outer wall is remarkable, and only the outer wall on the western side is made in part with white plaster. In the rammed earth wall on the northern half of the building, old walls can be seen up to the first floor, and there are traces of a series of restorations of these walls from the ground floor to the second. The owners of this house can be presumed to have acquired a two-storey building in a near dilapidated state and extensively restored it to transform it into a three-storey building.

Until 2008, there were two families living together in the main house who separately occupied the first and second floors. The ground floor of the northern half is used as a store and warehouse, the first floor is used as a workshop for carved artisan products, and the second floor is offered for rent. Meanwhile, the ground floor of the southern half is currently vacant and the first and second floors are offered as residential rentals.

The composition of each floor

The ground floor of the main building consists of four rooms: north and south room on the northern half, and east and west room on the southern half, with the east side of the southern half being an open room. The ground floor has an earthen floor, and the northern room on the northern half of the ground floor has one additional entrance on the rear side. A long pillar with a base stone square pillar is situated in the centre of the room and slightly to the rear and extends to the ceiling beam on the first floor. The south room on the northern half is very narrow, with a distance between wall surfaces of approximately 175cm, and are closed spaces with only one small opening on the western side. The northern half of the building has a sunbaked brick partition between the north and south room, with a doorway oriented near the centre of the wall's width. The ceiling on the northern half of the northern side of the building is made of wood, with the joist of the first floor oriented in the direction of the depth and the width, with a wood floor laid on the fascine. A joist is placed in the width direction on the northern half-south side of the room where a fascine is also laid. In this south side of the northern half of the house, only the ceiling in the northeast corner is not covered by the fascine, and the wooden floor on the first floor is removable.

In the southern half of the ground floor of the main building, the east room is blocked by a sunbaked brick partition, obscuring the interior. There is a doorway at the northern end of the front, and no other openings. The ceiling is covered with two beams made from squared timber oriented in the width direction, and a fascine is laid on top of the beams with joists in the beam lines. The ground floor of the main building was likely originally used as a livestock shed.

The room configuration of the first floor is almost the same as that of the ground floor, but the southern half is a single room space. In the northern half of the first floor, the east end of the floor is used as an earthen floor, and a furnace is installed in the northeast corner. The rest of the floor is made of wood, and the wooden floor has a relatively considerable width of approximately 78cm. The room on the northern side of the northern half has two openings, one on the north side and another on the east side, in addition to the doorway on the western side, and the centre of this width contains a doorway on the border of the room on the southern side of the northern half. The westward opening on the north face and the eastward opening on the east face have a high inner height, suggesting that they were originally openings meant for doorways. The rooms on the northern and southern sides are nearly the same size as those on the first floor, but smaller, and contain earthen floors. There is one opening on the western side, and a rammed earth wall is dug into the south wall as a shelf. The ceiling on the northern half of the northern side contains a beam oriented in the depth direction above the previously mentioned long pillar, and the axe-scraped pattern contains a joist in the width direction made of squared timber with clear traces of suspension. A fascine of small diameter is laid over the joist. The ceiling of the room on the northern half of the southern side is covered by a similarly small diameter fascine placed over the joist. Both rooms on the northern half of the second floor have plastered walls.

The southern half of the room on the first floor has a doorway to the south on the western side, a window opening to the north, as well as an opening to the north on the eastern side. Most of the building has wooden flooring, and only the northwest corner of the building, where the furnace used to be, has an earthen floor. For the ceiling, a beam in the width direction is placed in the centre of the width, slightly to the east, and a ceiling fascine is placed over the joist in the depth direction. The interior walls are finished with plaster.

The northern half of the second floor is divided into three rooms: the northwest room, the northeast room, and the room situated to its south. A doorway on the west side of the northern half south side leads to a room of the same size as the one on the lower floor. The partition between the two rooms on the northern half north side is not a rammed earth wall, but a board wall, with a board door placed slightly to the east of the centre of the wall's depth. An altar is arranged in the northern half of the northwest room, facing west towards a pillar in the northeast corner. This pillar has a decorative paint finish, and the waist board on the west side of the altar is decorated with a mosaic. There are *rabsel* windows on the west and north sides of this room. The room in the northeast corner has an earthen floor with a high interior opening on the eastern side. The ceiling of the northern half south side is covered with a sheet and the details are unknown, but the northern half north side has a squire pillar joist in the beam direction and a fascine. The axe-scraped pattern of the joist is clear, as are the traces of the suspension.

The southern half of the second floor is used as an entranceway with a board wall separating the western entrance from the rest of the building, and a single room space beyond that. The floor is made of wood, and the northeast and southeast corners are earthen floors, with a furnace remaining in the northeast corner. On the west front, there is a *rabsel* window on the southern side of the doorway, with two openings on the south side and one on the east side. The opening on the east approach of the southern side and the opening on the eastern side have high internal ceilings and may have once been doorways. The ceiling is covered with two beams in the width direction, and a fascine is laid over the beams in the depth direction. The eastern two-thirds of this joist is made of a single type of material, but the west third is made of another material. This may have been replaced when the *rabsel* window on the western side was installed.

The entrances to the attic space are in the upper part of the entrance room on the southern half of the second floor and in the southeast corner. A frame is set in a well in the upper part of the entranceway. The floor of the attic space is almost flat, and there is no rise

4 Shop space in front of the north side of the ground floor
5 Living room on the south side of the first floor
6 Living room of the second floor on the north-west part of the north side
7 Attic space
8 Traces of joists on the south wall surface

to the rammed earth wall. Three sleepers are placed on the floor in each beam row, and six beams of single-ply squared timber are placed in the direction of width. On the beam, roof struts and ridge struts are erected to support the purlin and ridge beam, a round timber rafter is erected, and shingles are pitched on the rather thin, round, timber roofing. The eave beams are different for the front and back, northern half and southern half, and the position of the eave beam is also different. This reveals the differences in the extension work conducted.

Considerations for restoration to the original state

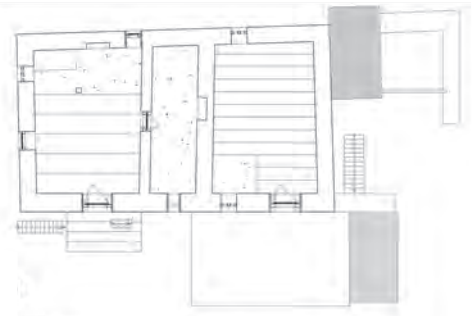
The history of restoration performed on the outer wall indicates that the building on the northern half that was two storeys when built was expanded to a three-storey building. In addition, there are several holes in the outer wall where joists were inserted. On the western side, there are openings for entrances on the first floor of the northern half and the second floor of both the northern and southern sides, which are believed to be the traces of brackets for floor joists and eaves, and may have been attached to a veranda. Similarly, on the south face of the building, joist traces can be seen on the second floor, suggesting that the rammed earth wall that now remains only on the first floor may have previously been a three-storey structure. That is, the history of extensions suggests that the original structure was up to the first floor in the northern half of the building, which was later restored and extended to three floors, after which a new three-storey structure was built in the southern half of the current building, and was followed by a further three-storey extension to the south. Stated differently, the structure is believed to have expanded two degrees width-wise.

Additionally, there are many rooms in the initial part of the building up to the first floor of the north half where joists are placed width-wise. Although there is a relationship between the width and the depth, this is interesting as an example of the use of joists in the width direction.

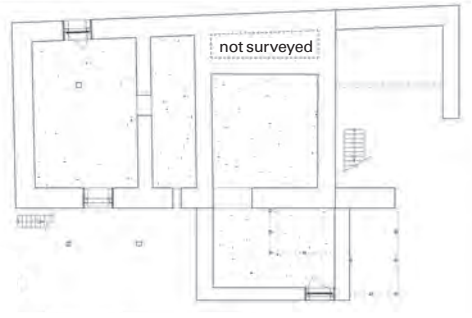
Conclusion

The Kinley (Apkimey) House is a valuable example of a house with a history of being extended, beginning with a two-storey building on the northern half of the house, followed by restoration and extension to a three-storey building, and then two extensions to a three-storey building on the south side. The closed space on the south side and the joists oriented width-wise are particularly characteristic of the initial stages of the project. The building is currently rented out not only as a residence but also as an artisan workshop and store for sculptural goods, and is attracting attention as an example of multi-use structure. (Fukushima Hirohito)

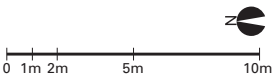
Second floor plan 1:300



First floor plan 1:300



Ground floor plan 1:300



Dawa Tshering House

DATA

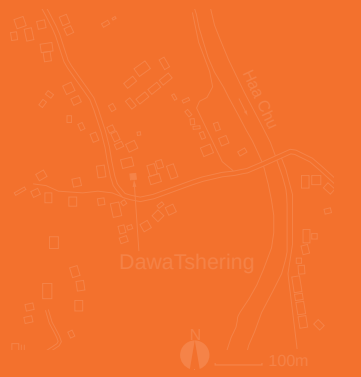
Dzongkhag
Haa

Gewog
Kartsho

Village
Ingo

Settlement location
riverside

Settlement pattern
clustered



Coordinates: 27.3909, 89.2759

1 Whole view of the front side (from northwest)
2 Whole view of the back side (from northeast)
3 Evidence of rammed earth wall addition shown on the backwall

Location and summary

This is a traditional farmhouse located on the main road southwest of the centre of Haa Dzongkhag and stands on a flat area in the Ingo settlement, near the bridge over the Haa River.

The village is a typical settlement in the flatlands of the Haa Dzongkhag, and the building highlights the typical architectural style of the area. The time of its construction is unknown, but the central section of the main structure displays the old style.

The main building faces west in the centre of the site, with a rectangular yard surrounded by a rammed earth wall with a stone shingled roof in its front. The main building has an entrance on the north side and a side entrance in the northwest corner. In addition, a rammed earth wall encloses an approximately 5m square in the south of the main building. The masonry walls on the rear of the main building are slightly curved, which expands the area of the section.

The west side of the yard has a simple sloping roof of corrugated metal, and a furnace has been installed there. The main building side is paved with stones, and the western edge is lined with stones to form a north-south rainfall trench that flows out of the site at the southern tip.

The main building is a two- storey rammed earth construction, and the central section has a raised corrugated metal-gabled roof. The total length of the ground-floor outer wall is the plane scale. It has a width of 12.4m and a depth of 10.5m.

In terms of the exterior, the front (west face) of the first floor has a *rabsel* inserted between the side walls, but the wall on the north side is not visible from the exterior because the shingle roof extends on the north

front and the north sides. The northeast corner of the building is covered with corrugated metal roofing. The rest of the building has a rammed earth wall, and the former door at the rear has been modified into a window.

There are two entrances to the building—one at the centre of the front of the ground floor and the other at the end of the stairs attached to the front, which leads to the upper floors.

The composition of each floor

The interior of the building, which is almost rectangular in plan and is surrounded by outer walls on both the ground and first floors, has a rammed earth wall that separates the front third from the rear two-thirds along the direction of the street, and the rear is further halved by a rammed earth wall. An overhanging section with a different depth extends to the north of this rammed earth main structure.

The ground floor consists of three rooms—one in the front and two in the back (northeast room and southeast room). The entrance is at the front centre, and the two rear rooms have their own doors. However, the southeast room is currently inaccessible because the front door does not open. In addition, there is a 340mm diameter pillar erected at the entrance in the centre of the front of the building to receive the header member. Moreover, there is no doorway that connects the southeast and the northeast rooms. Other than doors, there are traces of an entrance in the front northeast room, but that is currently blocked with stones. Independent of these three rooms, there is a room attached to the northern part of the main building with a long and narrow wooden floor that is enclosed by rammed earth.

The ceiling is made of floor joists, with the first-floor floorboards directly serving as the ceiling. The joist is made of squared lumber, some of which are surface-coated. Since the northeast room is wide in depth, a square pillar stands in the centre and a beam is set over it along the north-south direction, dividing the joist into east and west sections. All rooms have earthen floors covered with straw, and except for the north side of the front room, which is partially used for straw storage, they were likely to be used as livestock sheds. There is a difference in the thickness of the rammed earth wall between the two rear rooms and the front room, which indicates a difference in the period of construction.

The front stairs lead to the overhanging section of the shingle roof at the front of the first floor. From here, one can enter the northern overhanging section of the main building. The overhanging section at the front of the building, along with the brick-walled toilet on the northeast side discussed below, shows little weather-

4 In front of the altar room on the first floor
5 Addition of the rammed earth wall shown in the living room of the first floor
6 Storage on the back of the Buddhist altar of the first floor
7 Roof structure

ing, and appears to be a recent modification.

Like the ground floor, rammed earth divides the first floor into three rooms, but the front and the southeast rooms are further halved by a wall, creating a total of seven rooms including the northern overhang. The front side of the southeast room has a altar room set in the back wall and partially overhanging into the rear room. There is a three-way opening with two middle pillars in front of the altar room, and beyond that is an extensively lit *rabsel*. The *rabsel* is flush with the side walls.

The northeast room is used as a living room and has a fireplace in the centre. The northwest corner of the room also shows where the former furnace was. The ceiling has two beams that divide it into three sections along the depth, and the joist is placed on top of them. There is also a sweeping window on the east side, which appears to have been modified from a former doorway. The external appearance reinforces the reasoning that the small hole in the rammed earth at the height of the lower edge of the window was once a joist receptacle. Directly under this window is the buried former entrance to the ground floor. Half of the living room front entrance has been covered with boards, and the upper section of the other half is densely lined with joists that show the wood face, which indicate the previous construction of the altar.

The ladder to the attic space is also located in the northern part of the building. The roof beam on the rear is supported by a rammed earth square pillar, the roof struts have been erected to support the front *rabsels*, and the same method is used to support the middle of the beam. The interconnecting members in the roof struts, roof beam, and ridge struts along the width are made of the original material, while the rafters are a mixture of new and old materials. In particular, the purlin in the centre of the roof is new lumber that appears to be machine-made, but the rest of the purlin, large beam, and part of the roof struts show a lot of weathering and are thought to be from when the current plane scale was formed.

Considerations for restoration to the original state

The expansion from the single rammed earth wall can be seen by examining the process of modification and restoration. An extension was made to the two rooms— southeast and northeast—to align the total beam length from when it was built. The difference in the time of construction can be seen in the difference in the thickness of the rammed earth walls. A rammed earth overhang also appears to have been added to the north side. The thickness of rammed earth in the rear section of the first floor is 71cm, which appears to have been added later. Outer wall traces show that the rammed earth was originally formed in the shape of a square pillar and that it got added to. Similarly, from the inside, the plasterwork of the lower section of the living room wall differs from the upper section, and we can determine it as a later addition.

The former first-floor doorway is now a window of the living room with embedding walls below it. Moreover, the condition of the west side living room door indicates that the altar room was formerly on the west side of the living room. It indicates one of the instances of rammed earth being added to the front side.

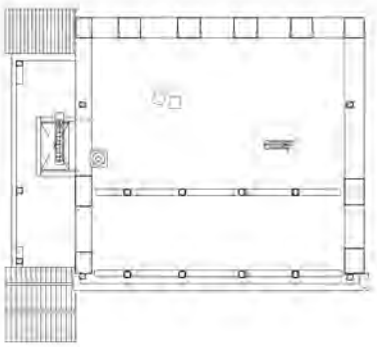
Therefore, this was originally a small low two- storey, two-room rammed earth structure. However, it now has a living room window and an entrance positioned directly below it. The altar room set up in the northwest room seems to have been added along with the west side addition and the *rabsels* that were added on both the side walls. The doorway on the ground floor may have been moved at this time to the centre of the west side, where it currently remains. The north side extension with the current form of the entrance seems to have followed that.

The rammed earth on the north side of the building was also renovated at this time, and although the current roof has been partially remodeled in recent years, its fundamental elements were installed at this time. In the recent remodelling, the extension of the north side expanded the main building width-wards, forming the current plane, and the toilet seems to have been added even more recently than this extension.

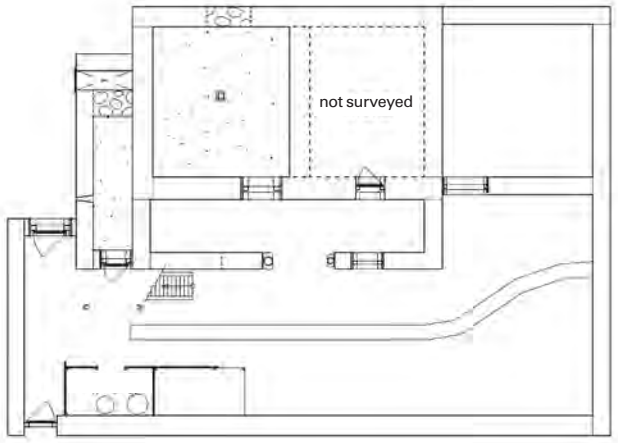
Conclusion

Although doorway changes, intermediate modifications, and other additions were conducted, this building represents a case where the original form and the changes of modifications are well understood. The

modified west facing *rabsels* of the first floor that are flush with the side wall appear to exhibit the characteristics of the Haa region. The original closed, small-scale rammed earth architecture is important for understanding traditional old-style farmhouses of Bhutan and is highly valuable in indicating the transition from the open, three-sided *rabsel* style to *rabsels* set flush with the side walls. (Unno Satoshi)



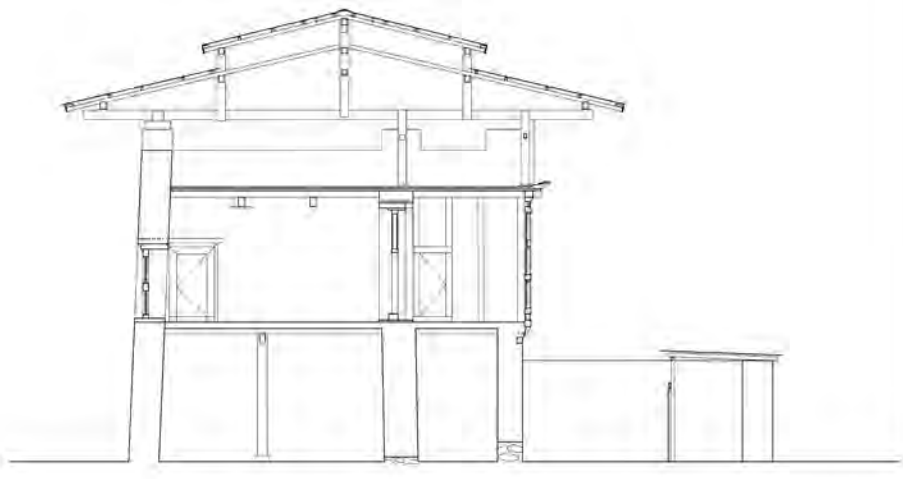
Attic floor plan 1:300



Ground floor plan 1:300

First floor plan 1:300

Modification of the opening between the room on the first floor



Cross section 1:200

Sangay Om House

DATA

Dzongkhag
Paro

Gewog
Doteng

Village
Phusha

Settlement location
riverside

Settlement pattern
linear

Coordinates: 27.4979, 89.4349

1 Front side view (from southeast)
2 Details of the *rabsel* on the east face of the first floor
3 Back side view (from northwest)

Location and summary

This building is located on a gentle slope at the base of a ridge at the north end of a long, narrow valley running north-south formed by a tributary of the Paro River. According to the owner, it is one of the oldest buildings in the village.

The main building is located to the west of the centre of the site and faces east. A rammed earth wall connecting to both sides of the back of the building surrounds the front face to form a yard. Simple gates open on the western, southern, and northern sides of the wall, and a small storage shed abuts the eastern side. The southeast wall was removed in recent years for vehicle access.

The main building has two storeys, and a gabled, stone-weighted shingle roof; the ground-floor plane scale measures 12.9m wide (east side) by 9.7m deep (north side). Apart from the front face of the first floor, which features a single plane style *rabsel*, the building's exterior consists of bare, rammed earth exterior walls. An overhang is attached on the rear at the south end of the first floor and slightly to the south of the centre of the attic level. The western half of the south face of the ground floor has a shed attached, enclosed by a rammed earth wall, which is covered by a wooden floor and a corrugated iron sheet roof, serving as a workshop, although this appears to be a recent construction.

The composition of each floor

The ground floor is divided into east and west sections by a rammed earth wall running north to south across the building's length, slightly to the east of the ridge of the roof; the western side is divided into three rooms by a rammed earth wall running east-west. The north and centre rooms are almost the same size. However, the south

room is less than half as wide and is small, long, and narrow. With the exception of the small room, which is used as a warehouse, these rooms are livestock sheds, each of which has earthen floors, above which stand round timber joists for the upper floor and fascines. There is an entrance and one window with a wooden grating on each side of it at the front of the east room, but in the western half, there is only a very small opening at the rear of the north and central room. There is no exterior openings in the south room. All of the partition walls between the three rooms on the western side bear traces of a doorway that was closed up by piling up stones.

An exterior staircase is fitted along the eastern edge of the south face of the exterior wall, leading to an outer balcony with a balustrade in front of the first-floor entrance. The first floor is the living space and consists of six rooms. The north-south rammed earth wall spanning the total length of the building, and the rammed earth wall that forms the boundary between the north and central rooms on the western side of the ground floor, continue up to the first floor. Of the three spaces partitioned by these walls, the northwest section is split east-west, while the eastern half is separated into three rooms by *ekra* partition walls. Passing through the entrance, there is a narrow front room from which a ladder extends up to the attic. A doorway on the eastern side of the front room leads to a living room, a wide opening on the western side with a central pillar leads to the kitchen, and a doorway at the west end of the partition wall on the northern side leads to an altar room. The kitchen is the largest room on the first floor and has two furnaces at the northeast corner; it also serves as a private living room. Behind the door at the west end of the northern rammed earth partition wall is a granary in which rice chests are attached to the wall. There is also a doorway at the south end of the western side of the kitchen, which leads to the rear overhang. This small room is an old latrine and has another entrance from the floor above the shed on the southern side. The altar room to the north of the living room has a triple entrance on the west face of the rammed earth wall, which leads to a room containing an altar. The back of the altar, embedded into the rear wall to form an alcove, protrudes into the granary on the other side; a beam crosses over the top, which suggests that the partition is a wooden wall. Besides the above-mentioned doorways and a set of windows in the centre of each room on the *rabsel* across the length of the east face of the living room and the altar room, the only other exterior openings on the first floor are a floor-level window on the south face of the kitchen and a small, crenel-shaped window on the west face of the granary. Each room on the first floor has wooden floors, plastered walls, and square timber joists on the ceilings.

The attic is high enough to be a workspace. The perimeter and central rammed earth walls are raised and timber cotters rest on top of them, while along the front face, struts are raised to support the roof beams. Both the vertical ridge strut and the purlin strut attach to the beam using an open mortise and tenon joint; the eave purlin is placed directly on the end of the beam. Long split boards are placed on top of the roofing layer with fascines laid on barked round timber rafters, tied with vines, and secured using riverbed stones. The wooden storeroom at the southwest corner and the small room overhanging from the west exterior wall are both made of newer wood and are likely relatively new additions.

Considerations for restoration to the original state

The building shows little trace of modification or differences in the specifications of its wooden parts; there was likely little change that impacted its present form. Nevertheless, a window on the southern side of the kitchen on the first floor was added or widened by cutting the rammed earth wall. In contrary, the rammed earth wall contains components with various dates of construction. The clearest of these is the north exterior wall, where the joints run vertically on the eastern side of the north-south partition wall. At this boundary, there are differences in the specifications and locations of the horizontal joint between the east and west walls. The west wall was erected using a construction technique of sticking corner materials in an alternating pattern. Besides, the chamfering at the external corner angle shows that there was only the western side when it was built; the eastern side was added later. The symmetrical position of the south exterior wall does not have such a joint but focusing on the exterior wall on the north face of the ground floor, we can see a series of sections beyond the south end of the present main building all the way

to the gap on the north face of the shed further south. At the southern end of this wall, there are signs on the east side of it that it was broken up where a masonry technique of sticking corner materials in an alternating pattern was applied, suggesting that the earlier building's north-south scale was about 2.6m longer than the present building. Restoring the old ground-floor layout to its original state would result in three rooms of roughly the same size lined up on either side. On the northern side of the current entrance to the south room, there are clear signs of breaking off the rammed earth wall (the earlier building's east exterior wall), implying that the original entrance was located in the centre of the room further to the south. Due to the disturbance observed around the opening, the closed-up entrance in the partition wall between the three rooms was probably not around when it was built but was rather added to the predecessor building at some point and later abandoned. On the first floor, the wood of the doorway between the kitchen and the granary is old and may date back to the predecessor building. Inferring from the positional relationship with the doorway on the ground floor and analogous examples, the old exterior entrance on the first floor was located close to the existing opening between the current living room and kitchen, giving an extremely enclosed outward appearance.

While the extended rammed earth wall uses a construction technique of sticking corner materials in an alternating pattern on the north and south corners of the front face of the ground floor, this is not the case on the first floor, which was built on the premise that the entire front face was a *rabsel*. Looking again at the north and west exterior walls, from the top end, the five rammed earth lifts have the same specifications as the front extension wall, and the taper of the wall face is less than that of the old wall. On the north-south partition wall in the interior too, the top end was extended, and roof joists were inserted there. Bringing these elements together, we can deduce the process by which today's building was constructed: The rammed earth walls of the predecessor building were reused; its south end was cut away and a new south exterior wall erected, expanding the plane to the east, as well as increasing the height of the first floor. According to the owner, the construction dates back 80 years. This likely refers to this series of works.

Conclusion

Examples of full *rabsels* of a single plane styles at the front of the upper floors are common in Haa Dzongkhag, but they are rarely seen in Paro region. This is a valuable remaining example, as it demonstrates a stage prior to the form of *rabsel* generally used today, which wraps around both sides. Although it was reconstructed from a predecessor building, it has undergone little change since taking on its current form. With the exception of the dilapidated roof, the building is well-preserved. The roof also appears to have been refitted with CGI sheets after our survey was conducted. (Tomoda Masahiko)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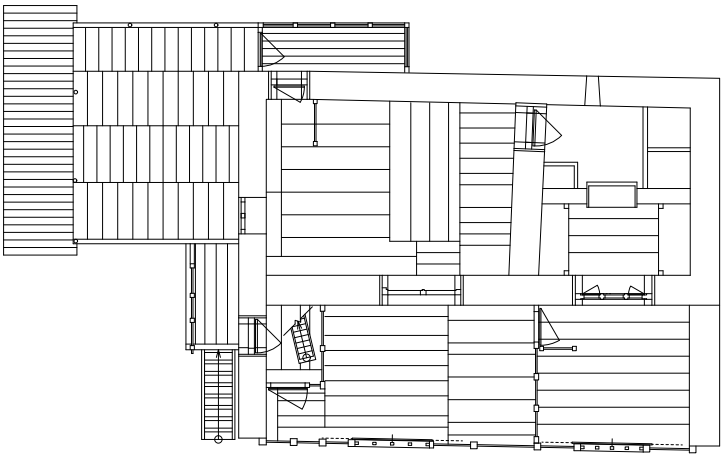
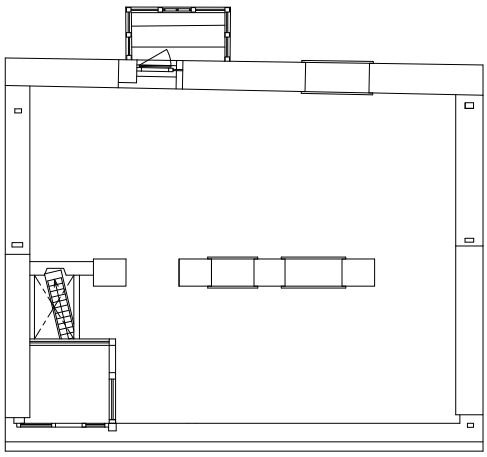
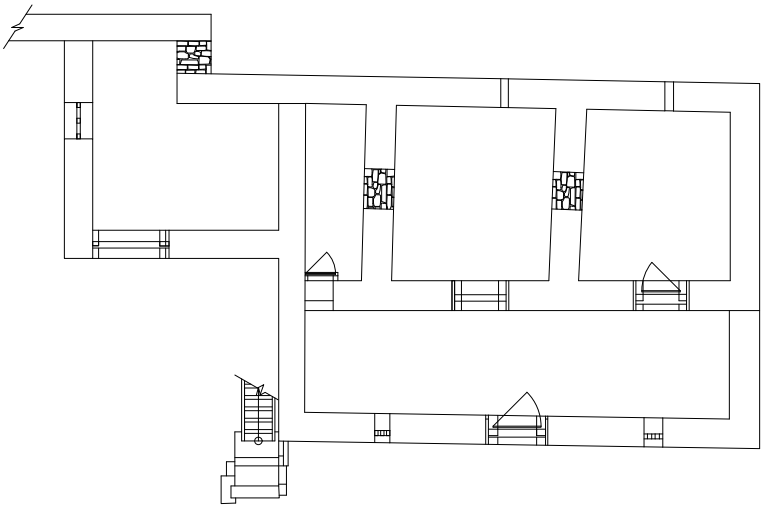
4 East room on the ground floor
5 Front room on the first floor from above
6 Living room on the first floor
7 Kitchen on the first floor



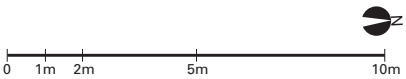
First floor plan 1:200



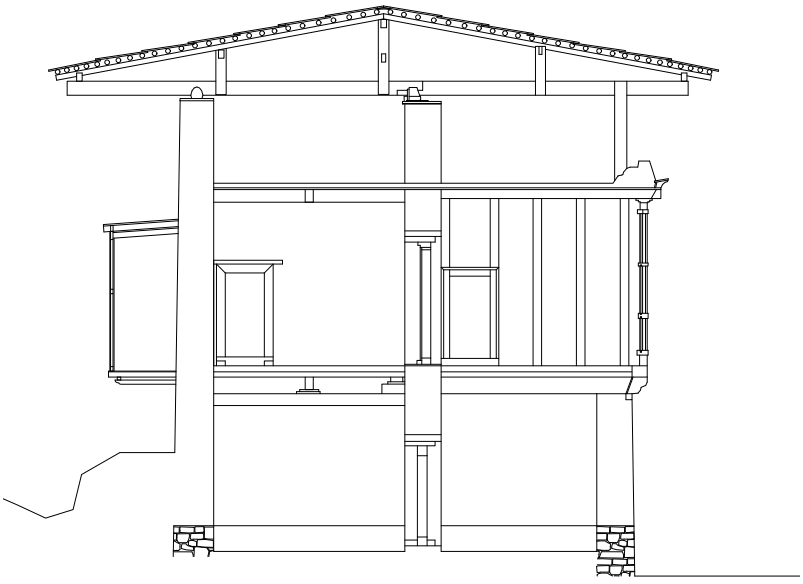
Attic floor plan 1:200



Ground floor plan 1:200



Rammed earth wall in the southwest corner of the earlier building



Cross section 1:150

11

Sangay Wangmo House

DATA

Dzongkhag
Haa

Gewog
Uesu

Village
Domchug Cheka

Settlement location
riverside

Settlement pattern
clustered

Coordinates: 27.3612, 89.2978

1 Distant view (from southeast)
2 Front view (from east)
3 Back view (from west)

Location and summary

This building stands clustered together with a several others on a river terrace on the right bank of the Haa River, near the southern edge of the town of Haa. The two-storey building has a gabled, corrugated iron sheet roof, which accompanies a yard enclosed by the stone wall running from the west to north side, with a simple covered gate opening up on the northern side of the yard. The building consists of a 9.4m-wide (west side) and 9.4m-deep (south side) main structure, and an annex section on its northern side approximately 3.0m wide. The main structure's outward appearance is that of an east-west, double front-facing structure. The eastern facade of the first-floor incorporates a wooden *rabsel* flush with the end surface of side walls, while the western facade is a rammed earth wall with two large openings, to which a wide open balcony is attached.

The composition of each floor

The ground-floor interior consists of two rooms running east-west in the main structure and a single room in the annex section. With the exception of their respective entrances, on the northern side of the west room as well as the eastern side of the east room, walls surround the main section. The two rooms are separated by a rammed earth wall but are connected via a doorway at its north end; both rooms are used as livestock sheds. The annex section, which is likewise surrounded by a rammed earth wall, is a storage room, with an entrance on the western side and small windows on its north and east faces.

Access to the first floor is via an external staircase leading to the balcony on the west face of the main building, further leading to the interior of the building from the west side of the annex section that serves as a front room to the main section. The main section interior

is divided into three rooms by wooden partition walls, but the plywood wall dividing the northwest kitchen and the southwest living room, along with the ceilings in the three rooms, were recently added. This space previously consisted of two rooms, with an altar room in the eastern half bordered by a north-south wall. There is a sink at the northwest corner of the front room in the annex section. A separate household uses another room to the east.

The roof was replaced in 2017. At the same time, a change was made to the shape of the roof, raising the central part one level higher. It is unusual for a continuous roof to cover up the upper section of the annex part on the north face. This is probably due to previous modifications.

Considerations for restoration to the original state

The history of modifications to this building is quite complex, and there are multiple aspects that cannot be clarified through observation of the building's external appearance alone. However, we outline our considerations below, although they are limited to the context of the rammed earth walls.

The rammed earth wall, with the earliest possible date of construction, is the eastern half of the north wall of the main building (A). Viewed from the eastern side, this wall curves around to form the southeast corner, which curves under the annex part opposite the main building; this may be part (the southern and eastern walls) of a section of a building that stood where the annex part now stands. The western end of this wall, A, is interrupted by the west room of the ground floor of the main building. That said, this and a series of foundations continue in the western direction, on top of which the north wall (western half) of the current main building is erected in a slightly different direction. On the other hand, looking from the interior of the ground floor of the annex part, there are traces of the removal of a rammed earth wall that continued from the western end of wall A towards the northern direction. From its relationship with the foundations described above, this removed wall can be considered a partition wall. Hence, the predecessor building to which wall A belongs, comprised at least two rooms running east-west.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4 Northwest exterior of the ground floor
5 West room on the ground floor
6 Northwest room on the first floor
7 Altar room on the first floor

With regard to specifying the period of the rammed earth walls of the current main building, while observation of the plastered western exterior wall is difficult, two-thirds of the western side and one third of the eastern side of the southern exterior wall clearly have different specifications and measurements of rammed earth. From its outward appearance, it seems that the eastern side (D) is simply an extension of the western building (B), which was completed up to the position of the boundary line. Notwithstanding, when viewed from the interior, the position of the eastern end of this wall does not match the current partition wall. A new partition wall of about the same thickness was built shifting toward the west after the eastern side of wall B was removed. Considering the wall's specifications, this new partition wall appears to have been erected at the same time as the extension made to the eastern side. Oddly, there are no signs of the removed east wall B having been attached to the south face of wall A at the northern end, yet wall A nonetheless precedes this as long as we assume that all sides of wall B were built at the same time.

After building A was abandoned, the remaining ground-floor rammed earth walls (the north half of the eastern side, north side, west side, that is wall C) of the current annex part were constructed. Notwithstanding, since the south end of the western side ended up being attached to the west half of the northern face of the main building, which belongs to B, B precedes C. In this case, the position of wall A in relation to B is an unnatural way to reuse an existing wall, A. Therefore, let us assume that the eastern half of A was still functioning as a building when B was erected, that this building was abandoned after B's construction, and that C was built later on still. This is also consistent with the construction of north wall B attaching to the west face of the removed partition wall A within the annex part.

8 Traces of the former partition wall on the attached part's south wall of the ground floor

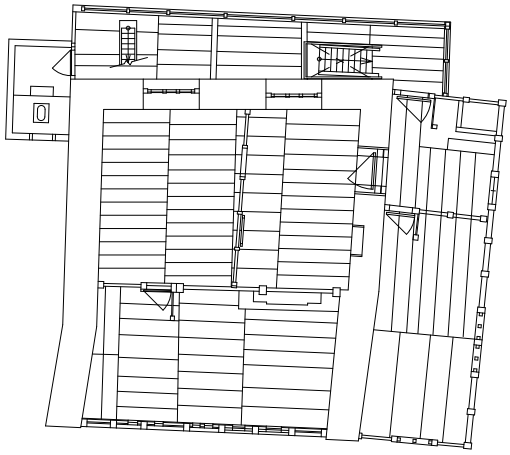
In the context of C and D, although the lack of points of direct contact mean that there is no decisive proof, judging from the extent of weathering of the wood, C appears slightly older than D. In addition, the eastern end of south wall D of the first floor does not use a construction technique of sticking corner materials in an alternating pattern. From this, it is understood that when this extension was built, the entire front face of the second storey was planned to be made of wood in between the side walls.

Prior to adding D, we infer that there was only one room on both the upper and lower floors, however it is also possible that this was an annex to building A, described above. There are few clues as to the form of the east-side facade on the first floor at this stage, but the east end of the south wall from this period appears to use a construction technique of sticking corner materials in an alternating pattern, which would suggest that it was not a side-wall type. The two large windows on the first floor, west-facing rammed earth wall are inferred to be later modifications due to the irregular cross-sectional surface of the wall around the openings. However, we cannot reject the possibility that in the past, there may have been smaller openings in the same positions and that the west-side was the front of the building.

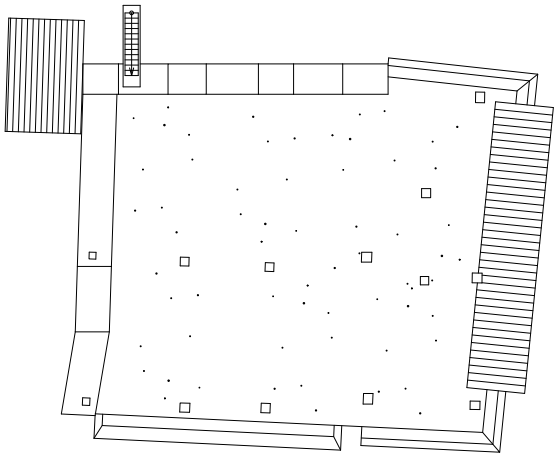
Conclusion

The plane scale and height of the building are small compared to other traditional farmhouses in the area, but it is not clear whether this indicates the building's oldness, or whether this is due to the building's original character. In any case, there is no doubt that it has undergone a complex transition. This is a highly instructive case study from the perspective of variations in the architectural styles that have resulted from such transition.

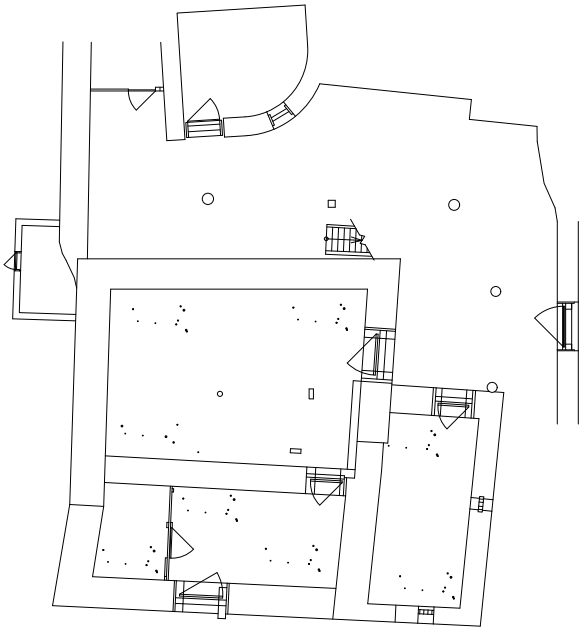
(Tomoda Masahiko)



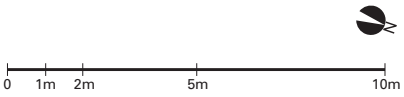
First floor plan 1:200

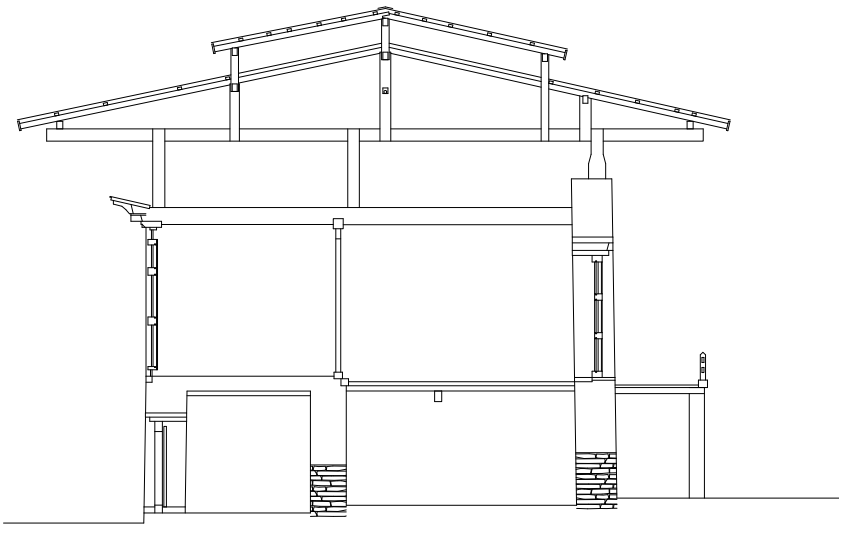


Attic floor plan 1:200



Ground floor plan 1:200





Cross section 1:150

3-8 Vanishing Vernacular Houses

1

Wangmo House

DATA

Dzongkhag
Thimphu

Gewog
Genye

Village
Khoma

Settlement location
mountain

Settlement pattern
clustered

Coordinates: 27.3040, 89.6064

1 Front side view (from southeast)
2 Front side view (from noutheast)
3 Veranda on the north side of the second floor

Location and summary

Khoma is located on the northern slope of a valley extending from the highway from Thimphu running south to Paro, and then southeast to near the Dzongkhag border. Wangmo House is in the centre of the village and there is an elementary school nearby.

Although the date of the house's construction is unknown, it is said to have been built four generations before the current owner's time. The building is divided into the northern and southern halves, creating a two-home row house. The northern half is currently unoccupied.

The main building faces east on land that slopes slightly from east to west. The southern half of the building is two-storeyed with a shed roof that extends to the south, and the northern half is three-storeyed with a gabled roof construction. Both buildings have corrugated metal shingle roofs. In the past, the building had three-storeyed on both the northern and southern sides, but the second floor on the southern half was demolished in 2005.

The main building has a width of approximately 12m and a depth of approximately 7.4m. The northern half of the ground floor has a section exhibiting masonry construction on the eastern side. The building exterior has rammed earth walls on masonry foundations on all four sides, with most of the masonry foundation on the west side exposed due to the sloped terrain at the site. The northern and southern halves of the main building are partitioned by rammed earth walls and there is no opening on this wall. There is one entrance on the front side of each floor, north and south, and an open balcony on the southern half of the first floor with a staircase attached to the southern end. The northern half

has a terrace atop the masonry structure and a staircase is attached to the northern end. On the front side of the second floor of the northern half of the house, there is an open balcony with a staircase attached to the northern end. On the upper part of this open balcony, there are eave's rafter traces, indicating the presence of eaves affixed here in the past. There is also a single-roofed veranda overhanging the northern side of the second floor.

Although the edges and terrace on the front side were partially damaged by an earthquake, the rest of the house remains in relatively good condition. The southern half of the building has no openings except for the front of each floor, giving the structure a rather closed-off interior overall.

The composition of each floor

The external shape is rectangular, with the western side slightly shorter than the eastern side. The taper of the rammed earth wall is approximately 88° on the ground floor, and the taper of the first floor is greater than that of the ground floor. The ground floor is excavated approximately 28cm into the ground surface, and both northern and southern sides have earthen floors. This structure appears to have been used as a livestock shed when it was built, but is now used as a storage area.

The first floor has wooden flooring on both the northern and southern sides, and only the northwest corner of the southern half retains the earthen floor, where a furnace was placed in the past, and on which the kitchen was later built. In the northern half, the earthen furnace remains intact on the western side, and a cupboard is embedded in the western side of the rammed earth wall partition. The northern half of the second floor has a room with a wooden floor, and only the upper part of the first-floor furnace at the western end has flooring placed in a different direction. Removable wooden flooring is installed in part of the northwest corner for smoke ventilation. Some of the rooms on the first and second floors have intervening columns and board walls, but these are all later additions.

The southern half of the building is very secluded, with no openings on the ground and first floors except for the front doorway. In the northern half of the build-

4 Living room on the south side of the first floor
5 Living room on the north side of the second floor
6 Masonry wall in front of the north side
7 Small opening of the west wall on the north side of the second floor

ing, there are openings on the western side of the ground floor, and on the western and northern sides of the first and second floors. The western side has a small opening with a narrow width and no fittings, using hewn stone as a header member to retain the old style. The northern side of the first floor has a small rectangular window. The entrances and exits are single-panel doors, and the entrances to the verandas on the second floor of the northern half are double-panel doors. The veranda on the second floor of the northern half was constructed by extending the joist of the first floor. The joist is supported by a bracket underneath it. The bracket extends into the room and supports the joist on the indoor side, functioning similarly to a balance. The floor of the veranda is wood, as is the wall. The ceiling of each room is assumed to be the joist ceiling of the upper floor, and the southern half of the second floor appears to have been demolished with the wooden floor remaining. The southern half of the first floor is assumed to have the joist and wooden floor of the former second floor as its ceiling.

The stairs to the northern half of the attic space are currently missing. The roof structure of the northern half of the gabled roof construction has a foundation plate on the east and west rammed earth walls, which are raised like parapets, and a ridge struts are placed in the centre to support the ridge beam. While the parapet of the rammed earth wall is not affixed above the veranda on the north side, it is partially interrupted on each of the other sides. Eaves girders are placed at both ends of the beam running from east to west, and rafters have been erected to create a gabled roof construction. The beam is made of old wood, but the rest of the wood is new. Some of the original beams in the southern half of the shed roof have been recycled, but most of the materials appear to have been added later. At the northern end of the shed roof, a beam has been inserted into a part of the rammed earth wall that was demolished.

Considerations for restoration to the original state

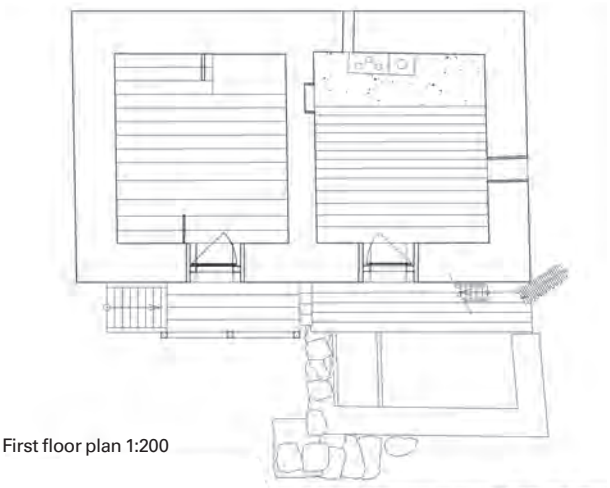
The rammed earth walls on the ground and first floors show the differences in the construction processes of the rammed earth walls between the north and the south after the perimeter rammed earth wall was constructed. The construction dimensions of the rammed earth walls on the ground and first floors are 60–62cm high and about 110cm thick, while the second floor is 60cm wide and about 90cm thick. There are differences in the units of the rammed earth on the ground and first floors and the second floor, suggesting that the second floor was subsequently extended. The building was originally constructed as a two-storey row house, and later the second floor was extended. Finally, in 2005 the southern half of the second floor was demolished, giving the house its current configuration. In addition, the rammed earth walls on the front and rear sides of the ground and first floors are rather long in width, suggesting that the original two-storey building was constructed with rammed earth walls on the eastern and northern–southern sides on each floor, followed by rammed earth walls for partitions, and lastly rammed earth walls on the western side of the rear of the house.

In the currently unoccupied northern half of the building, the terrace in front of the first floor and the open balcony on the second-floor front have been severely damaged by an earthquake. There is also a large crack near the centre of the north face rammed earth wall from the ground floor to the second-floor veranda. It is unclear whether the damage was caused by an earthquake or by deterioration over time, but it is possible that the western side of the building may have sunk slightly as the building is located on terrain that slopes from east to west.

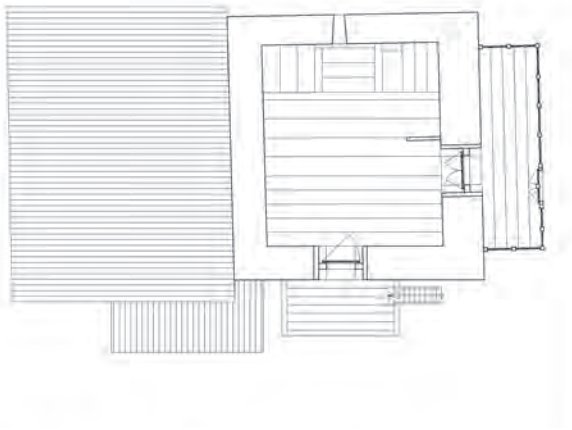
Conclusion

The process of the addition reconstruction can be confirmed from the apparent difference in rammed earth wall construction. Wangmo House was built as a two-room row house, with one room on each floor, but the ground and first floor, including the openings, have been preserved in the old style.

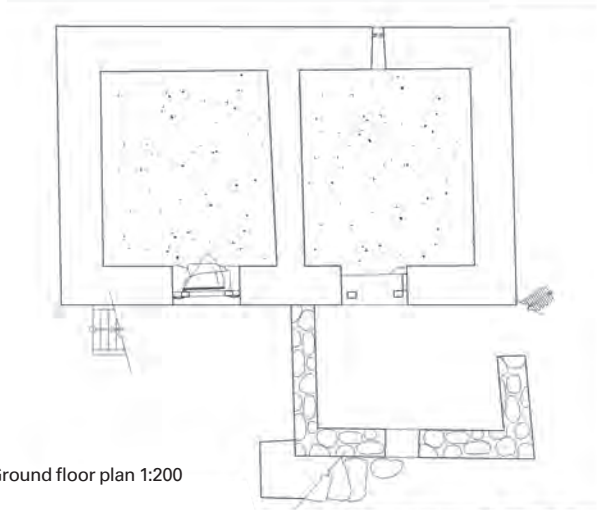
Overall, although there is an extension of the second floor and demolition of the southern half, the walls of the rammed earth are thick and its units clearly visible. Although its exact date of construction is unknown, there are few modifications, and the old style is well preserved; it is a valuable example of a small-scale two-room row house. (Fukushima Hirohito)



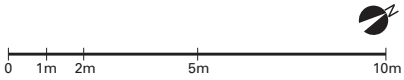
First floor plan 1:200



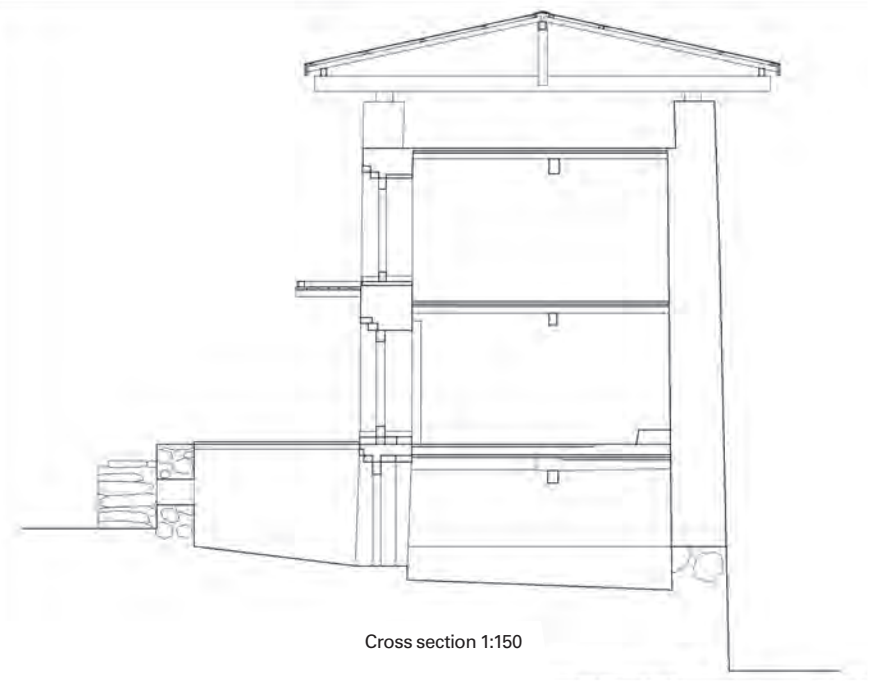
Second floor plan 1:200



Ground floor plan 1:200



Bracket beam of the overhanging section shown in the living room of the first floor



Cross section 1:150

3-8 Vanishing Vernacular Houses

2

Dawa Zam House

DATA

Dzongkhag
Punakha

Gewog
Shengana

Village
Jazhinkha

Settlement location
tableland

Settlement pattern
clustered

Coordinates: 27.6078, 89.9294

1 Front side view (from southwest)
2 Back view (from north)
3 Details of the entrance

Location and summary

This building is in Jazhinkha, a mountain valley village about 7km east of central Punakha, dotted with a few traditional farmhouses and surrounded by terraced rice fields. The main building faces south on land that slopes downward to the southeast, and there is an attached building to the west. There are yards to the north and south of the main building. The main building has two storeys and is made of rammed earth, with a corrugated galvanised iron shed roof. The plane scale has a width of 10.7m and a depth of 6.5m. The building had three storeys when it was built, but the second floor was removed in 2016. There is a lean-to roof over a portion of the west and north sides of the main building, and the area in the west side of the roof is used as a semi-outdoor cow shed. As for outward appearance, there are openings bored into the rammed earth walls on each side, but as will be described later, there are corbels on top of the south and west sides; it is believed that these two sides had *rabsel* bay windows when they were built. The ground floor has an entrance on the south slightly to the west, and another on the north slightly to the east. The first floor has one entrance on the south slightly to the west, and another on the east slightly to the south. However, the balconies are not there and no longer function as entrances.

The composition of each floor

As for the overall plane composition, there is a rammed earth wall from the ground to the second floor, dividing the width into east and west sections. Thus, it has a plane form like a tenement house, where there are two rooms, east and west, of the same size on every floor.

On the ground floor, the west room was a livestock

shed. There is an entrance on the south, and there are openings with no fittings bored into the rammed earth wall on the north and west sides. The floor is earthen and covered with straw. For the ceiling, there is one squared timber beam with an ax-scraped pattern running east-west, with unstripped round timber joists lined up north-south on top, overlaid with hand-split boards for the foundation of the upper floor. The east room has an entrance on the north, and there are openings with fittings on either side of the entrance, and on the south. It is said that when it was built, the opening on the south side was an entrance to the west room. The current entrance on the north was apparently built in 2012. At that time, the opening on the south was changed into a *rabsel* window. There are two squared timber beams with an ax-scraped pattern running east-west, supported by several pillars, but these were all done later. There are also traces of impact on the bottom part of the westerly portion of the beams, so it is believed that there were pillars when it was built. The floor is earthen, except for the southwest part which is laid with planks. The ceiling is composed of unstripped round timber joists, overlaid with fascines for the foundation of the upper floor.

On the first floor, the west room is further divided into smaller east and west, with a mud wall partition. The partition has been installed over soot and is believed to have been done later. The floor is earthen, and the ceiling is composed of unstripped squared timber joists laid over with thin fascines for the foundation of the upper floor. There is only one entrance on the south, but as mentioned above, there is no balcony, and only the traces from the cantilever beams for the balcony floor remain on the south outer wall. The east room was used as a single one, and it is believed that there was a furnace in the northwest corner. There is one entrance on the east side, but as in the west room, the balcony has disappeared and only traces from the cantilever beams remain on the wall; at present, it is not used as an entrance. On the south there is a vertically long wooden-grated window. However, the header member is longer in width than the current opening; it is the same size as the header member for the entrance in the west room, and the area beside the wooden-grated window has been closed with blocks.


4


5


6


7

4 Livestock shed on the ground floor
5 Room on the east side of the ground floor
6 Room on the west side of the first floor
7 Room on the east side of the first floor

Therefore, it is believed that when it was built, there was an entrance here as in the west room.

The second floor has already been dismantled; all that remains is some of the rammed earth wall rising up from the floor below, which is earthen. Corbels are on the west and south walls, and it is believed that they once had *rabsel* bay windows. However, corbels on the south differ those between east and west in shape, interval, and height, so it is possible that the shape of the bay windows also differed.

For the roof structure, there are three purlins running east-west. The southernmost one is placed on top of the rammed earth wall. Both the east and west ends of the centre purlin are placed on top of the wall and supported with roof struts in the centre. The west half of the northernmost purlin is placed on top of the wall, and the east one is supported by roof struts. Unstripped round timber rafters and laths are placed on top of the purlins, and the building is covered with corrugated iron roofing. At present, the building has a shed roof, but before the dismantling of the second floor, it had a gabled roof.

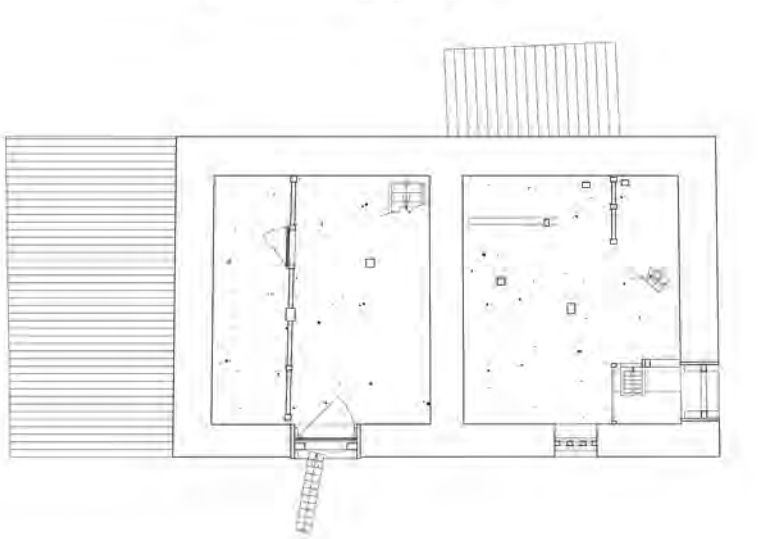
Considerations for restoration to the original state

It is possible to identify the following major modifications: the dismantling of the second floor, the replacement of the roof framework, and the changes to the area around the first-floor entrance. It is unclear how the interior of the second floor was structured, but it is thought that like the first floor, it was divided into two rooms, east and west, by a rammed earth wall running down the middle, with *rabsel* bay windows on the west and south. It was probably used as a living space. The right and back sides, it is said, were rammed earth walls. The shape of the corbels for the bay windows are different between east and west, so it is possible that they are from different periods. As for the first-floor entrances, we can assume that the south entrance once had a balcony attached, as is clear from the traces left on the west side of the south wall. As for the east room, there is now a vertically long window on the south, and the east side has an entrance and traces of a balcony. However, these indicate an intermediate stage; it is thought that when it was built, the south side of the east room had an entrance and a balcony, like the west one.

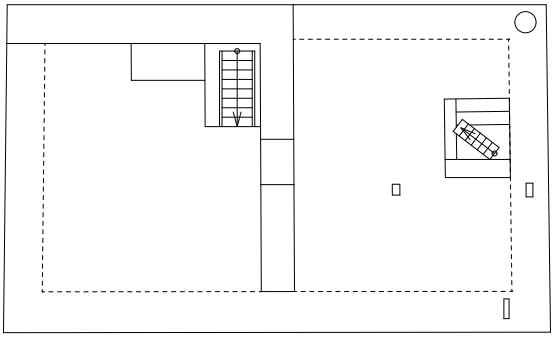
Conclusion

Although the second floor has been demolished, the building is a valuable site. Overall, it has few modifications, and it would be possible to restore it to its original state. Furthermore, there is a rammed earth wall running down the centre of the width, and it is structured like a tenement house with residences of equal size on either side. It is thus an extremely unique and important case. However, there is considerable breakage on the outer rammed earth wall and the interior wooden parts, so it is necessary to take prompt restoration measures. (Maekawa Ayumi)

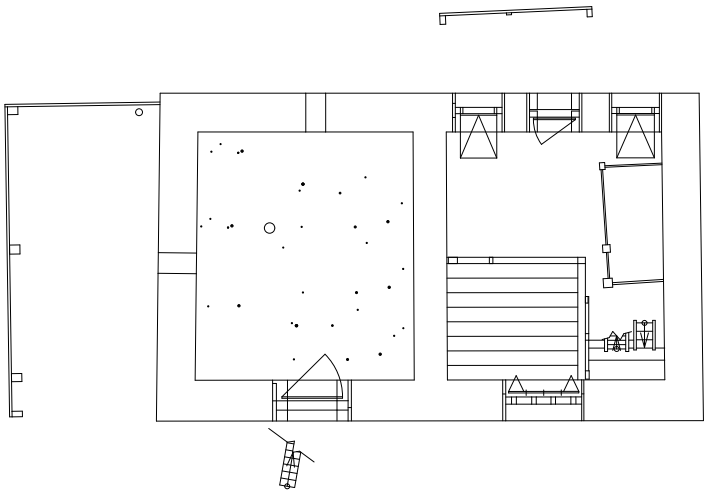
8 Bay window brackets of the second floor through the south front to the west side
9 Traces of the opening on the east wall of the first floor



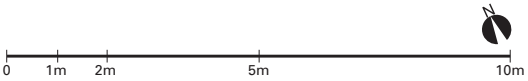
First floor plan 1:150



Second floor plan 1:150



Ground floor plan 1:150



Cross section 1:100

3-8 Vanishing Vernacular Houses

3

Lham Tshering House

DATA

Dzongkhag
Haa

Gewog
Bji

Village
Talung Toed

Settlement location
tableland

Settlement pattern
clustered

Coordinates: 27.4322, 89.2508

1 Front view (from southeast)
2 Side view (from southwest)
3 South exterior of the ground floor

Location and summary

This building stands at the southwestern edge of a village located above a valley along a tributary of the Haa River, with views of a deep mountain stream to the west. Only two houses—one at the southern end and the house in question (both bordering the stream)—have a roof ridge oriented 90 degrees differently from the other houses. This two-storey building, with a gabled, stone-weighted shingle roof (partly CGI sheets), has a yard in front of its southeast-facing front, surrounded by a cobblestone masonry wall with gates on both sides. A recently erected, two-storey rammed earth building (not subject to this survey) is connected at the rear, but it is not possible to move between the front and rear buildings internally. The building consists of a main section made of rammed earth and a wooden section at the front, with a plane scale 14.6m wide and 7.5m deep for the main part, and a depth of 2.5m for the wooden structure. It is unique in that the *rabsel* on the front face is supported not by the usual rammed earth wall but rather by round log pillars with the lower section exposed. The western side of the first floor of the main structure also has an overhanging attached part. Including this, the wooden section is covered by an eaves-like slanted roof.

The composition of each floor

The ground-floor interior is divided into two rooms (east and west) by a rammed earth wall, with an entrance door on the south face of each room, as well as a doorway in the middle of the rammed earth partition wall, enabling movement between the two rooms. Both rooms appear to have been used as livestock sheds initially, although currently, only the west room is used for storage.

The first floor is accessed via an external staircase leading to an entrance at the east end of the front face. Entering it leads to a small front room with a ladder leading to the attic. On the other side of the door on the east side of the front room, there used to be a wooden overhang running the entire length of the building's eastern face, which led to the latrine at the north end; this deteriorated and collapsed about 20 years ago. The first floor living area consists of four rooms corresponding to the eastern and western halves of the rammed earth section, as well as the eastern and western halves of the wooden structure. However, the partition is positioned slightly to the west in the wooden section. The doorway between the two rooms on the eastern side has a double opening, while the doorway between the western rooms has a large, tripe opening. That said, neither presently has a door installed; a wooden door is fitted in the entrance leading between the southeast room and the northwest room. In addition, a small wooden door exists between the two northern rooms, while an old doorway between the two southside rooms has been closed up. The northeast room encompasses a living room and kitchen, with a furnace in the northwest corner. The northwest room is an altar room with a small Buddhist altar inlaid into the north wall, while the southwest room is its front room. On the western side of the northwest room, a tall, double-hung door with a supporting centre pillar leads to the overhang. The southern half of the overhang is a small room enclosed by a wooden wall, while the northern half is semi-outdoors, with a staircase reaching from the western edge of the yard. As for exterior openings on the first floor, there is only a small window in the upper part of the east face of the rammed earth section, while the wooden section features three sets of large windows on the front face and another on the west, forming a *rabsel*.

With regard to the roof, the rammed earth section has a roof with a ridge running north–south and a gentle slope stretching to east and west, while the wooden section on the front face has low eaves running south. Much of the roof structure is old wood, but some struts on the front face have been replaced with new timber, and some of the roofing shingles have been replaced with CGI sheets.

Considerations for restoration to the original state

There is a clear boundary on the south face of the rammed earth wall, including the foundation. The eastern side of this boundary probably dates back to when the house was built, while the western side is an extension. The boundary line is continuous, running up to the first floor. The old western exterior wall dates from when the house was built, remained unmodified, and now serves as a partition wall. The house was a two-storey structure when it was built, and the extension of two storeys was likely made at once. There is no clear difference in the specifications of the rammed earth walls in the original section and the extension. Moreover, since the walls of the extension feature a strong taper, it is probable that the extension was built in a rather early period.

Among the doorways on the south face of the ground floor, the entrance on the south face of the east room is likely later work based on the fit with its surroundings. Thus, the doorway in the centre of the current partition wall between the east and west rooms was previously the entrance. When it was built, the western face was the front, but with the addition of the building's western half, the building's southern face became the front. The entrance on the south face of the west room has about the same dimensions as the old entrance to the east room, yet the entrance on the south face of the east room is smaller in size, and the latter is presumed to have been installed following the extension of the western section.

Even on the first floor, there is a large, closed-up opening in the centre of the wall between the east and west rooms, which dates back prior to the extension to when the house was first built. Whether this opening was an entrance doorway, or a window is difficult to establish from observations of the current appearance, but were it a window, if the house initially had an entrance on the first floor when it was built, it could only be in the location of the current opening on the southern face. On the other hand, the large doorway on the west face of the west room appears to have been installed during the addition of the building's western half. Notwithstanding, its construction is too grand to have been a side entrance, so this may have been the

main entrance at the time of the extension. From the fit with the surroundings, the three existing openings on the south face of the rammed earth wall were all likely installed by cutting through the rammed earth wall at a later date, although we cannot dismiss the possibility that the smaller openings originally existed at the same locations. The small doorway at the southern end of the wall separating the east and west rooms breaks up the rammed earth wall and is clearly later work.

The wooden sections appear to be considerably more recent than the rammed earth section and looking at the first-floor perimeter alone reveals no particular difference in the date of construction. By contrast, the log pillar on the ground floor contains a mixture of old and new material, with the fourth, fifth, and seventh logs from the east being older and the first, second, third, and sixth logs being newer. Since the extent of weathering on the latter is similar to that on the wood of the exterior of the first floor, it is possible that the original materials (such as the exterior balcony support pillars) may have been converted for use in the former.

Within the first-floor interior, the timber of the wall with exposed pillars separating each room appears to be newer than that of the exterior walls. The specifications of the earthen walls also differ; while the outer walls are simple *ekra* walls made from split bamboo, the partition walls have a lath made with thin vines woven on both sides of lined branches. Judging from the location, the doorway leading from the southeast room to the northwest room appears to have been installed after the partition wall, yet the wood is older and comparable to the two other openings in the same wall. Further, since the specifications of the wooden screen wall facing to the back of the doorway differ from those of the partition wall above, this doorway was probably installed before the existing partition wall.

From the above, the changes made to this house can be summarised as follows: When the building was erected, it had a west-facing rammed earth structure. → A rammed earth structure of the same size was added to the west side. The front of the building changed to the south face (the main entrance on the first floor of the extension is west facing). → The wooden structure was added to the south side, and an opening was either created or expanded in the south wall of the rammed earth structure. → A new partition was created in the wooden structure.

Conclusion

The building's original form can be restored as a square plan with a one-room on each floor. The method used to widen the opening downward for the old opening on the front (west) face of the first floor is strikingly evident, and there is a 36mm difference between the inner width of the outer frame, which is 1,950mm in height. A similar technique can be seen in several other buildings, but the difference in dimensions between the top and bottom is generally around 10mm only. This may indicate oldness of the construction period of this building.

This building was uninhabited at the time of the survey and in an advanced state of dilapidation, with a portion of the rammed earth wall collapsing and the loss of most of the eastern half of the first floor structure. By the time of our return visit in 2019, it had been demolished and replaced with a new building. This building was a valuable example of the unique process of extension. In that regard, its loss is regrettable.

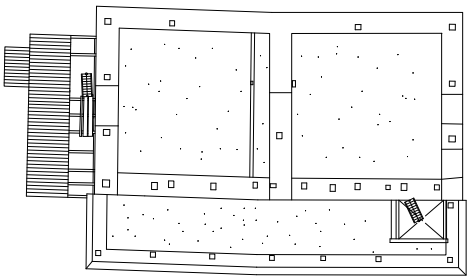
(Tomoda Masahiko)

4 Southeast room on the first floor
5 Northwest room on the first floor

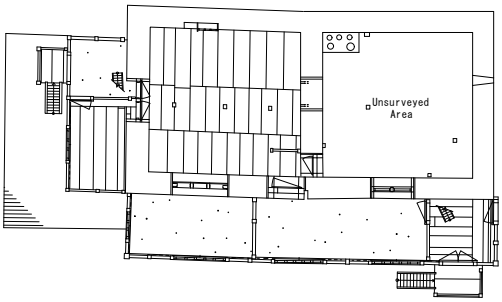
6

7

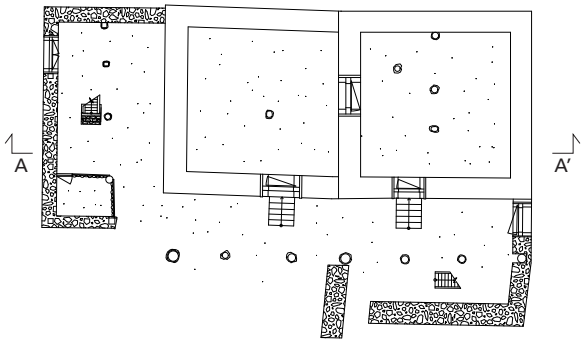
6 Southwest room on the first floor
7 Attic space



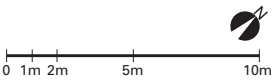
Attic floor plan 1:300

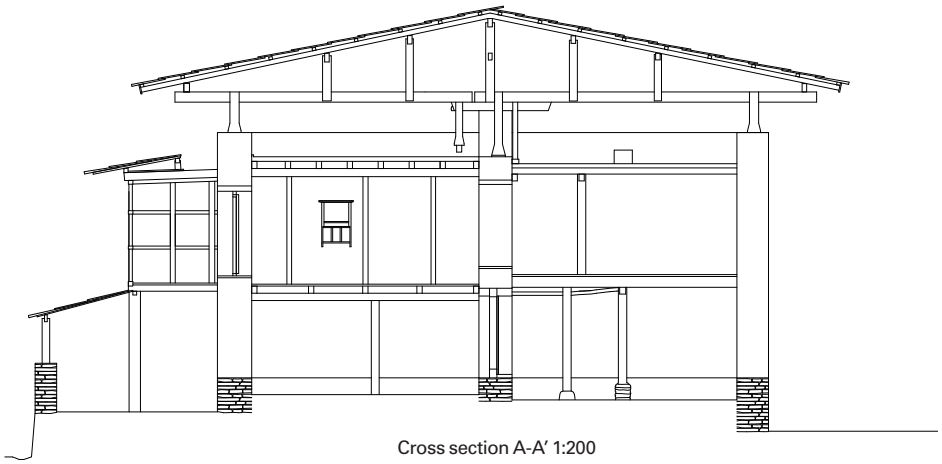


First floor plan 1:300



Ground floor plan 1:300





Cross section A-A' 1:200

Pema House

DATA

Dzongkhag
Haa

Gewog
Samar

Village
Pudhana

Settlement location
riverside

Settlement pattern
dispersed

Coordinates: 27.3039, 89.3137

1 Whole view of the front side (from southeast)
2 South elevation with the open balcony
3 Furnace in the room on the south side of the first floor

Location and summary

This building has been constructed on a slope facing the east valley in Puduna village, which is to the south of central Haa Dzongkhag. As the site is in a staggered form, the depth of the structure is restricted. The building thus has low depth and expands along its width.

The cliff is behind the building, which has no attached buildings or shielding facilities around it. The building is a two-storey rammed earth structure that has a stone shingle gabled roof, with a slanting shingle roof attached to the north. Its plane scale is trapezoidal rather than rectangular and is wider towards the front. A rammed earth structure is attached to the north side. The width of the ground floor is about 14.1m and the depth is 7.7m.

Looking at the outward appearance, the front side of the east face has a rammed earth wall rising above a thin masonry structure and has two entrances—one in the north and the other in the south. A *rabsel* has been installed on the south side of the first floor, and side walls are visible on both sides of the *rabsel*. There is also a *rabsel* along the north side of the front face that connects directly to the north face. There are almost no openings on the rear side, except for one small window on the ground floor and two on the first floor. The south face is a rammed earth wall that only has an entrance on the first floor, but there is an overhanging terrace attached to this side. This terrace area serves as the entrance to the interior of the first floor. This terrace also has a ladder the leads to the attic space.

The composition of each floor

The ground floor is surrounded by a rammed earth wall and is divided into two rooms—north and south. Both

are livestock sheds with earthen floors, and both have an east-facing entrance at the front of the building. There is a single room in the south that has a small window at its rear. As mentioned, the ground floor has a closed structure. There are two pillars inside that are connected to width-wards beams, and squared timber joists and floorboards are laid on top of them. The rammed earth wall also appears to have been rebuilt in most of this room. There is a single room to the north that has a small window that opens toward the south face. The joist of surface-coated logs is set along the north-south direction, and the upper floorboards are placed on top of it.

The south side of the first floor is surrounded by rammed earth walls on three sides, except for the east. There is a *rabsel* set between both the side walls, sections of which are visible from the east side. Wooden walls divide the southern side into three parts. A furnace is placed at the southwest corner, which is the only part with an earthen floor made of hewn stone. A wooden side wall is connected beside the furnace. The east side of the building is divided into two rooms—north and south—but the floorboards pass under the partition wall, which confirms that it is a later addition. The other partition walls are later work as well. This may have been a single room, but the ceiling has a north-south partition along the beam and a joist over it, which suggests that the ceiling was divided by this partition. The joist has an axe-finish, and manufacturing traces are visible on both the sides as well as the underside. Similar manufacturing marks can also be seen on the pillar and the beam of the partition. Since there is no discrepancy in the attachment of the *rabsel* and the partition, they appear to be from the same period. The upper part of this *rabsel* is a large vertical *rabsel*, which is a characteristic design.

There is a rammed earth wall only on the west side of the north room and *rabsels* wrap around the north and east sides. These *rabsels* do not protrude from the wall. There are traces of a small window on the west side that is now filled up with stone, and a grain chest is set in front of it. The ceiling is covered with a square joist along the width, and ceiling boards have been laid.

The north and south rooms are connected by a door that opens to a rammed earth wall. A terrace overhangs from the south of the southern rammed earth wall, and there is a staircase to the lower floor on the east of the terrace.

The rammed earth wall extends to the roof only on the south side of the attic, and there are no walls in the centre of the north and south sides. There is a roof beam on top of the wall on the west side, and the east side has a pillar to support it. The roof struts are jointed above the roof beam with the end processed into a U shape, and the roof structure that penetrates the ridge


4


5


6

4 *Rabsel* window of the room on the south side of the first floor
5 Room on the north side of the first floor
6 Roof structure

struts are laid along the width. Then the gabled roof is structured with a shingle roof attached. Since the rammed earth wall extends only in the east, it cannot be connected to the roof on the south side, and a single sloping roof is laid on the north side.

Considerations for restoration to the original state

We can infer the modifications made from the traces found in the rammed earth wall and the wooden part. The rammed earth wall on the southwest of the ground floor is old, and new rammed earth has been piled on top of it, indicating that the building was constructed using an abandoned rammed earth wall.

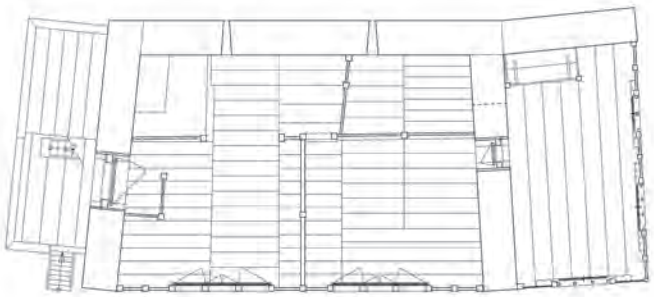
Clearly, the modifications have changed due to the northward expansion of the south side rooms. The current door opens into the rammed earth wall on the north side of the first floor. However, reviewing the rammed earth wall to its west, it appears that a wider doorway existed there. Looking at the northern rooms on the ground floor, there are joist traces directly below the old doorway where an overhang is attached, which suggests the existence of a staircase. The rammed earth south wall shows traces of squared timber, and it is possible that there was a sloping roof attached to the terrace, like there is to the north, but the details are obscured.

Conclusion

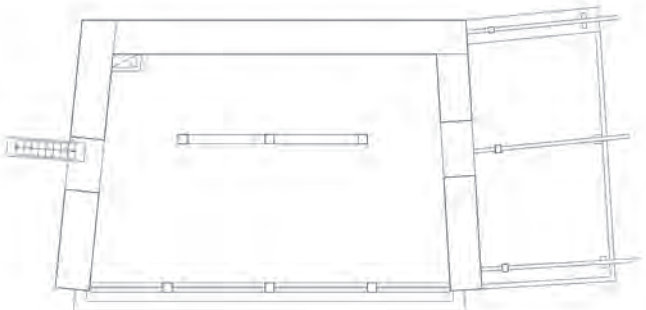
The building is a small-scale house that was constructed using ruins, and the front of the two side walls have *rabsels* laid flush, rather than bay windows. This point is significant as it may indicate an older form in the Haa region. On the other hand, the breakage of the *rabsel* and the roof panel are remarkable, and the spandrel wall of the interior partition wall has exposed lathing, which indicates that the structure has been poorly preserved and requires urgent conservation measures.

(Unno Satoshi)

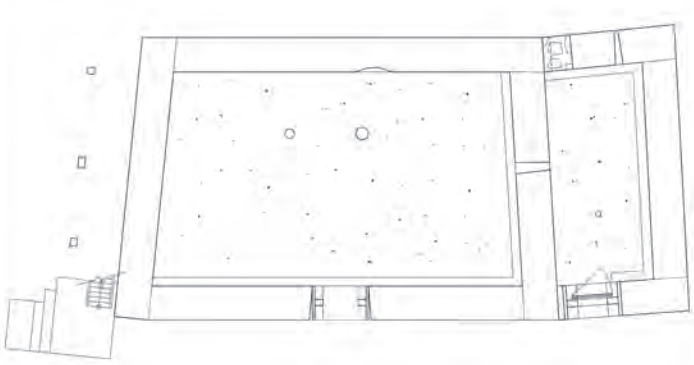
7 Modification of the entrance on the first floor
8 Details of the back side elevation
9 Grain chest of the room on the north side of the first floor



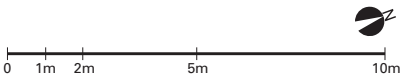
First floor plan 1:200

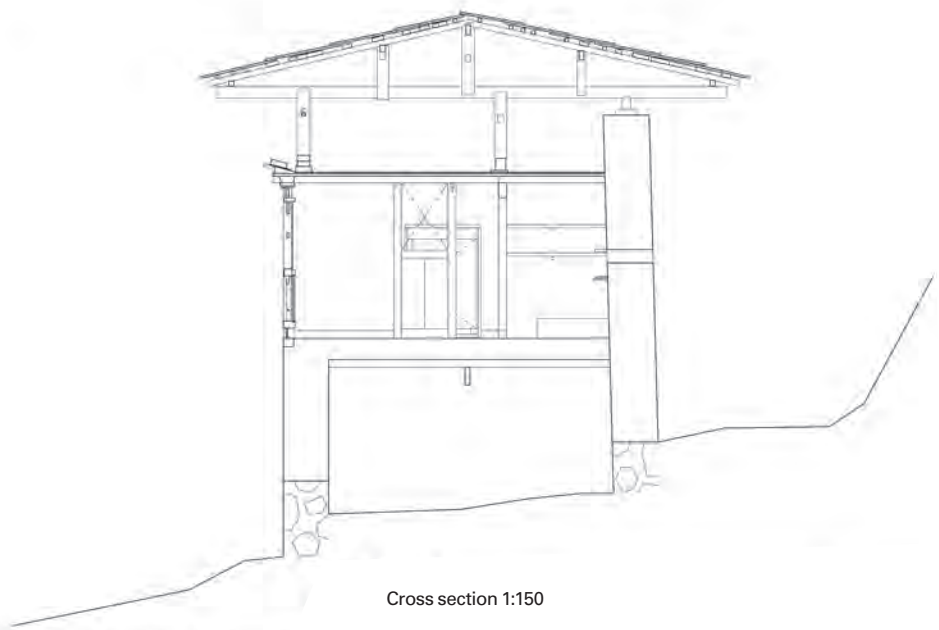


Attic floor plan 1:200



Ground floor plan 1:200





Cross section 1:150

VERNACULAR
HOUSES in Bhutan

CHAPTER

4

HERITAGE CONSERVATION

4-1 Current Status and Prospect of Heritage Conservation in Bhutan

Cultural Landscape

The bill recognises Bhutan as a whole as a unique cultural landscape. The tangible and intangible cultural heritage should be protected and safeguarded with the understanding of its association with natural settings and lives of the people of Bhutan in such a manner as to respect the cultural landscape.

Cultural Landscape is the landscape which is evolved from the interaction of the people with the nature, and consists of cultural and natural elements that can reveal the aspects of the country's culture, origins, development, and distinctiveness.

Milestones of the Cultural Landscape and Sustaining its Significance

I. International Competition on Cultural Landscape in Bhutan, 2014

First international competition on Cultural Landscape in Bhutan was conducted in 2014 on settlements under Dopshar-ri Gewog, Paro Dzongkhag to promote a sustainable living environment, and to enhance its cultural and social values.

II. Workshop for Cultural Landscape & Sustaining its Significance, 2015

The second workshop was conducted on the Kartshok valley, Haa Dzongkhag. The main objective of the workshop was to establish a process to recognise and identify values of the cultural landscape of Bhutan from social, economic, environmental, geographical, architectural and historical viewpoints.

III. Workshop for Cultural Landscape & Sustaining its Significance, 2016

The third workshop was targeted to work out for preparing management frameworks from two case sites in Paro and to deliberate the proposed schemes with national stakeholders and international experts to enhance the cooperative approach with different stakeholders for planning and implementing heritage management. The case sites chosen were Chubar-Aatso village as cultural site and Paro valley as cultural landscape site in Paro Dzongkhag.

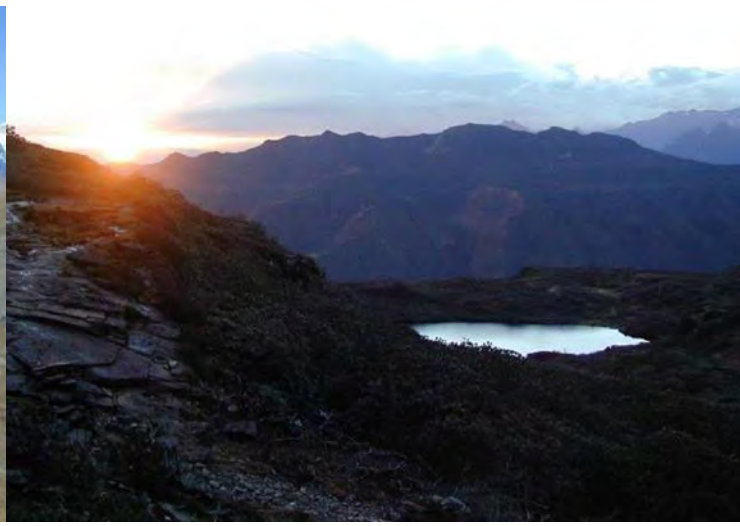
IV. Workshop for Cultural Landscape & Sustaining its Significance, 2017

All previous workshops were conducted with the international participants and in 2017 the workshop was conducted in-house (DCHS) for capacity building. For this particular study, six sites were identified namely, Rinchengang village, Ura-Doshi village, Nabji village, Buli village, Gangtey village and Ramtoe village.

The significant outcome of the workshop besides capacity building was the preparation of management plan for sustaining the significance of the above six sites.

Link between the GNH and Cultural Landscape

Gross National Happiness, a development philosophy



Different types of landscapes in Bhutan

of Royal Government of Bhutan (RGoB), has four pillars, namely, Sustainable and Equitable Socio-Economic Development, Environmental Conservation, Preservation and Promotion of Culture and Good Governance.

Cultural Landscape broadly covers the above four pillars. It is associated with the importance of nature, social life, economic development, preservation of culture and tradition. All the identified values and significance are then important to be sustainable which is catered by the policies thus good governance. Therefore, the Sustenance of the Cultural Landscape is directly or indirectly linked to the GNH.

Development philosophy of Bhutan and Cultural Landscape

Cultural Heritage Bill

Key principles of the Cultural Heritage Bill

I. Principal Law to protect and promote Bhutan's living culture

The purpose of this Act is to sustain cultural heritage (CH) and the cultural landscape of Bhutan for the present and future generations.

1. Tangible cultural heritage
- Movable cultural property (MCP): amendment of Movable Cultural Property Act of Bhutan 2005
- Heritage site (HS)

2. Intangible cultural heritage (ICH)

II. Streamline and improve the current practice exercised by DoC

- Roles and responsibilities of concerned public offices
- Administrative procedures for protection and safeguarding of CH
- RGoB's financial assistance and subsidies

III. Encounter the current challenges

- Increasing vandalism or illegally transportation of movable cultural properties.
- Demolition or inadequate renovation eliminating historic fabric and distinctive form/material of heritage building.
- Imminent risk of discontinuity or standardisation of ICH.

- Deterioration of landscape and community strength caused by rapid rural-urban migration.

IV. Promote comprehensive stewardship for "value-based protection"

1. Recognition of cultural heritage value (CHV): (aesthetic, architectural, archaeological, historical, scientific, religious or spiritual significance)
2. Extension of definition of CH: to include not only monumental buildings, religious artefacts or national festivals, but also vernacular houses, folk arts or indigenous practices which are in danger of disappearing.
   a. Foster the people's sense of ownership and appreciation to cultural heritage
   b. Achieve a good balance between CHV and other values including economic development

Management and Protection of Heritage Site

Management plan of Designated Heritage Sites will be prepared by Dzongkhag, Thromde and Department of Culture and approved by the Committee.

1. Restriction of Works on R/D Heritage Site (R: Registered, D: Designated)

- Not execute any works on a R/D Heritage Building unless approved by DoC
- Not execute any works in Important Cultural Site, Registered Archaeological Site, or conservation zone, unless approved by DoC
- Not collect archaeological remains from Registered Archaeological Site

2. Approval for Works on R/D Heritage Site

- A owner submit an application to Dzongkhag Administration/Dzongkhag Thromde Administration
- Dzongkhag Administration/Dzongkhag Thromde Administration verify and forward the application to DoC.

- DoC approve if it is necessary for the protection or sustainable use, or
- DoC instruct the owner to undertake works specified in project plan in order to ensure CHV wouldn't be lost by the work

3. Execution of Works on R/D Heritage Site

A owner execute the work in accordance with DoC's instructions or the project plan

Financial assistance may be provided based on type of work and financial status of the owner;

- Registered HS: from annual budget of Dzongkhag Administration / Thromde Administration
- Designated HS: from annual budget of MoHCA

Buffer Zone of Designated HS

The area surrounding the conservation zone of the Designated Heritage Building or the Important Cultural Site for effective protection of Designated HS

Dzongkhag Administration / Dzongkhag Thromde Administration:

- issue a development permit for the development activity in accordance with the development control regulations
- report the issuance of development permit to DoC

1. Incentives

- Provisions for tax exemption, subsidies on local materials, reduction or waiver of customs duties
- Allocations of subsidised timber to each protection work on R/D Heritage Site within annual quota determined by authority.
- Financial Assistance provided by DoC or Dzongkhag Administration / Thromde Administration for protection work for R/D Heritage Site
- Charging Fees: A part of fee collected shall be spent for the sustenance of R/D CH

Heritage sites category

1. Heritage Building

a. Dzong, temple, palace, nagtshang

b. Vernacular house of CHV

c. Other built structure of CHV

2. Cultural Site

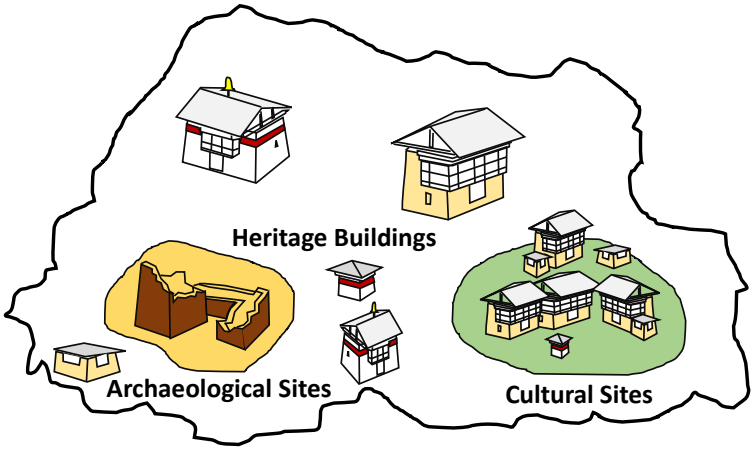
a. Group of traditional buildings with its natural setting, the combination of which bears CHV

b. Geographical area association with human settlement, activities or beliefs bears CHV

3. Archaeological Site

a. Ruin/remains of a building of CHV

b. Area in which remains of the past are discovered and may potentially have CHV



Registration and Designation of Cultural Heritage

1. Heritage Building (religious structure, palace, vernacular house of CHV)

a. Registered Heritage Building

b. Important Heritage Building

c. Heritage Building of Special Importance

2. Cultural Site (a group of traditional buildings with its natural setting, Ney area)

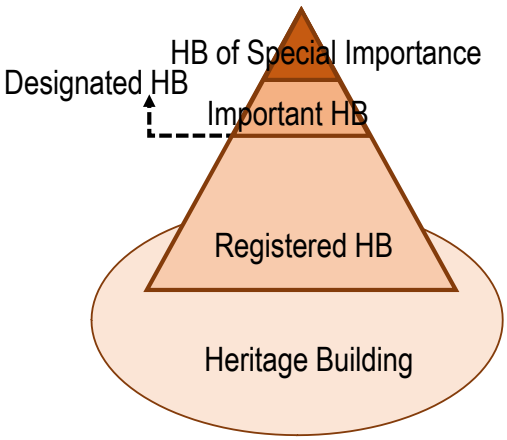
a. Important Cultural Site

3. Archaeological Site (ruin/remains of building, area in where remains of the past were discovered)

a. Registered Archaeological Site

4. Cultural Heritage Value of vernacular houses

- Distinctive typology which is testimony of particular period
- Specificity of style (rareness value)
- Historical value - Relation to historic figures or events
- Aesthetic and artistic value
- Social value



4-2 Three Candidate Traditional Houses of National Designated Cultural

Current knowledge regarding traditional houses in Bhutan

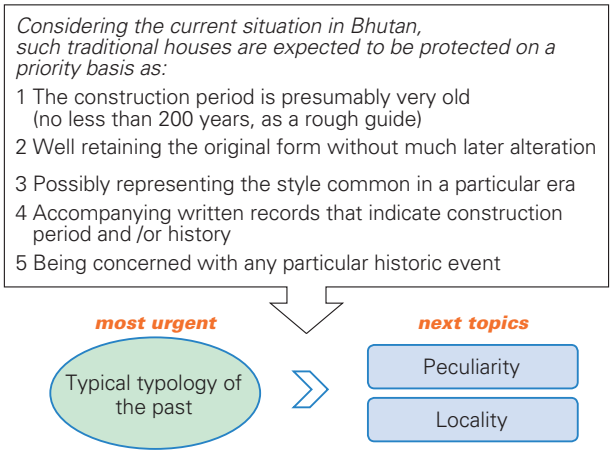
As noted in chapter 2, as a result of architectural investigations conducted thus far, it has become possible to some extent to distinguish which vernacular houses in Bhutan are quite old in terms of when they were constructed. Concurrently, awareness has also grown in the sense that the remaining number of old-traditional houses are surprisingly small, and the majority of these have not retained their original forms due to later modifications or other factors. Although evaluation methodologies, including the determination of absolute age, have not yet been clearly established, it is not difficult to imagine that if nothing is done to protect them, the few remaining traditional buildings will soon disappear. A web of legal protections must be created, starting with buildings that are presumed to be of highest priority for preservation.

Evaluation criteria for the selection of buildings for preservation

Points of view vary regarding what criteria should be used to assess the value of a cultural heritage, and such criteria also reflect the historical-cultural traditions of each country. Bearing in mind current conditions in Bhutan, the following could be some examples of selection criteria for traditional houses which should be prioritised for protection.

1) Buildings whose year of construction is estimated to be quite old
2) Buildings that have had few later modifications, whose original forms have been well retained
3) Buildings that are presumed to represent styles typical of the period
4) Buildings for which documents, and so forth, exist regarding the year of construction or the history of the building
5) Buildings that have a connection to specific historical events, and so forth.

Of these, 1-3 are the basic evaluation criteria, and 4 and 5 could be described as additional criteria that further increase the estimated value. In other words,



Criteria for the selection of candidate buildings to be preserved

Different categories of built heritage
Above left: Dzong,
Above right: Lhakhang,
Below left: Traditional houses,
Below right: Cultural landscape

Heritage

the historical importance of a building should be based not only on factors like its intangible lore, but its cultural value as tangible heritage should also be guaranteed. Furthermore, as mentioned in 1) to 3) above, at least for the time being, I would like to suggest that the buildings with the greatest urgency and risk of disappearance should be prioritised for protection, indeed the types of traditional houses that were likely ubiquitous in Bhutan in the past, more than those with an extremely unique or local flavour, even if their construction is exceptional.

Based on this, of the old-traditional houses that have been surveyed thus far, I would like to propose that the following three buildings be given priority for designation as cultural heritage.

In the cultural properties protection system in Japan, a traditional house could be designated as:
- Important Cultural Property (building)
- Component of a Historic Site
- Important Tangible Folk-cultural Property
- Component of an Important Preservation District for Group of Traditional Buildings
- Component of an Important Cultural Landscape

Criteria for designation
- meets one of the significances below, being typical example in a period or a category:
- outstanding in design
- outstanding in technique
- with high historical value
- with high academic value
- remarkable in character of a school or a region

Criteria for the selection of candidate building to be preserved

Candidates for designation as cultural heritage properties

Candidate 1: Lham Pelzom House (located in Kabesa, Thimphu city, cf. chapter 3-3-1)

Located in a valley village north of Pangri Zampa Lhakhang, this building and the building which has been converted into Choki Traditional Art School are said to be the oldest two buildings in the village. The building that is now Choki Traditional Art School is said to have been built at the end of the 17th century, and underwent major internal and external modifications in 1999 when it was converted for use by Choki Traditional Art School. In contrast, Lham Pelzom shows almost no signs of later modification, and is believed to closely retain its original form. Excluding the front wall, there are almost no openings on all three sides of the outer rammed earth walls of this three-storeyed building, giving it an extremely insular outer appearance. Specifically, on the second floor, which is the main living area, there is only one narrow doorway to the outside in the middle of the front wall, and a small window on the back wall above the furnace. Since no similar extant examples have been found, this building merits special mention. Decorative aspects such as the carving on the wood of the outer veranda, as well as the wooden partition walls in the second floor's interior,

Recent threats to the preservation of rammed earth buildings
Above left: Depopulation in vernacular areas,
Above right: Longing for modern life,
Below left: Loss of traditional social system,
Below right: Safety concern against earthquake

give the building an old-style feel. Although the details of its history are unknown, this is likely one of the oldest traditional houses in Bhutan. Today, there are very few examples of traditional houses with a square plane scale, but sketches of farmhouses from the late 18th century by Samuel Davis closely resemble the proportions of this building, suggesting that this type of structure was more common at the time. The building has been uninhabited since 2008. In 2017, after our investigation, some wooden portions such as the interior floor collapsed; however, most of the materials have been recovered and stored (explained in chapter 4-3), so these can be reused to restore the building to its original state according to its original specifications.

Candidate 2: Tandin Zam House (located in Changjokha, Punakha Dzongkhag, cf. chapter 3-3-3)

This building is located in one of the villages whose residents migrated seasonally as directed by the monastic body, and it is said that the land was provided by Ngawang Namgyal. The building is located between Punakha Dzong and the Pho Chhu river, suggesting its close connection to both the village and the Dzong. It is said that the building was constructed by the monk Ugyen Phuntshom, whose statue stands at Tsalu Goenpa in Babesa (in the southern suburbs of Thimphu), such that the residents could move from Changjokha in winter to Babesa in summer. It is said that the Dzong was built around 1638, so Tandin Zam House must have been built sometime after that. Although slight modifications have been made to areas such as the openings, the insular, tower-like outer appearance and sharply tapered outer walls are a good indication of the building's age. Such tower-like buildings with few wooden elements on the outside also frequently appear in Davis' sketches, so this likely was a typical style for farmhouses around the 18th century. The interior is partitioned with rammed earth walls on the ground and first floors, and wooden pillar-exposed walls on the second floor, dividing each floor into two rooms, north and south. The only access to the grain storehouse on the north side of the ground floor is through the removable floorboards on the first floor; this style seems to be characteristic of residences belonging to the village headman class.

Candidate 3: Phub Lham House (located in Talung Toed, Haa Dzongkhag, cf. chapter 3-3-4)

This is a small, two-storeyed traditional house located in a valley village in northern Haa Dzongkhag with an ancient road leading to Paro passing through it. There is no evidence of additions or structural alterations to the rammed earth walls, and their extremely sharp tapering is striking. It is also highly likely that the old style has been retained in areas such as the openings. The interior of the ground floor is a single-room livestock shed, and it is believed the main part of the first floor, which is currently divided into two rooms, was also a single living area when it was first built. Several techniques presumed to be in the old style have been used; for example, the customary layer of earth between the first floor's joists and floorboards is

Left: Candidate1: Lham Pelzom House, 2013
Right: Sketch "*In the village near Tassisudon*" by Samuel Davis, 1783

absent, and the level of the masonry joints have been adjusted on the outer rammed earth wall of the first floor at floor level. The date of construction for this building is unknown, but it closely resembles the scale and format that has been deduced from ruins found in abandoned villages such as Debsi and Tenchekha; furthermore, there are similar examples, not small in number, deduced from old-traditional farmhouses that have undergone later modifications. This building could be considered a well-retained relic of a style that was typical for a commoner's residence in a mountain village in western Bhutan in ancient times, and it is thus extremely valuable.

Conclusion

It is customary to identify traditional houses as cultural properties only after being recognised as commemorative monuments such as religious buildings, and even among residential buildings, it is usually the residences of the ruling class, which tend to be exceptional in design, technique, and scale, which tend to be given priority as candidates for preservation. Therefore, if we do not pay conscious attention to the traditional residences of the general masses, which should represent the overwhelming majority in every period, these buildings are in danger of disappearing unnoticed. It is not my intention here to deny the importance of preserving high-class housing; however, it is only by paying attention to the residences of commoners, which tend to be overlooked by comparison, that it becomes possible to pass on to future generations the actual artefacts needed to learn about the scenery and society of ancient times without incurring such loss. Furthermore, it is hoped that the value of the buildings will be made more evident through the process of designation and the restoration work they undergo as cultural properties, and that investigative methods and evaluation indices will gradually be established which can lead to the discovery of additional important properties. Finally, I would like to emphasise once again that although there is still time to preserve these historic buildings in Bhutan, the time to do so is extremely limited.

Above left: Current status of candidate2: Tandin Zam House, 2019

Above right: *Sketch "View of the Palace of Punukka in Bootanin"* by Samuel Davis, 1783

Below left: Distant view of Talung Toed and candidate 3: Phub Lham House, 2019

Below right: *Sketch "View of the mountain Downgala, taken in the village Puga on the road to Tassisudon in Bhootan"* by Samuel Davis, 1783

4-3 Emergency Conservation Measures for Lham Pelzom House

Introduction

Lham Pelzom House in Kabesa Village, Thimphu Dzongkhag is a tall three-storey building with thick rammed earth walls and a nearly square floor plan. It has very few and small openings apart from the main entrance and a window with a wooden cantilevered balcony on the front (west) side (see full description on 3-3-1). These features seem to indicate that the building has mostly retained its original appearance and experimented with very few alterations. Therefore, it constitutes a valuable example of an early traditional rammed earth house in this region.

Due to its cultural significance, conservation of the house as heritage building was proposed during the Workshop on the Conservation of Rammed Earth Traditional Houses in Bhutan held in Thimphu in March 2013. Following the workshop, the owners agreed to actively cooperate to ensure the conservation of the building.

Condition of the building before the emergency conservation measures

The building ceased to be used as a residence in 2008. It was first surveyed by the Tokyo National Research Institute for Cultural Properties and the Division for Conservation of Heritages Sites, Department of Culture, MoHCA in 2013. At that time, part of the roof and the wooden balcony had already collapsed, and the floor of the second storey was in a poor state of conservation (photo, this page left).

By the time the building was inspected for the second time in March 2018, only the cantilevered beams remained from the balcony, and the roof had completely collapsed inside the house (photo, this page right). The collapse of the roof had caused rapid deterioration of the inside structure of the building. A two-storey high rammed earth wall running in the north-south direction that divided the ground and first floors roughly in half had partially collapsed, the central section having completely fallen down (photos, next page). The wooden beams, joists and floorboards of each floor had also almost entirely collapsed inside the house, with the exception of the northeast sector of the first floor and a few isolated joists of the first and second floors. A wooden partition wall and a built-in wooden cupboard originally located on the second floor had also fallen down. The outside rammed earth walls, on the other hand, remained in relatively sound condition.

The collapsed wooden members remained inside the building in the same position where they had fallen down. Although most of them were in a fair condition, they were exposed to the rain and the humidity from the ground, and many of them were rapidly decaying. In addition, some wooden members had been partially buried by the earth from the partition wall and the floor of the attic.

Methodology for salvaging, sorting and storing the collapsed wooden members

In view of their rapidly deteriorating condition, it was decided that the collapsed wooden members had to be urgently salvaged and stored. Additionally, it was decided that as far as possible, the original location of each member should be identified. In this way, it would be possible to reuse them in their original location in future repair interventions.

The following methodology for the implementa-

Lham Pelzom House, Details of the west façade in June 2013

Lham Pelzom House, outside view from the west in March 2018

tion of these emergency conservation measures was devised before initiating the works.

1. In principle, members that are in their original position should not be removed, but conserved in situ.
2. The position in which members were found should be recorded through sketches and pictures (general and detailed) before they are moved.
3. Each member should be numbered before being removed. The orientation relative to the north and the side facing up should also be recorded on the member.
4. Broken members should be given an additional compound number.
5. Tallies or similar devices should be used to record the relative position of members that are found assembled together.
6. Damaged members should also be salvaged. No members should be disposed of or repurposed.
7. Cleaning of members should be limited to sweeping their surface. Members should not be cleaned with water.
8. Nails and other elements attached to the members should not be removed.
9. The place of storage should be higher than the surrounding ground, protected from rainfall, and with appropriate water drainage and ventilation.
10. Salvaged members should not be put directly on top of each other when storing them; small timber pieces should be set between them to separate them.

Inside view from the west showing the collapsed central section of the partition rammed earth wall

Implementation of the emergency conservation measures

Emergency conservation measures were implemented between July 2018 and January 2019 by the Tokyo National Research Institute for Cultural Properties and the Division for Conservation of Heritages Sites, Department of Culture, MoHCA. The owners were fully involved during the process and offered active cooperation.

A temporary shelter for the storage of the collapsed wooden members was built on flat ground in front of the building (photo, next page above). After taking photographs to document the as-found condition, each member was given a temporary number. The temporary number, the orientation of the member relative to the north and the side facing up were marked on its surface with chalk (next page middle) before removing it from the building (next page below). Then, the definitive identification number of the member was determined and written with permanent marker on a small veneer board attached to the member with short nails. Members were then measured and examined. When possible, their original location was identified on the basis of their shape, measurements, and as-found position. All salvaged members were inscribed in a list recording their identification number, measurements, type of member (beam, joist, floorboard, etc.), features (mortice holes, grooves, etc.), state of conserva-

Inside view from the north showing as-found condition of collapsed wooden members

tion, and original location if identified. Members were sorted by type and original location and stored inside the shelter. As far as possible, members were stored in the shelter with the same orientation they had in the building. Small timbers were used to separate the stored members and ensure sufficient ventilation (photo, next page top).

In January 2019, the earth from the collapsed partition wall and the attic floor was removed to salvage the wooden members buried below (next page middle above). Several floorboards and joists were recovered (next page middle below). After documenting their as-found position, they were recorded, sorted and stored following the same methodology.

The salvaging, sorting and storage of all collapsed wooden members inside the building were completed on 18 January 2019 (next page bottom).

Conclusion

Although the condition of the collapsed wooden members inside Lham Pelzom House was rapidly deteriorating when the building was inspected in March 2018, the implementation of an emergency conservation project allowed to salvage most of them and prevent their further deterioration. Several members had broken parts and showed signs of decay; however, most of them were in an overall fair condition and could be reused if appropriately repaired. In addition, after analysing the shape, measurements and as-found position of the members, it was possible to ascertain the original location of many of them, including most of the beams and some of the joists and floorboards. The members from the wooden partition wall and built-in cupboard of the second floor were also identified (drawings, next page). Moreover, the original location of some yet unidentified members could be determined if further analysis is carried out in the future.

As a result of these emergency conservation measures, it would be possible to reuse a large proportion of the original wooden members in their original location if it is decided to repair the collapsed parts of the building in the future.

The methodology devised for the salvaging, sorting and storing of wooden members at Lham Pelzom House could also serve as a model if similar interventions need to be carried out in other heritage buildings in the future.

On the other hand, the shelter where the wooden members are currently stored is only a temporary struc-ture, and it is not intended for their conservation in the long term. Therefore, it is necessary to devise a com-prehensive strategy for the salvaged wooden mem-bers, the standing building and the site that ensures their conservation in a permanent and sustainable way.

Temporary shelter for the storage of salvaged wooden members built in front of the house

Temporary marking collapsed wooden members with chalk

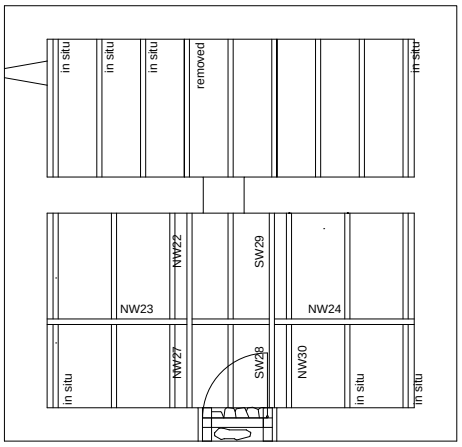
Removing collapsed wooden members from the building

Salvaged members stored inside the temporary shelter

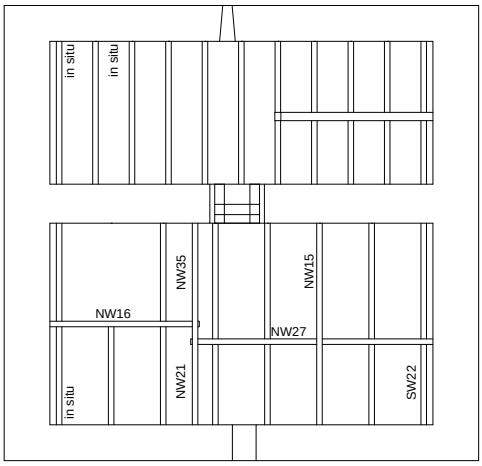
Removing the earth to salvage buried members in the east side of the building

Buried wooden members found in the east side of the building

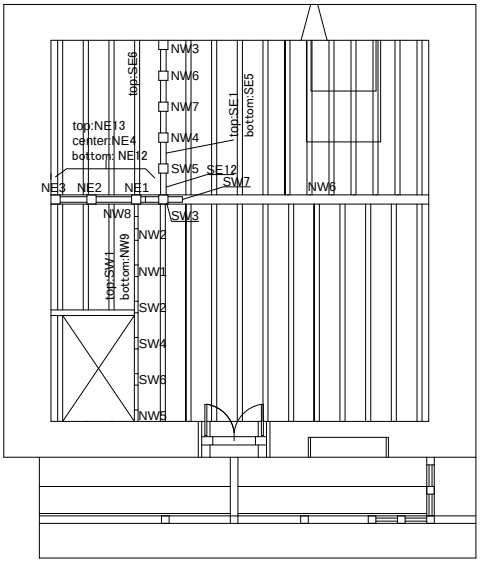
Lham Pelzom House in January 2019 after salvaging, sorting and storing all collapsed wooden members in the temporary shelter



Lham Pelzom House, ground floor plan showing ceiling structure (numbered members were identified during the salvaging process)



Lham Pelzom House, first floor plan showing ceiling structure (numbered members were identified during the salvaging process)



Lham Pelzom House, second floor plan showing ceiling structure (numbered members were identified during the salvaging process)

4-4 Challenges and Measures for the Restoration of Lham Pelzom

Surveys to date have identified Lham Pelzom House as the oldest residential building in Bhutan, based on the main structure's thick rammed earth walls and the small number of openings. It is believed to have been built at the end of the 17th century. Based on such architectural characteristics, this study considers the challenges in preserving the building as a cultural heritage site.

Rammed earth structure

The rammed earth walls are believed to have been constructed approximately 300 years ago; they are approximately 1m thick at the foundation, and 0.7m thick at the top. Viewed from the outside, the outer walls slant inward. There is very little slant from the inner walls towards the outer walls. There appear to be wooden crosspieces built into the wall to connect the corners. The front and back walls constitute the full span of the width, with the side walls inserted between the front and back walls. Most of the openings are concentrated on the front face of the building, with an entrance on the ground floor, a small window on the first floor, and an entrance leading to and from the open balcony that projects out from the second floor. The building has very few openings overall, which likely contributes both to maintaining the strength of the rammed earth walls, and to protecting against intruders. There is a wooden shelf embedded to a depth of approximately 30cm into the wall facing the second-floor open balcony. The foundation for the walls is approximately 1.0m high and constructed of river rocks, protecting against humidity from rainwater or other moisture from the ground surface or underground. The part inside the foundation has been deeply dug out; this area was used for raising livestock. The ground and first floors have rammed earth wall partitions located approximately one third into the depth, with an entrance in the centre of each floor. These inner walls also function as a buttress for the rammed earth walls on either side, contributing to the strength of the surrounding rectangular wall.

Condition of the rammed earth walls (front corner section)

The method of construction can be inferred from the seams that remain on the outside of the rammed earth walls. There are horizontal seams at ascending intervals of approximately 60cm; the ground floor consists of one layer of stone masonry and three layers of rammed earth for a total of four layers. The first floor consists of three levels of rammed earth, and the second floor consists of seven layers. The horizontal seams range in width from approximately 2-4m. The width appears to have been determined according to the length of the sheathing boards that were used. Small holes remain at regular intervals on the horizontal seams, indicating that crosspieces once passed through to secure the sheathing boards. It is thought that the rammed earth was formed by repeatedly tamping down mountain soil mixed with fine gravel and rock salt water on these sheathing boards.

Wooden structure

The interior of the building consists of three storeys. Floor joists for the first and second floor (8 joists, 12cm high, 10cm wide) are placed at intervals of approximately 2.5m moving up from the bottom edge of the stonework of the rammed earth wall on the ground floor, at intervals of approximately 1m in the depth direction. Holes from a girder (50cm high, 30cm wide) in the depth direction remain in the second-floor ceiling; it appears that there was once a beam running parallel to the ridge, laid over with rooftop joists to bear the weight of the roof. There are six beams for the protruding balcony on the front side of the second

House

floor, covered with broad wooden floorboards. The protruding beams are supported by four protruding beams inserted 1.2m into the bottom, and by protruding beams placed over struts. There are small holes above the balcony entrance, these are believed to be the rafter holes for the eaves.

The front entrance on the ground floor has a plank door made of four thick vertical planks hammered into place with three horizontal crosspieces. The thick plank alongside the wall forms an axle; the door opens and closes by inserting it into the planks for the front step piece and the base. The door is locked by inserting the inside latch into the rammed earth wall.

The joists, beams, and girders are inserted into the rammed earth wall. The floorboards appear to have a beaten-earth finish; twigs are laid over joists, and soil is spread and packed over the surface. The surface of the floorboards and plank door of the entrance have been worked with an axe. The floorboards for the open balcony are simply laid over the girders. The method of relying on adhesion for the rammed earth wall and earthen floors seems to indicate a traditional construction method for wooden structures. However, using earthen walls and floors to secure the wooden parts may lead to certain problems, such as degradation over time from factors such as humidity, or coming apart from movement due to earthquakes.

Shingle roof

Joists are lined up to support the second-floor rooftop and received by beams placed widthways. Twigs are laid over the rooftop joists and covered with a beaten-earth finish. There is a gabled roof, and struts are placed on half-split boards spread on the rooftop floor and overlaid with horizontal roof beams. There is also a seamless, one-piece horizontal beam laid over the rising part of the rammed earth wall; it juts out approximately 1.8m from the building wall.

The horizontal beams are approximately 3.6m longer than the depth of the building and tied at the ends with outriggers. Posts stand near the inside border of the rammed earth walls; the tops have been processed into a concave shape and overlaid with purlins. The bottom of the main posts has been processed into a concave shape and laid over the centre of the horizontal beams; the tops have also been processed into a concave shape and overlaid with the ridge. Under the horizontal beams, there is a spot reinforced with supports inserted into the rooftop boards. The roofing material is comprised of long split planks and weighted with stones using the traditional method of securing them in place.

Proposal for method of restoration as a cultural heritage site

There are cracks at the adjoining parts of the rammed earth walls and in the middle of the outer wall. The cracks at the adjoining points between the front and back walls and the side walls are thought to be due to 1) the infiltration of rainwater from the top due to faults in the roof, 2) the vibration due to earthquakes causing the adjoined parts to come apart, and 3) the result of deterioration of the walls over time.

The basic method of repairing the cracks will be to fill them with the same wall mud material. The mud from the area around the cracks will be scraped off to a depth of 3-5cm. Course linen used for plastering work in Japan will be pasted onto the cracks and recoated with 2-3 layers of wall mud. Japanese plasterers will be able to take part in the project and participate in technical exchange with wall craftsmen from Bhutan.

In areas where additional strength is needed, iron plates will be concealed inside and secured in place with bolts. Coarse linen will be pasted to the wall mud and covered with additional layers of wall mud. Sheathing boards will be used for the portions of the rammed earth wall that have been lost, thus reproducing the traditional construction method. In temple construction

An example of a shingle roof combining traditional and modern construction methods (renovated traditional house near Paro Airport)

in Lhasa, Tibet, young people walked together on the group to pound down the material using small diameter tamping rods, sprinkling water with dissolved rock salt and packing it down tightly.

To reinforce the wooden floors, it may be necessary to increase the loading capacity, depending on how it will be used. Thus, deterioration can be expected to occur in the floor joists where they connect with the rammed earth wall in some cases. Therefore, it is thought that building the frame for the steel structure inside the walls and laying the wooden flooring over this would be the most appropriate method to withstand the weight of any load. If no significant increase in load is expected, it would also be possible to combine traditional construction methods with new materials. For example, by processing iron plates into a concave shape and inserting them into the joist and beam holes in the rammed earth walls. As for the fittings, the current plank door will be retained, and the damaged areas will be repaired. As for the method of repairing the wooden fittings, Bhutanese craftsmen could participate in technical exchange with Japanese joiners.

For the roof materials, the traditional construction method of a stone-weighted shingle roof would be preferable. With durability in mind, we suggest using moisture-durable wood (cypress, lauan) for the roof materials. These will be fixed to the purlins with nails and lined with stones for design. These will last longer than lightweight iron plates. For the production of the long shingle boards, Bhutanese craftsmen could participate in technical exchange with Japanese roofers.

Opening the reconstruction site to the public

To make the structure of traditional houses as cultural heritage widely known to society, the reconstruction site should be opened to the public, including the reconstruction of rammed earth walls using traditional construction methods, board splitting for the roof materials, and repair of the plank door by a joiner. For example, tourists could be invited to take part in operations such as tamping down the rammed earth wall. It is also hoped that through the repair work operations, technical exchange will be advanced at a concrete level between Japanese and Bhutanese craftsmen involved in the repair of cultural heritage sites. Information about these types of activities would ideally also be made widely available to the public.

Increased use of disaster prevention equipment

At Lham Pelzom House, the walls on the first floor and above are stained with soot, so it is conceivable that there was once a wood-burning stove on the first floor, and that cooking was also done on the second floor. The first-floor interior of Tandin Zam House (3-3-2), which similarly retains the form of an old traditional house, also has an earthen floor, as well as a small stove that is still in use today. Since cooking is still commonly conducted indoors in traditional houses in Bhutan, it is important to preserve these buildings not only through repair and mending, but also by taking conscious fire prevention measures.

Effective measures that could be taken immediately include 1) the installation of simple battery-powered fire alarms, and 2) the provision of simple fire extinguishers.

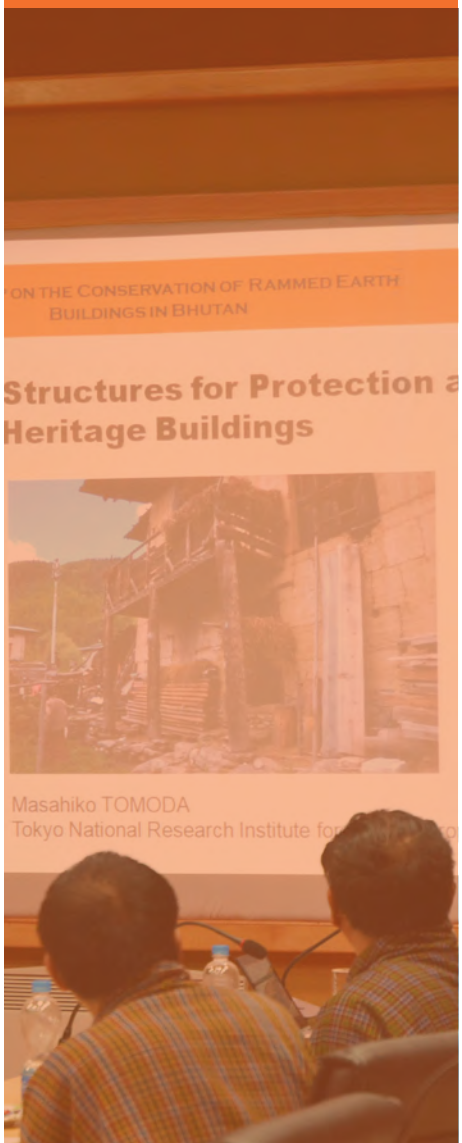
In traditional houses, there is commonly an entrance on the first floor or above, with an open balcony at the front with steeply sloping stairs. These stairs could be dangerous in emergency situations such as fighting a fire or evacuating; thus, from the perspective of disaster preparedness, external stairs could be installed in an inconspicuous place for this purpose. If traditional houses are opened to the public as cultural heritage sites, these types of stairs could also be used by tourists unfamiliar with the place.

Fire prevention equipment of traditional houses in Shirakawa-mura

CHAPTER

5

PROCEEDINGS



5-1 Outline of the Workshop

Date the 13th March 2018
Venue DoC Conference Room (Post Box No.233, Thimphu, Bhutan)
Participants Government staff, Municipal staff, Traditional house owners and residents, etc.

Schedule

9:00~9:30	Arrivals of Guest and Participants
9:30~9:40	Opening Address
9:40~10:10	Background of the Cooperation Project Since the 2009 Earthquake **Nagtsho Dorji**
10:10~10:50	Outline and Methodology of the Survey on Rammed Earth Architecture **Unno Satoshi**
10:50~11:30	Construction History and Transformations of Rammed Earth Buildings **Ezura Tsuguto**
11:30~11:40	Tea Break
11:40~12:20	Proposed Structures for Conservation as Heritage Buildings **Tomoda Masahiko**
12:20~13:00	Survey and Conservation of Residential Architecture in Japan **Kamei Nobuo**
13:00~14:00	Lunch Break
14:00~14:40	The Current Legal and Administrative Framework for the Protection of Built Heritage in Bhutan **Pema Wangchuk**
14:40~15:20	Recent Developments and Tendencies in the Designation and Conservation of Heritage Buildings in Bhutan **Yeshi Sumdrup**
15:20~15:30	Tea Break
15:30~17:00	Discussion

The contents of presentations by Unno, Ezura, Tomoda, Pema and Yeshi are updated and summarised in Chapter2 and Chapter 4.

5-2 Background of the Cooperation Project Since the 2009 Earthquake:Nagtsho Dorji

We are all aware of the earthquake that we experienced in the year 2009. What we realised from that experience is many of the rammed earth structures which were really the traditional structures in western part of Bhutan were highly affected by the earthquake. There was a lot of doubt that was kind of seeping into our people saying that traditional buildings were not performing so well as compared to the reinforced concrete buildings. After the 21st September earthquake there was a lot of initiatives to see how we could assess the damage by the earthquake and also overcome the problems of reconstructing these structures particularly because they pertained to structures related to heritage sites. As part of the collaboration that we already have with the UNSECO office, the New Delhi UNESCO office had dispatched preliminary investigation team to go down to assess the role of government of Bhutan in assessing the situation as well as to understand how to overcome the reconstruction issue that arise from the earthquake.

At the same time, our focal group had also explored the possibility of how we could seek support from the Government of Japan. In continuation to that dialogue, the Japan Consortium for International Cooperation in Cultural Heritage (JCICC) sent a mission of specialists to investigate possible area of providing support to Bhutan in the field of cultural heritage. While this dialogue was going on, again we experienced the earthquake of 2011, 18th September, again similar problems. While in the first case, the damage was more concentrated to the eastern part of Bhutan, the second earthquake again damaged several of the traditional buildings in the western part of Bhutan. During this dialogue with the JCICC, what we had expressed particularly the Royal Government of Bhutan was and there were several initiatives to understand how we could overcome the recovery and reconstruction. The concerns were also on how to set a standard way of reconstructing. And while, this was a very good initiative but this did not go in the field of particularly the DoC because our responsibility was largely to see that we continue the sustenance of our traditional techniques and materials.

We also have a dialogue saying that while we respect and we value our traditional techniques and the architectural style we have, we did not have enough expertise to understand how we could make it more resilient to earthquake for the fact that we are sitting over a highly vulnerable earthquake prone area. When certain concern was expressed to the team that had come from Japan, we also understood that we severely lack in understanding how we could assess our traditional buildings. Because that was a mammoth task for the team working under the department to understand how

Venue of the workshop

Poster presentations at the entrance lobby of the conference room

do you assess traditional buildings in numerical formula as in case of the buildings that are done in reinforced concrete.

In 2011, the technical support experts from Japan came about to see how they could assess in developing future and mid-term plan on how to diagnose traditional structures of Bhutan largely to understand how we could assess this building and identify relevant techniques to incorporate such as earthquake resilient features to renovate the heritage buildings as well as to construct them with appropriate measures if anyone was interested in reconstructing the building in traditional techniques and materials. Following that collaboration in 2011, we also had the experts research group headed by Professor Ezura who had come here and conducted several interviews as well as conducted workshops and meetings to sensitise several stakeholders to understand if their understanding of the concern that DoC put forward was similar in the other agencies as well.

The agency that we extensively consulted was the Ministry of Works and Human Settlements, Bhutan Standards Bureau because they were then taking the lead on preparing guidelines, the Department of Disaster Management who also we have the representation here today and School of Planning Division under the Ministry of Education. Following such an elaborate discussion and collaboration, we finally entered into collaboration with TOBUNKEN in the year 2012. The main intention was firstly to carry out a joint survey and study of Bhutanese traditional building within the framework of the Networking Core Centre Project for Conservation of Traditional Buildings in the Kingdom of Bhutan. A large pool of Japanese experts came in and helped on a different timing depending on the need of the project. The counterpart agency was the DoC. The DoC appointed the DCHS as the responsible agency for implementing the project from Bhutan side. As you are all aware DCHS is a central agency that's actually responsible for protection of heritage sites and sustainability of cultural landscape in Bhutan.

As I mentioned, the title was the Networking Core Centre Project for the Conservation of Traditional Buildings in the Kingdom of Bhutan which ran from a period of 2012 to 2014. The main aim of the project was to study the structural characteristics of Bhutanese traditional buildings. This was the absolute essence of the project because that was exactly after the earthquake we did not know how we to look at our buildings particularly when we talked about renovation and reconstruction. The project also aimed to identify possible techniques and methods to improve the performance of the buildings in a feasible appropriate manner to preserve its her-

Whole view of the conference room

Presentation by Nagtsho Dorji

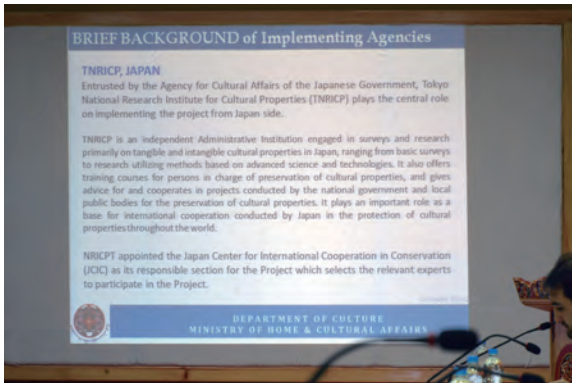
itage values.

The activities carried out from 2012 to 2014 were divided into largely three. One was the architectural study which dealt largely with the technology of traditional buildings. Chronological and regional features, construction methods and practice of traditional buildings, view of Bhutanese public to conservation of traditional buildings. This was a very interesting part of the entire study because it was very important for us to understand what our Bhutanese think about the traditional buildings. We got a lot of mixed feedback on the views of how they wanted to see traditional buildings. Especially after the earthquake, we have to say the comments were not really positive. To a large extent, given the opportunity everyone wanted to reconstruct back in something very modern. Of course, it would have sufficed to their immediate requirements but in the long run would have largely impacted the cultural landscape of Bhutan and our goal of preservation of cultural heritage.

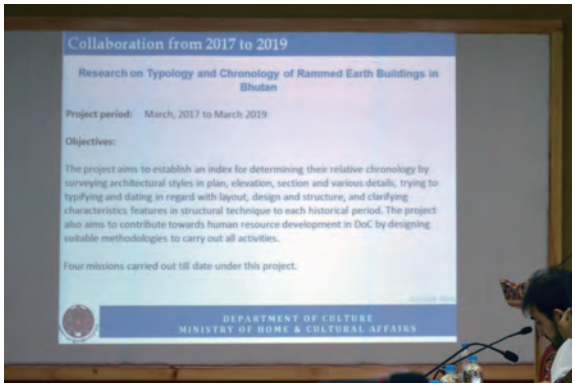
The other component that we were looking was the structural study. That was very interesting for us. It was very important for us to understand what aspect of our traditional buildings, what values they hold and what kind of techniques they have. We have to analyse the characteristics of the traditional construction materials and this is an ongoing effort since the year 2012. We have to understand the performance of a structure through the measurement and analysis of micro tremor to determine the evaluation characteristics of traditional buildings and its surrounding buildings. Of course, we were trying to understand how to incorporate seismic resiliency measures. So, this was again another crucial aspect and the static experiment on structural strength of a lot of the traditional buildings.

In addition to these two extensive studies, it was also important that we have workshops to share and examine the results with our various stakeholders. This workshop is one of such platform where we want to be able to share where we have reached with the outcome of whatever studies we have done.

In the 3-year span, we had carried out joint surveys by the experts from Japan as well as the in-house team from Bhutan. The survey area was largely concentrated because we were specifically looking into at this point of time, rammed earth structure. It is also about the composite form of the buildings where we also have the wood elements in it, how the timber elements came together. That was another crucial aspect of this study. Since the focus was on rammed earth, we realised most of the rammed earth is concentrated in the western part of the region. The extensive survey was done for build-



Nagtsho's presentation slide
"BRIEF BACKGROUND of Implementing Agencies"



Nagtsho's presentation slide
"Collaboration from 2017 to 2019"

ings in Punakha, Thimphu, Paro, and Haa. I think in that period of time over 60 buildings were surveyed. They consisted of farmhouses, temples, *dzongs*, and ruins as well.

Another outcome was also to study the building patterns and also the evolution of building patterns because from the study we realised to a large extent we had these four kinds of building typology that kept repeating. To a large extent out of this survey, we were able to establish to a large extent the whole typologies that were predominantly present we were studying.

With regard to the structural study, it was absolutely necessary that we understand the material characteristic of the structure. Therefore, extensive comprehensive test of the rammed earth specimens was done. A large number of our tests were conducted in the Bhutan Standards Bureau. We also undertook extensive micro tremor measurements of the buildings. Another test is the static test to understand how the buildings performed. The extensive study was done on cool down test which is currently also being carried out. The professionals who are involved will understand both the project funded by the World Bank and the current starters project funded by Government of Japan. This kind of static test continues to be carried on within the DoC in collaboration with Department of Disaster Management, Department of Engineering Service, and Department of Geology and Mines. This was the first time that we had undertaken such a step with this. The results tell us a lot about the performance of the traditional buildings.

The best part of the entire 3-year programme was the preparation of a roadmap for our built structures in Bhutan. One of the main intentions of this roadmap was to understand that how we go about both in the context of the architectural study as well on the structural study of the rammed earth buildings. Clearly, if you look into the map, it charts out a long way of how we examine buildings, how we analyse them, and what is the end outcome at the end of the day. I hope that at the end we will develop a guideline that would help towards understanding how we reinforce our rammed earth buildings and how we strengthen them for the safety of the buildings. It will eventually help us towards protection and perseveration of rammed earth buildings in Bhutan.

Now, another important project which is adopted by the Government of Japan and for which the structures of the reaction frames are already being built at a nearby site next to this office which started from early this year. But, it can always be asked from our experts here who would certainly assist in elaborating the roadmap which continues to be the basis on how we continue to collaborate. A wonderful publication at the end of the collaboration. Title is "Study of the Conservation of Rammed Earth Buildings in the Kingdom of Bhutan," which elaborately explains all the surveys and everything that we have done.

We wanted to continue surveying our rammed earth structure because the stock of buildings is large in number. Therefore, we entered into a new collaboration titled "Research on Typology and Chronology of Rammed Earth Buildings in Bhutan." This is a project that is within a 2-year frame from March 2017 to March 2019. The project aimed on establishing an index for determining the relative chronology by serving architectural style in planned renovation sections and various details trying to typify and work towards dating the layout design structure and clarifying the characteristics with the structural techniques for each of the historical buildings.

The main activities continue to remain similar, but they are a lot more extensive and intensive. Now we are starting to move our focus a little away from the western part of area and also on buildings. We hope that with the feedbacks that we received today from the presentations that are made by the experts as well as our team from Bhutan. We hope to look up for more views and experts so that we understand how we again further align ourselves to build up more capacity as well as to understand our rammed earth structures better.

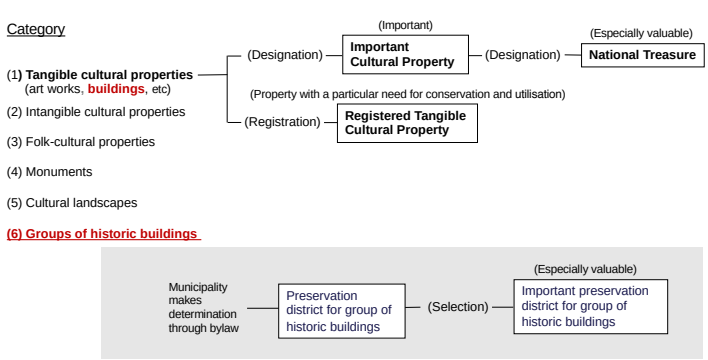
5-3 Survey and Conservation of Residential Architecture in Japan: Kamei Nobuo

First, I will explain about the outline of protection of buildings and structures as cultural properties in Japan. The conservation of cultural properties in Japan follows the "Law for the Protection of Cultural Properties" which was established in 1950 as its legal basis. This law is developed one but original one is the "Law for the Conservation of Ancient Shrines and Temples" which was established in 1897, only temples and shrine buildings are targeted. After that, the "Law for the Conservation of National Treasures" of 1929 which expands the protection target, castles, shoin and chashitsu room were added to them. After that, in the present Law of the Protection of Cultural Properties, traditional houses and modern architecture was also covered. And about 20 years ago, the industrial, transport, and civil engineering structures we said heritage of modernisation basic contributor to the modernisation and development of the Japanese society, were added as well.

This is the outline of the conservation system of cultural properties by the law. We have the six categories of cultural properties. First, tangible cultural properties which contains artworks and buildings; and intangible cultural properties; folk-cultural properties; monuments; and cultural landscapes; and groups of historic buildings. Today, I will explain about first tangible cultural properties. It is very important for Japanese culture and architectural history, and especially it fits special value in designate as it is national treasure at the second stage.

Also, properties which is particularly need for conservation and utilisation with registration because another system is registration – registered tangible cultural properties. In Japan, private house for daily life is generally called minka. The research on it have already started since the 1920s mainly in the fields of geography and folklore by means of field survey or hearing on its architectural styles region by region, also regarding the people's manner of living styles in the village. However, under the "Law for the Conservation of National Treasures," only two cases involving private houses received national designation. Those are Yoshimura family's residence in Osaka, and Ogawa family's residence in Kyoto which were considered to be closely related with the ruler's class.

Under the high growth of the Japanese economy from the late 1950s, many traditional cultural assets including historic traditional houses were rapidly lost with urban redevelopment, regional development, or movement to improve the quality of life in rural areas. In the field of architectural history, full-scale research on rural houses started around the 1960s. Buildings surveys were conducted on plan and structural style of old houses which remained in the rural areas or in the mountainous villages. Nasu family residence built in 1823 and Imanishi family residence built in 1650 are the



Conservation system of cultural properties by the law

Yoshimura family residence (built in 1798)

representative examples.

General method of survey for traditional houses. During the individual survey, we created the following drawings through field surveys. First, floor plan in the present state, cross section plan, structure plan, traces plan which means relative chronology of structural members and from the traces on it, deducing the modification process of the house, restored floor plan, and taking documentary pictures from the whole to the details. Investigation of construction date of the main building with the relative document or some character which was written on the members. And based on the restored plan of the houses in the same areas or regions, examining their chronological order and seeking the development process with chronological study and also a layout plan of several old houses in the same area. And finally, publication of the research report. This is very important to share the information of research result.

The survey method was established during the preceding study of historic private houses by reconstructive and chronological investigation, which was led with restoring the floor plan by attentive observation of traces on the surface of columns or beams, and sometimes judging its chronological order by comparison with the floor plan styles of the local traditional houses rest in the same region. A textbook on how to survey historic traditional houses was published in 1967 by the Cultural Property Protection Committee, now Agency for Cultural Affairs. In the textbook, we show the notation of typology on partitions and openings between pillars, and how to take the plan by section. Present floor plan and recording of age of columns and sometimes changes of columns of beams as a development of lifestyle, so we check it which is the oldest, which is middle, which is new. And also, there are many traces on the surface of beams or columns, so we check each facing. To know how was the oldest time and how to change it. So, after that, we make list of floor plan. We can compare original surveys and original plan. Mostly the framework is similar, but it is a little bit changed.

Urgent survey on private houses was launched in each prefecture throughout Japan, since 1966, as the project funded by the Agency for Cultural Affairs, along with remarkable development of urban and regional areas and architectural improvement. This urgent survey has been conducted around a decade, by approximately 5 prefectures a year, in all of 47 prefectures throughout Japan. The targets of the survey were firstly selected among the preliminary survey sheets at the prefecture level, drawn in collaboration with the municipal boards of education, by senior researchers including university professors specialised in the field of architectural history. Based on this first selection strictly done, the

Nasu family residence (built in 1823)

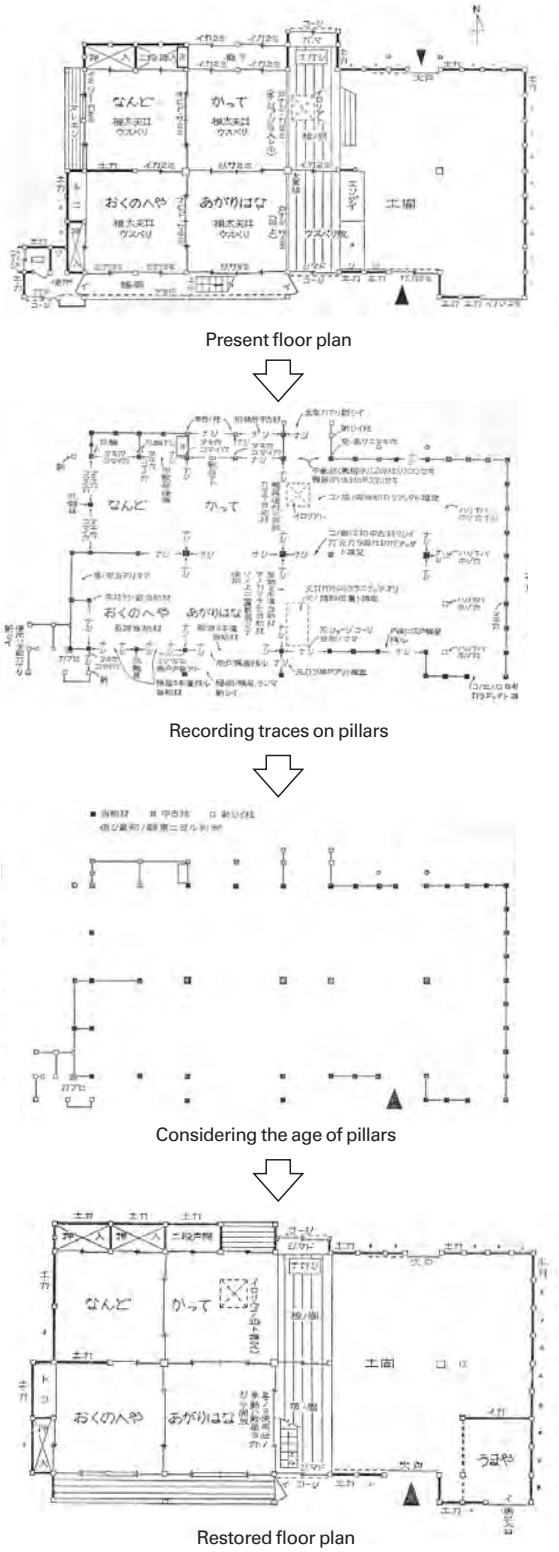
Textbook on how to survey historic traditional houses (published in 1967)

on-site primary research was conducted. Then, for those to be considered especially valuable, the detailed survey would be carried out as a second stage. The results would be compiled as a survey report.

The Agency for Cultural Affairs designated based on the list of valuable houses to be conserved, important houses for protection. In consequence, 350 main buildings of traditional houses were designated as important cultural properties, with approximately 800 buildings including subsidiary structures such as detached room, warehouse, gate in total. And after that, the urgent survey, designation of historic private houses is continued according its architectural value till present days. Here is an example of designated traditional houses of Furui family residence in Hyogo Prefecture built in 16th century.

Generally speaking, preservation of valuable buildings at the original place is desirable. But in cases where it is difficult, there are several cases transferring to preserve and utilise to suitable places as a second best measure. As grand collection and facilities for historic private houses, several museums were inaugurated in 1960 and 1970. We have many different types of facilities or museums, but in this case actually open-air museums in Kawasaki and Takayama as representatives.

The Kawasaki Municipal Japanese Traditional Houses Open-air Museum opened in 1967, exhibiting 25 precious buildings, including representative traditional houses in eastern Japan, in which 7 houses are designated as important cultural properties by the Law. Main objective is restoring the old houses in the Edo period from 17-19 centuries, in eastern Japan and transmitting them to posterity in good condition. A restoration survey of the traditional houses was carried out to clarify the process of the modification and remodelling corresponding to the change of daily life and are restored to the original form. Second, transmitting information of traditional lifestyle in previous age to domestic and overseas society. Curators of the museums survey and collect materials related to old house such as traditional life



Present floor plan

Recording traces on pillars

Considering the age of pillars

Restored floor plan

Example of reconstructive study (cf. textbook on how to survey historic traditional houses)

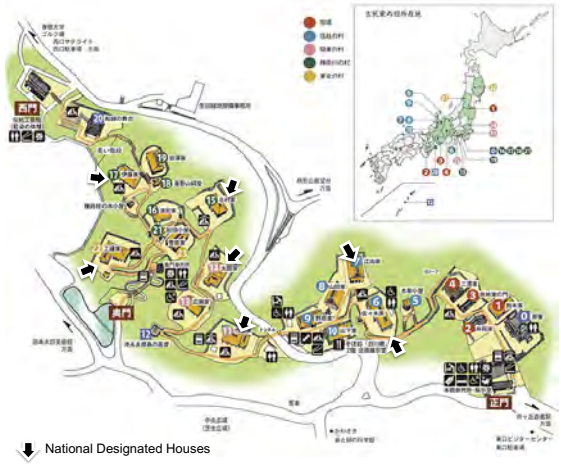
culture, and they perform various exhibitions, seasonal events, demonstration work throughout the year.

To conserve the buildings, we have some benefits for designated houses as national important cultural properties. The building has got more repair then government pay supporting, national government 50% plus additional expense and maximum of 35%. Furthermore, subsidy from the prefecture and municipality are added. So normally, private owner can take only several percent. In addition, owners of the designated houses are given the benefits of tax incentives, property tax exemption, inheritance tax exemption, and transfer to the public body. If they want to sell the properties to public property body, subtraction of 20 million yen.

The purpose of the survey on private houses is not only to know how the development process of buildings in the targeted region but also to seek the people's manner of living there. It is also required that we discover from here some useful clues to consider how the region should be toward its future, and how to succeed the tradition at the same time of modernisation of the daily life.

In the today's Japanese society, industrialisation advanced even in the section of house production, in consequence, a uniform appearance in urban spaces and the rural configurations is generally seen with the development of housing industry. On the other hand, the regional revitalisation based on the region-specific history and culture came to be demanded. Many cases are reported the preservation and utilisation of private houses contribute to succession of the regional history and culture. I believe this movement should be contributed to succeed the traditional culture and also create new and rich culture.

Furui family residence (built in the 18th century)



Map of the Open-air Museum in Kawasaki

- The houses designated as important cultural properties are eligible for subsidy from the national government at the time of repair, or other installation of equipment necessary for disaster prevention.

  Supporting rate from National government: 50% + additional expenses (per 5%up, 35% in maximum)
  Furthermore, a subsidy from the prefecture and municipality are added.

- In addition, owners of the designated houses are given the benefits of tax incentives, such as exemption of fixed property tax and inheritance tax.

Property tax	Exemption
Inheritance tax	Subtraction of 20 million yen (appr. 188,000 USD)
Transfer to the public body	

Benefits of designated houses as national important cultural properties

5-4 Discussion

Kamei: So, today we spent the whole day to different presentations from different person in terms of the department, including our preliminary report on the current state of our survey. I think it was a very important and significant meeting today. In our presentations, we showed the methodology of survey that we have been currently cooperating between our institution and the Bhutanese side. But I think that this kind of methodology of survey can be applied also in other parts and other regions and in this case by Bhutanese experts. Now I think that we have here the participation of many representatives of different departments, so I would like to ask them what is the impression of today's workshop and if they have opinions, and also how they apply to their area, to their department today's workshop's results.

Karma: You have any additional points to take on the presentation that has been done till just now. I think there was a series of presentations starting by Nagtsho and ended by Yeshi. There was various type of presentation on our landmarked character design of home. So you have any additional viewpoints or comments, or if you have your own perspective or any different views on the presentations, or methodology, or surveys on their presentations, it is right time to share. I would request Nagthso's group to break the ice and put forward the discussion.

Nagtsho: Thank you very much. What we would like to submit is also that I think the chronology aspect of what was presented and the interpretation is something that was very insightful, something that we had no clue about when we started out seven years back. But what we see now is really just a start, the interpretation aspect is really starting to make sense and I think it opened up our eye to now look into the buildings in a much more careful way to understand what it means for us as well.

So the team has been of course delighted with the entire execution and we are looking forward for more such interpretations coming about in the next one-year time. I would also like to submit to the floor that we were hoping that we could continue to extend our collaboration, and we had a small discussion yesterday whereby we submitted to the team from Japan that if we could extend further collaborations for looking into the concerns and the challenges of the Royal Government of Bhutan.

Of course, capacity building and survey will always be a priority, but in addition to that we also want to see if we could make an impact on the field. Because I think the next question is while our bill awaits to be enacted, incentive schemes are not totally in place, we need to do some kind of action on-site to show that our support towards protection and sustenance of particularly the rented houses and what would we do.

So we hope that our next collaboration will be something more tangible to be shown. This is something for everyone that we wanted to share. It's a work in progress. We will continue to update but in the entire process I think the Department of Culture, particularly the DCHS office has been tremendous for this entire collaboration.

I think here we would like to request everyone to seize the opportunity because the experts here have diverse knowledge. So, I am sure that if you do not have questions at this point of time, we could also hopefully work towards providing such inquiries. Because today we are represented here by private owners as well who in their own ways have put in their initiatives. I am sure this is the first time to you all to understand what is going on. So, I think you can continue opening the dialogue if everyone is speaking a little. The private house owners have anything to say about this.

Karma: Particularly on our final quarter, I think the question just for you to flashback on the presentation made by Yeshi Sumdrup where there was subsidy component, initiative component, incentive component, or if you

have any general comments. I think everyone will have a look at the series of presentations but nonetheless I think how much important to preserve our traditional houses and how much we need to do with the rapid modernisation and drastic development, there are so many things happening, and so many challenges too. I think it has come up very clear on the presentation. So, if you have any comments or opinions from the private side.

Participant: Good afternoon, everyone. Thank you for the wonderful presentation and inviting a few of us, the owners of the proposed heritage sites to attend the conference. We understand, me and my family, and for that matter everyone understands that to actually protect our cultural heritage is very important for national identity and cultural preservation. But since some of us house owners are not economically viable, or for that matter we are not able to financially sustain to restore the old houses. So for that matter, I would like to request the Department of Culture or for that matter any other concerned stakeholders if there is any other financial assistance for the restoration of the houses, which is number 1. And number 2, even if we by any means restore the cultural heritage, cultural monuments, how sustainable or viable is it for years to come or for decades to come when it is being transferred to our future generations. And third question is, is it really I feel to ask this question personally but I have to ask this. Is it compulsory to restore the proposed or the selected which is kind of privilege for me and for my family to restore the cultural monument, cultural site or cultural house? Is it really mandatory to actually restore the house? That is all, Thank you.

Nagtsho: If I may, some of them were the questions is directed to the Government of Bhutan. Thank you very much for your very pertinent questions. I think this is exactly the concerns and the challenges of the owners. I think the three questions that you raised are very valid as well as something that we need to work together as a team. On the first question of whether there can be any kind of financial incentives of the Royal Government of Bhutan to support the private initiatives, particularly on sustenance of traditional houses in Bhutan, the Ministry of Home and Cultural Affairs in collaboration I understand now Ministry of Works and Settlements also takes this much more strongly than ever before. We have been working on the concept of providing incentives since the last 3 years. Ministry of Works and Settlement managed to take over this in a much larger scheme and I think they have put some incentive schemes at this moment. And I think our colleague sitting next to you is from the same agency if you need further inquiry on that.

I think largely the incentive as far as I remember was largely to ensure that there was a lot of tax exemption in the process and also to encourage if you have a rural house in the urban area, even if you want to do farming in that area, exemption is going to be given and not enforce you as in the case of urban area whereby you do not benefit. So a waiver on this have been put in place.

The initial step of financial support is largely into softer component of how we can relieve the owners from building taxes as well as to seek subsidies on timber largely because many of the structures have a lot of timber issues particularly on having to replace. So that incentive is something that you can certainly avail even at this point of time. Other than that we want to institute in future, and I am not promising anything but this is the work in progress under the initiative of our Director General. We want to institute a fund which will look into providing support in the context of giving loans probably with no interest, a no interest loan to private owners so that they can work towards it. We also hope that as in case of Japan that the government also give some money but that will only come once we have a legal framework in this. So all we have to do is I think legislative framework that we have to forward comes in through. So once that come through, I think it makes it easy for the government to exercise flexibility in provid-

Kamei Nobuo of TOBUNKEN (left) and Karma Weezir of DoC (right)

ing financial assistance as well. But again, on the other hand, I would also like to submit that we had important traditional buildings that needed to be renovated. One particularly example being there was a very traditional house we had in Changjokha, that needed renovation, and I think the owner was not able to put in money because we totally understand. I think it's very cost expensive to be investing in a building like this. It' s rather I think to a large extent economically more viable if you construct something new as compared to renovating these old buildings.

But in such a case when the Government felt that there was a need to support, the government did not have any legislative framework to do it. What the government then did was write to TCB, Tourism Council of Bhutan, and provide some parts of the money because they keep some share of them money and I don't know but in that case, we had to go through it. So therefore if the government and the owners come together and they believe that this is important, it needs to be protected, financial incentives will continue.

In the case of Changjokha, much of the priority was given because of the fact that this building was associated with and it is very important historically. So that was how it was done. But other than that the timber subsidy is something we can always provide even at this point of time. So that's something I believe will also be considerable economic benefits to the owner. So that I think that at this moment is the only answer that we have to offer at this point of time.

Your second question was whether it is viable to continue sustaining? I think it is. We may be wise for the fact that the experts and we are in the field of cultural heritage. But for a small county like Bhutan, if you see where we are heading towards, I think we have always stood strong on our unique cultural identity and this culture is tangibly important with our traditional houses as well as *dzongs* and temples. *dzongs* are public institutions which are meant for everyone. But houses, traditional houses, I think the value of it, what it resembles, we fail to see it at this point in time when the development of the country is happening so rapidly that everyone is aimed for modern living, modern kind of materials. We are being introduced to, many kinds of new materials which we still are overwhelmed and we want to use them.

But if you look back in countries like Japan, I think they have gone through all the stages and they realise how important it is to preserve their traditional cultural heritage at this point. And looking at I think we often see in the field of cultural heritage, we always can stand apart, because we are a country which is in the process of developing and we always have lessons to learn from other countries. Therefore, we can always be a step ahead. So, for Bhutan, if we do not protect our cultural landscape, down the line we are not going to be any different from our neighbouring countries. And you already know what the impact of that to our neighbouring countries is. So we have clear examples of what we should not do and what we should do.

When we ask the owners to preserve and sustain their traditional houses, it does not mean that we are restricting you from using it for any other different options. Social elements and the essence, the value that we talked about, as long as they retained we hope that you find new uses. Over the years, one realisation is that people who would like to live in these houses more than the reinforced concrete buildings, because they are very much healthy to your body comparatively also. But at the moment the only way we can propagate the strength to instill the owners that you can rehabilitate and use it for something of economic benefit. So, therefore also the only thing we could convince him that he could retain his building was trying to explain to him that if he could rehabilitate into something that could make some economical gains for him, it was not meant for him to stay in

that housing. So on that condition I think as long as we can find a solution at this point, but without losing the value of the building, we believe that it will be viable and then there is a lot more appreciation for this building and the value of this building will be a lot more in a couple of years down the line.

So, therefore we think it's viable. But again I would like to put it on record, because we are sitting on the other side of the coin. What we can see from the lessons learned from other countries and where we are heading towards, I think that's unique and this will also add a lot of value economically.

And third, whether it is absolutely necessary whether you should preserve it or not. I think we won't dictate from the government side but as our job I think we feel we are failing make awareness. Our job is to do raising awareness. So at this point of time nobody is going to enforce these strict rules for at least the traditional houses at this point of time. When it comes to public institutions like *dzongs*, we are mandated to preserve it and it is under our authority because this is state-owned building. Whereas for private owners, I think it will not be fair if we do not instill awareness of the importance of preservation of traditional houses first, and this programme is exactly about that. We feel that if we inform our owners, then they can take the informed decision but if we do not, the decision they will take will not be informed and therefore, sometimes decisions taken in a hurry at this point of time, may not bear the desirable outcome down the line and owners might regret the decisions. So, we don't want that situation to arise. That's exactly what this forum is about, raising awareness. However, the final decision will be of private house owner and there is no dictation from the government. Tomoda-san, would you like to add more to this?

Tomoda: I think the economic part of the question is a very important problem, especially for the owner. If we limit our discussion to disassembling in Kabesa, I think here there are several conditions. Firstly, it is located very close to Thimphu, and also it is not in used as residents anymore. So, in this case it is possible to seek several options of adaptive reuse, for example, related to tourism or activities or social education or social activities.

On the one hand, this kind of adaptive reuse, I think it is very interesting opportunity for these kinds of assets to be conserved as cultural heritage and at the same time be used as a tool for economic development and asset for social and economic or touristic use. But, at the same time, it is very important to be very careful when you are doing this kind of adaptive reuse. And actually in Japan currently there is proposal going on to renew the Law for the Protection of Cultural Heritage, putting more stress on the adaptive reuse part of cultural heritage for conservation. So, in the Japanese case, the background of this reform is probably that the Government is expecting to use these cultural assets as a tool for touristic development. That is not necessary, but for us, as experts on cultural conservation, it is also a little bit worrying question because our first job is always to try to preserve the cultural value and the cultural significance as a whole. Before in the presentation by Yeshi, he explained that about value-based conservation. I think that is a one of the key points. Before taking any kind of intervention, it is important to first make clear what is the cultural value or the cultural significance of the building. And depending on that, some kinds of repair intervention will be possible and some others would be not.

In the Japanese case, Japan has very long experience with the repairs of especially timber structures. But it would not be realistic to try to import that level of conservation of wooden structures here in Bhutan all of a sudden. But at the very least the minimal condition is always that the cultural significance should not be disturbed or damaged doing the intervention. I think for the future, one of the areas in which we can have cooperation is thinking together what kinds of repairs of interventions are possible in the case of Bhutan's cultural heritage buildings.

I am also whether this is a kind of very good question. But of course familiar resources are one of the necessary conditions in order to make an intervention, for example… or conservation intervention. Sometimes it could be possible to bring in foreign funds to preserve some buildings. But in order to do that, the first stage is trying to objectively explain why a certain building has a cultural significance. It is necessary to support the cultural significance with the legal framework.

Kamei: I think that first step of the first condition for the conservation is the designation as cultural heritage. Also in the Japanese case, the first stage is always designation either at the municipal, or provincial, or national level. But there must be an official recognition of the cultural heritage from the legal basis. Once a designation as cultural heritage is made, then it is possible to explain that cultural heritage is part of our common heritage of the society. So, it is also possible to use government funds to support or subsidise the intervention.

In my presentation, I showed you some examples of open-air museums where buildings from different parts of Japan, were collected and put together for conservation. Those were buildings that were not used anymore as residences and could not be kept in their original place. So, that kind of open-air museum initiative was started in several places in Japan to try to conserve those kinds of buildings. Of course, the buildings that are conserved in that way in Japan are mostly wooden buildings that can be dismantled and moved and reassembled relatively easily. That would be much more difficult to do with rammed earth buildings in Bhutan. But maybe it's not completely impossible, and I believe that there are maybe some previous examples of buildings that have been moved also here in Bhutan.

But in any case, at this stage I am going back to the example of the house in Kabesa for example. The rammed earth wall part probably can stand or be maintained for a while even in the current situation. But the wooden members that make the roof and the floor are probably going to decay very rapidly if there is not some urgent conservation measure taken. So probably in that case the most urgent measure would be taken some kind of emergency conservation measure or protection of covering for the wooden members.

Also speaking about the Japanese examples, one scene that has also been possible in Japan is in building that were afterwards reused for a different adaptive use. The owner sometimes can rent for the certain period of time, maybe five or ten years the building to, in this case a company, that would make different use of that building but with the condition that the building has to be maintained and repaired as a cultural asset. So, that was one initiative that was successful in Japan, and maybe could also be one option in some cases like in the case in Kabesa which is close to Thimphu and also there is possibility of making an adaptive reuse with such kind of social education or social use.

Participant: Good evening. I am the owner of the one-of the old house in Babesa, Thimphu, which is under renovation or rehabilitation. And I am very happy to know that during the course of the presentation under the guidance of the Department of Culture, there are so many incentives like tax exemption, subsidies, etc, but unfortunately these are all in the favor of the model set by these. So, my suggestion here is particularly to the Department of Culture that there are so many countries whereby the rate of interest varies based on the kind of activities like, for example, promotion, construction and other different percentage.

And my suggestion here is that in case the Department of Culture, or for that matter the Ministry of Home and Cultural Affairs, can make a provision with the concerned authority in order to encourage the people to rehabilitate or renovate old buildings to have like sufficient money. And the rate of the interest, when we get the loan to renovate a whole house if you can talk with the concerned authority that we can have the affordable interest rate, some sort of provision.

Karma: Probably, I think I will try to clarify what I know. At this point of time, bill is yet to be enacted; we are not able to help much. In the meantime, your case is a first of a kind project that DoC has undertaken. Regarding your queries, we need to deliberate more on this and see how best we can try to support you. But once this becomes clear, the process and procedure come in place; the private-government partnership will be smooth.

Once this is okay, it will become easy and straightforward and you won't face the problem as you are facing now. In such cases, probably we need to sit down, discuss together, and probably I think issue here it is particularly on the loan and every financial institute will try to charge high interest. However, we need to have Dialogues with financial institute and bring changes to the policies, which I foresee happening in future.

This is first one or two cases where we are trying to influence or encourage private owners to maintain upkeep or rehabilitate the old traditional houses which are the cultural identity for small country like Bhutan. So, the Department of Culture is trying to work in help and support and cooperation from the other agencies. So, this case probably we will have to come in, and to collaborate and discuss with them. So, from that I think as head of the Department, I would like to make clear that these are our cultural identities; these are our identities that showcases Bhutan's unique cultural setup. I think we are here today as a perspective of this workshop, we would like to take home that such cultural aspects or such cultural characteristics are very important for our country like Bhutan, which is like a soft power. So, I would like to request all persons present here, please be mindful of importance and the critical importance for the culture in Bhutan. So, I would like to request the owner that you must promote or encourage to safeguard of such traditional houses. We have to also keep our country strong and unique in the world.

So, jointly I think, we can make difference. Now we would like to request the support of each and every one involved starting from the younger generation to senior citizen, at least to promote and try to encourage and campaign and advocate the importance of such cultural heritage sites, or such cultural properties in this modernised world. Everyone present here must come in and try to promote this idea, try to create awareness on the importance of preserving and try to restore or try to educate general public on the importance of such soft power. I think we will have a broader discussion on the solutions.

I think while we have experts here and we should have a meeting to have clarification. It may be relevant, or it may not be. We are here to learn and we have to take the opportunity in the presence of global experts who are coming from very advanced country, Japan. Japan has gone all through this. From their experience we are trying to learn and try to be a model in the world, particularly in such cases. I take this opportunity, get expert views, and get their professional viewpoints.

Ezura: I have been coming to Bhutan now for a very long time. I am very happy to see that finally there is a draft bill that is prepared. So at this stage I think the most important point from my experience, the key point now is going to be the training of specialist. Because as Mr. Tomoda explained before, the first stage is to make any intervention, or any kind of conservation is always identifying and assessing the cultural significance of the asset. But that is not going to be written in the law or written in any manual. We need specialists that are specially trained for that purpose. So every building, every cultural historic building has its own different history and some different cultural significance. So, it is not possible to make standard manual that will explain how to be intervene in old buildings. So for that purpose we need specialists, and capacity building of those kinds of specialists and training these specialists is the most important thing, I believe, at this stage. And at the very beginning at the starting point, it is possible to make a comparison where maybe Japan can cooper-

ate also in that aspect of capacity building and training. But there will come for sure a time that task has to be taken, undertaken by the Bhutanese experts on their own. So, I think it is important to keep that in mind very strongly all the time, and towards the next step always remembering that. Actually, looking at the sample of the Japanese Law for the Protection of Cultural Properties, there is one part of the law which is dedicated to the protection of selected conservation techniques, which are techniques required for the conservation of cultural heritage. So, that is also a very important aspect and we have to very aware of that.

Unno: Professor Ezura also already mentioned about this, but I have been working mostly on surveys in Japan, and it is very important always in order to plan the use of the building afterward, to identify where the cultural significance lies. In Japan in the case of designated cultural properties is more or less relatively easy to keep the cultural significance because it already makes clear. But in Japan we are also at the time now that renovation of older buildings is very popular. It is important to find a way of renovating the building while at the same time keeping its cultural significance intact. Yeshi mentioned in his presentation, the cultural significance has many aspects. There is an intangible part for some moderation of the building with a particular historical character or historical event. There is another aspect which is tangible part which is also important, and that can be made clear through the scientific surveys. I think we are now at the very first step of creating a legal framework for the protection of cultural heritage in Bhutan. But I think it's also a stage towards we will go back in the future, because we have always the feedback between this protection of cultural heritage and identifying the value through surveys. And I hope that this will be extended and developed into our cultural heritage framework which will be appropriate for the Bhutan's identity and particularly situation of this country. Thank you very much.

Kamei: As Director General Karma already has made before. I think this has been a very interesting workshop also for us as experts. Our research and surveys is not finished yet. Our presentation today was a presentation of the results up to now. But I am sure that in the future at least it is going to continue next fiscal year. So at that time we will be able to present more detailed and deep content. We hope also to be able to hear more information about development of the legal framework from Bhutanese side. Thank you very much.

Karma: Thank you, Doctor (Kamei). I think first of all, of course, I am being going to give a clear vision that now what you want to see. Professor (Ezura) and Mr. (Unno) mentioned the very important point, particularly my colleague has already noted. There may be important comments, Yeshi has probably noted, and try to see whether we can incorporate these things in future documents. And other thing I would like to thank doctor for visiting us and giving us his expert time with us, particularly on this workshop. We had good session today and it is and all thanks to doctor and his team. So, on behalf of the Department of Culture and on behalf, I would like to thank doctor and his team for making this workshop successful. As doctor has mentioned, this is the first part of the exercise, I am sure there is furthermore to come, so first one is successful. Forthcoming, I think it is going to be more and more exciting and going to be insightful. So, we will definitely keep in touch and we will try to collaborate and try to make this project very successful.

And at last, I think it is going to be the Royal Government of Bhutan in particularly and citizens of Bhutan in general. Last but not least, I would like to wish doctor and team a safe journey back home. I hope you have a good travel back home and wish you all the best and see you again and I pray for the good health of Dr. Kamei.

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